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REGION I

RECORD OF DECISION SUMMARY
SALEM ACRES
SALEM, MASSACHUSETTS

MARCH 25, 1993

DECLARATION FOR THE RECORD OF DECISION

SALEM ACRES SITE
SALEM, MASSACHUSETTS
MARCH 25, 1993

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for the Salem Acres Site in Salem, Massachusetts, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Regional Administrator has been delegated the authority to approve this Record of Decision (ROD).

The Commonwealth of Massachusetts has concurred on the selected remedy and on the alternative remedy.

STATEMENT OF BASIS

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 Salem Public Library at 352 Lafayette Street, Salem, Massachusetts and at the Region I Waste Management Division Records Center in Boston, MA. The Administrative Record Index (Appendix F to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in the ROD, may present an imminent and substantial endangerment to human health or public welfare or to the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for the Salem Acres Site, which includes source control components to obtain a comprehensive remedy.

The remedial action for the Salem Acres Site, as described in this ROD, addresses the principal threats to the human health and the environment posed by exposure of humans to contaminated soilsfrom the Salem Acres Site. This remedy addresses all

principal threats to human health and the environment posed by the sources of contamination at the Site resulting from dermal absorption and incidental ingestion of contaminants in surficial soils.

The major components of the selected source control remedy (SC-7B; Soil-Fixation) include:

1. Selection of a permitted landfill for off-site disposal;
2. Treatability studies to determine fixation material and mixing requirements, including bench scale laboratory tests and a field pilot test;
3. Additional soil delineation studies at hazardous waste areas including, but not limited to, Sludge Disposal Areas (DA-1 and DA-2) and Contaminated Soil Areas (SL Areas) to determine cleanup boundaries based upon Site Soil Cleanup Levels;
4. Site preparation, including road construction, security measures, well closure, grading and grubbing activities, and decontamination pad construction;
5. Drainage control measures to protect wetlands and waste areas;
6. Air monitoring and engineering controls for dust, odors, and noise;
7. Existing cap removal and disposal;
8. Removal of lagoon water and treatment (if required);
9. Pretreatment of sludges at DA-1 and DA-2 (if required);
10. Fly ash preparation and mixing;
11. In-situ mixing with fly ash at DA-1 and DA-2;
12. Excavation of treated waste from DA-1 and DA-2;
13. Excavation of untreated waste from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13;
14. Excavation of other soils and sludges above Soil Cleanup Levels based on additional soil delineation studies at the Site;
15. Off-site disposal by truck of DA and SL wastes and other soils and/or sludges above Soil Cleanup Levels at the selected permitted landfill;
16. Other components include groundwater well installation and monitoring for a minimum of five years, Site restoration to previous grade with clean fill and Site vegetation.

The Selected Soil-Fixation Remedy (SC-7B) must satisfy the following three conditions in order to be implemented:

1. Treatability testing by bench tests and pilot scale operation must demonstrate that the fly ash fixation process renders the sludges non-ignitable and non-toxic under RCRA as defined at 40 CFR 261.21 and 261.24 respectively.

2. All waste from the Site can be classified as a "Special Waste" under Massachusetts Solid Waste Regulations 310 CMR 19.00.

3. Treated lagoon sludges from DA-1 and DA-2, and untreated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 can be disposed at a permitted landfill.

Unless all of the above conditions are met, a contingent remedy, Alternative SC-2, RCRA Subtitle C Hazardous Waste Capping will be the selected remedy for the Site. The RCRA Subtitle C Cap will cover, at a minimum, the lagoon areas DA-1 and DA-2 and contaminated soils from the SL Areas and all other contaminated soils and/or sludges that are above the Soil Cleanup Levels. Pending design studies, these soil areas may be consolidated prior to RCRA Capping. Both the preferred remedy and the contingent remedy will address the primary risk at the Site which is direct contact with and ingestion of soils and/or sludges. The major components of the contingent remedy are listed below:

1. Additional soil delineation studies at SL and DA Areas to determine cleanup boundaries based upon Site Cleanup Levels; All contaminated soils on the Site that exceed Site Cleanup Levels will be included in the contingent remedy.
2. Site preparation, including road construction, security measures, well closure, grading, grubbing activities, and decontamination pad construction;
3. Drainage control measures to protect wetlands and waste areas;
4. Air monitoring and engineering controls for dust, odors, and noise;
5. Feasibility study on the use of the existing cap;
6. Soils consolidation to reduce the number of individual RCRA Caps and to increase remedy effectiveness;
7. Existing HDPE cap removal (if required);
8. Treatment of lagoon water and disposal (if required);
9. Construction of RCRA Subtitle C Cap at DA-1, DA-2, and SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 Areas based on results of design study for SL Area consolidation and soil sampling.
10. Construction of concrete retaining walls and barrier walls to protect wetlands and to provide side wall stability;
11. Institutional Controls to preclude use of Capped areas;
12. Fencing and sign posting to preclude access to Capped areas;
13. Groundwater well installation and sampling;
14. Operation and maintenance requirements to assure RCRA Subtitle C Cap integrity;
15. Evaluation of additional controls if groundwater monitoring shows levels that exceed a risk of 1.0×10^{-4} or that exceed ARARS.

DECLARATION

The selected remedy and the alternative remedy are protective of human health and the environment, attain Federal and State requirements that are applicable or relevant and appropriate for this remedial action and are cost-effective. The preferred remedy of Soil-Fixation, SC-7B, satisfies the statutory

preference for remedies that utilize treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances. In addition, this remedy utilizes a permanent Site solution by the requirement for off-site waste disposal after treatment.

The alternative remedy, SC-2, of a RCRA Subtitle C Cap does not provide for treatment of the waste, but the Cap will impede the mobility of the waste through the groundwater by the elimination of infiltration and control the primary risk at the Site associated with Site soils. As this alternative remedy will result in hazardous substances remaining on Site above health-based levels, a review will be conducted at least every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

3/25/93
DATE:

Paul G. Keough
Acting Regional Administrator
U.S. EPA, Region I

SALEM ACRES

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SALEM ACRES ROD DECISION SUMMARY

I. SITE LOCATION

The Salem Acres Superfund Site (the Site) comprises an area of 234 acres and is located approximately one quarter mile west of Route 107 near the Salem and Peabody, Massachusetts Town line as shown in Figure 1. The Site is comprised of lowlands and small wooded hills with an average slope of seven percent. To the north and west, the Site is bordered by wooded land in Peabody and to the south and east by residential housing in Salem. Although there are several debris piles scattered throughout the Site, hazardous substances are confined primarily to the southern 13 acres. This Record of Decision (ROD) covers the entire Site, but focuses on the southern 13 acres.

The southern 13 acres are located on a hilly area with several bedrock outcrops 200 feet from Barcelona Avenue in Salem, Massachusetts. This area is surrounded to the north, east, and west by seven wetlands. These wetlands, designated WA-1 to WA-7, range in size from one to three acres (Figure 2). Additionally, high tension power lines traverse the Site in this southern area in an east-west direction. The main hazardous substances[1] identified to date on the Site are shown in Figure 2 and are briefly described below:

1. Disposal Area (DA) DA-1, an area of 2.4 acres containing 5 unlined sludge lagoons and 8 drums of hazardous substances;

2. DA-2, an area of 2.3 acres containing 3 unlined lagoons;

3. Soil Areas (SL) SL-1, SL-2, and SL-3, a combined area of 2 acres containing contaminated soils from past disposal activities and/or from run-off from the adjacent waste lagoons at DA-1 and DA-2;

4. SL-4, a fly ash pile of 0.6 acres;

5. SL-5, an old landfill of 0.5 acres; and

6. SL-6, SL-12, and SL-13, three debris piles located in the north of the Site.

The lagoons at DA-1 and DA-2 contain approximately 21,300 cubic yards (cu/yds) of hazardous substances and the adjacent SL contain approximately 15,300 cu/yds of hazardous substances. There are also eleven debris piles located in the northern area of the Site which contain general refuse. Several of these

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[1] DA and SL waste areas designations are taken from the Remedial Investigation Report (RI), done by URS Consultants, May 29, 1992.

debris piles also contain hazardous substances. Other structures on the Site include chain link fencing around DA-1 and DA-2 and three separate security gates. These gates and fencing were erected on the Site in 1987 to preclude access to the waste areas. Despite these gates and the fence around the sludge lagoons at DA-1 and DA-2, there has been a history of vandalism and trespassing at the Site.

Densely populated communities are located near the Site (although the Site remains undeveloped). The closest, the Barcelona Avenue neighborhood is located about 200 feet south of the old landfill (SL-5), as shown in Figure 2, and comprises about sixty homes. Approximately 2,600 people reside within a one-mile radius of the Site, which encompasses portions of the cities of Salem, Peabody, Lynn, and the town of Swampscott.

A more complete description of the Site location can be found in the Remedial Investigation Report (RI) in Chapter I (Salem Acres, Remedial Investigation Report, URS Consultants, Cleveland, Ohio; May 29, 1992).

A. Surface Water

In the southern 13 acres, the surface water drainage pattern is complicated by a surface divide that separates the Site into two drainage basins. In general, this divide is found between DA-1 and DA-2. On the west side of the Site (including waste areas DA-1, SL-1, SL-4, and SL-5) drainage is in a westward direction toward a series of on-site wetlands designated WA-1 and WA-2. These wetlands connect and flow northward into the Strongwater Brook drainage basin. This Brook continues to flow north into the North River which eventually empties into Beverly Harbor on the coast of Massachusetts.

The east side of the Site (DA-2, SL-2 and SL-3), drains in an easterly direction toward wetlands WA-4, WA-5, and WA-6. Although there is some flow north from Wetland WA-4, the general flow from these wetlands is southward into the Thompson's Meadow Basin which flows into an unnamed brook along Swampscott Road.

B. Geology/Hydrology

As previously mentioned, the southern 13 acres of the Site where hazardous wastes is concentrated, are located on a hilly portion of land with several bedrock outcrops. Bedrock is overlain by recent marsh deposits and a veneer of glacial till. Overall, the overburden material is quite thin, varying from zero at the numerous bedrock outcrops, to more than 17 feet in the lowland areas adjacent to wetlands. The bedrock underlying these overburden materials exhibits fracturing.

Groundwater at the Site was monitored at seven locations in both overburden and bedrock wells. The shallow overburden, which averages about 9 feet, is discontinuous due to the bedrock outcrops. Moreover, several of the overburden monitoring wells were dry during sampling because of the thin nature of the overburden material. The occurrence of this discontinuous overburden aquifer limits the conclusions which can be drawn concerning the hydraulic gradients at the southern 13 acres of the Site. However, it appears that groundwater flow in the overburden and in the bedrock aquifer follows the same general pattern as the surface water with an east/west divide and a discharge into the surrounding wetlands at WA-1, WA-4, WA-5, and WA-6.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Response History

Beginning in the mid 1940's and ending about 1969, the South Essex Sewerage District (SESD) brought an estimated 38,000 cu/yds of sewage material on the Site under an agreement with a former Site owner, John Grasso. According to the RI, this material contained large quantities of tannery wastes including chromium, fats and grease, and was disposed of in a series of unlined lagoons located in the southern 13 acres of the Site. These lagoons are designated as DA-1 and DA-2 (Figure 3A & 3B). Lime was sometimes added to the waste after it was deposited in the lagoons and gravel was occasionally used as a cover for these wastes.

Historical aerial photographs show that there have been as many as ten lagoons within the DA-1 and DA-2 disposal areas at different times. There are presently eight identified lagoons at the DA areas. Adjacent to the DA areas are SL-1, SL-2, SL-3, SL-4, and SL-5 which contain varying amounts of hazardous substances. In 1969 the Site was sold to Salem Acres Inc. and at that time the agreement that allowed SESD to dump sludge on the Site was terminated.

In the waste lagoons at DA-1 and DA-2, there are approximately 21,300 cu/yds of hazardous waste sludge (hazardous substances) that include high concentrations of chromium, non-carcinogenic polycyclic aromatic hydrocarbons (ncPAH), and carcinogenic PAHs (CPAH). These sludges also contain significant quantities of oily material and xylenes, ignitable and volatile organic compounds (VOC). Based upon tests results in the RI, the wastes at DA-1 and DA-2 are classified as ignitable under the Resource Conservation and Recovery Act (RCRA ignitability is defined at 40 CFR 261.21). Wastes at SL-1, SL-2, and SL-3 contain run-off and other waste from the DA areas, including chromium, lead, and some

CPAH. The Site also contains a fly ash pile (SL-4) and an old landfill (SL-5), approximately 0.6 and 0.5 acres respectively. Both these waste areas contain hazardous compounds which include chromium and CPAH.

EPA conducted two Emergency Removal Actions (ERA) at the Site, one in 1987 and one in 1990. The 1987 removal action (funded by EPA) consisted of lagoon water removal and disposal, capping and slurry wall construction at DA-1 and DA-2, and fence/gate construction to preclude Site access. The capping which remains in place consists of a double layer synthetic liner made of High Density Polyethylene (HDPE). These capped areas are surrounded by a chain link security fence (This chain link fence replaced the original fence that was constructed by SESD at the recommendation of the Massachusetts DEP in 1985). In 1990 a second ERA was conducted by EPA and included drum repacking and storage, posting of new signs, and repair of security gates and monitoring well number 7. SESD carried out most of this work, while EPA repaired the broken gates and installed new locks on October 11, 1990.

The Site is zoned for residential housing, but to date, remains undeveloped. Current land use has been restricted by the security fencing installed during the ERA. However, vandalism of the signs, fences and gates, and Site trespassing with recreational vehicles continues to occur.

B. Enforcement History Contacts with Defendants

Between 1985 and 1992, EPA notified nine Potentially Responsible Parties (PRPs), who either owned or operated the Site, generated wastes that were shipped to the Site, arranged for the disposal of wastes at the Site, or transported wastes to the Site of their potential liability with respect to the Site. The earliest negotiations with the PRPs commenced on December 29, 1986 regarding performance of the Remedial Investigation/Feasibility Study (RI/FS) at the Site. As a result of these negotiations, SESD entered into parallel federal and state Consent Orders for the performance of the RI/FS. The Consent Order with the Commonwealth of Massachusetts was signed on June 11, 1987 and the federal Consent Order was signed on June 15, 1987. SESD, to date, has been the only PRP to work with EPA in conducting Site studies.

On January 28, 1987 the EPA Regional Administrator signed a Superfund lien on the Site which named the Site owners responsible for costs and damages associated with the 1987 ERA at the Site. That lien was filed with the Essex County Recorder of Deeds on January 30, 1987. On June 19, 1987 the EPA Regional Administrator signed a partial release of the lien for one of the

parties. That document was recorded with the Essex County Registry of Deeds on July 1, 1987.

Concerning case litigation, EPA filed a Cost Recovery Action on April 9, 1991 against the following three parties in order to recover costs incurred during the past two ERAs:

1. DiBiase Salem Realty Trust
2. Ugo DiBiase
3. South Essex Sewerage District

III. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been moderate. 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 December of 1987, EPA held an informal meeting at the Old Town Hall in Salem, Massachusetts to inform citizens of the ERA that began in April, 1987. During September 1989, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about activities during remedial activities. EPA published a notice and brief analysis of the Proposed Plan in The Salem News on June 18, 1992. On June 24, 1992, EPA made the administrative record available for public review at EPA's offices in Boston and at the Salem Public Library. Also, on June 24, 1992, EPA held an informational meeting at the Old Town Hall in Salem to discuss the results of the RI and the cleanup alternatives presented in the Feasibility Study (FS) and to present the Agency's Proposed Plan. During this meeting, the Agency answered numerous questions from the public concerning Site hazards.

From June 25, 1992 to July 25, 1992, the Agency held a 30-day public comment period to accept public comment on the alternatives presented in the FS and the Proposed Plan and on any other documents previously released to the public. On July 15, 1992, the Agency held a public meeting at the Old Town Hall in Salem to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in the attached Responsiveness Summary (see attachment A).

Following is a summary list of the Community Relations Activities at the Site:

1. December 1987 - EPA held an informal meeting at the Salem Town Hall to address the ERA that began in April 1987

2. September 1989 - EPA completed the development of a Community Relations Plan for the Site.

3. May 1990 - EPA issued a fact sheet which provided an overview of the RI Study.

4. February 1992 - Massachusetts Department of Environmental Protection (DEP) and Massachusetts Department of Public Health held a public meeting to update the community on the Site Health Assessment. EPA participated in this meeting and presented a summary of the RI.

5. June 1992 - EPA announced the preferred remedial alternative for the cleanup of the Site by issuing a Proposed Plan. Copies of the Proposed Plan were mailed to all parties included on the Site mailing list.

6. June 1992 - On June 24 a public informational meeting was held to present and discuss the results of the RI/FS and to present EPA's Proposed Plan.

7. June 1992 - On June 25 the Proposed Plan public comment period opened.

8. July 1992 - Additional copies of the Proposed Plan were mailed to 169 local residents who live near the Site and who were not on the original mailing list.

9. July 1992 - On July 15 a public hearing was held at which EPA accepted oral comments on the Proposed Plan.

10. July 1992 - On July 25 the public comment period closed.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by combining components of different alternatives to obtain a comprehensive approach for Site remediation. Because groundwater at the Site and adjacent wetlands demonstrate only minor contamination (within the acceptable risk established by EPA of 1×10^{-4} to 1×10^{-6} based upon average concentrations of contaminants), the selected remedy was developed for source control only. In summary, the selected remedy, Alternative SC-7B, involves the in-situ (in-place) treatment of lagoon sludges at DA-1, DA-2, with fly ash, followed by the excavation of the treated sludge and soil and excavation of other untreated contaminated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 for removal to an off-site permitted landfill. All contaminated Site soils and sludges above the Soil Cleanup Levels (see Section X.A.) will be remediated as part of

the remedy. The selected remedy includes the following components:

1. Permitted landfill selection for off-site disposal;
2. Treatability studies to determine fixation material and mixing requirements, including bench scale laboratory tests and a field pilot test;
3. Additional soil delineation studies at hazardous waste areas including, but not limited to, DA and SL areas to determine cleanup boundaries based upon Site Soil Cleanup Levels;
4. Site preparation, including road construction, security measures, well closure, grading and grubbing activities, and decontamination pad construction;
5. Drainage control measures to protect wetlands and waste areas;
6. Air monitoring and engineering controls for dust, odors, and noise;
7. Existing cap removal and disposal;
8. Removal of lagoon water and treatment (if required);
9. Pretreatment of sludges at DA-1 and DA-2 (if required);
10. Fly ash preparation and mixing;
11. In-situ mixing with fly ash at DA-1 and DA-2;
12. Excavation of treated waste from DA-1 and DA-2
13. Excavation of untreated waste from SL-3, SL-4, and SL-5; SL-6, SL-12, and SL-13;
14. Excavation of other soils and sludges above Soil Cleanup Levels based on additional soil delineation studies at the Site;
15. Off-site disposal by truck of DA and SL wastes and other soils and/or sludges above Soil Cleanup Levels at the selected permitted landfill;
16. Other components include groundwater well installation and monitoring for a minimum of five years, regrading Site with clean fill and revegetation.

The Selected Remedy, Alternative SC-7B, must satisfy three conditions in order to be implemented:

1. Treatability testing by bench tests and pilot scale operation must demonstrate that the fly ash fixation process renders the sludges non-ignitable and non-toxic under RCRA as defined at 40 CFR 261.21 and 261.24 respectively.

2. All waste from the Site can be classified as a "Special Waste" under Massachusetts Solid Waste Regulations 310 CMR 19.00.

3. Treated lagoon sludges from DA-1 and DA-2, and untreated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13[2] can be disposed at a permitted landfill.

Unless all of the above conditions are met, a contingent remedy, Alternative SC-2, RCRA Subtitle C Hazardous Waste Capping (hereinafter, any reference to a RCRA Cap or RCRA Capping shall mean a RCRA Subtitle C Cap) will be the selected remedy for the Site. The RCRA Subtitle C Cap will cover, at a minimum, the lagoon areas DA-1 and DA-2 and contaminated soils from SL-3, SL-4, SL-5, SL-6, SL-12, SL-13 and all other contaminated soils and/or sludges that are above the Soil Cleanup Levels. Pending design studies, these soil areas may be consolidated prior to RCRA Capping. Both the preferred remedy and the contingent remedy will address the primary risk at the Site which is direct contact with and ingestion of soils and/or sludges. The major components of the contingent remedy are listed below:

1. Additional soil delineation studies at SL and DA Areas to determine cleanup boundaries based upon Site Cleanup Levels; All contaminated soils on the Site that exceed Site Cleanup Levels will be included in the contingent remedy.
2. Site preparation, including road construction, security measures, well closure, grading and grubbing activities, decontamination pad construction;
3. Drainage control measures to protect wetlands and waste areas;
4. Air monitoring and engineering controls for dust, odors, and noise;
5. Feasibility study on the use of the existing cap;
6. Soils consolidation to reduce the number of individual RCRA Caps and to increase remedy effectiveness;
7. Existing HDPE cap removal (if required);
8. Treatment of lagoon water and disposal (if required);
9. Construction of RCRA Subtitle C Cap at DA-1, DA-2, and SL Areas based on results of design study for SL Area consolidation and soil sampling at areas SL-1 through SL-5;
10. Construction of concrete retaining walls and barrier walls to protect wetlands and to provide side wall stability;
11. Institutional Controls to preclude use of Capped areas;
12. Fencing and sign posting to preclude access to Capped areas;
13. Groundwater well installation and sampling;
14. Operation and maintenance requirements to assure RCRA Subtitle C Cap integrity;

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[2] The SL wastes will have to undergo testing to demonstrate that they are non-ignitable and non-toxic under RCRA as defined at 40 CFR 261.21 and 261.24.

15. Evaluation of additional controls if groundwater monitoring shows levels that exceed a risk of 1.0×10^{-4} or exceed ARARS.

This contingent remedy is based upon source control and was developed after an analysis of Site risks and the fact that off-site migration of contaminants is within EPA acceptable risk range of 1×10^{-4} to 1×10^{-6} ; based upon average levels of contaminants (See Chapter X of this ROD for a comprehensive description of the selected and contingent remedies).

V. SUMMARY OF SITE CHARACTERISTICS

A summary of Site contamination is provided below; however, a more detailed analysis of the nature and extent of contamination on the Site is found in Chapter IV of the RI. The RI included numerous samples in the soils, sludges, and groundwater at the Site as well as sampling and analyses in the adjacent wetlands for surface water, sediment, and biological organisms. Air sampling was conducted at six locations both on and off the Site to determine the health risk to the public.

Results of the nature and extent of hazardous substances indicate that contamination is primarily concentrated in the southern 13 acres of the Site. Hazardous substances at this area are found in the sludge lagoons at DA-1 and DA-2, contiguous soil area SL-3, a fly ash pile at SL-4, and at an old landfill designated SL-5 (Figure 2). Two additional areas, SL-1 and SL-2, are located adjacent to the DA disposal areas and contain superficial contamination from DA area runoff. Additionally, there are eleven debris piles (SL-6 through SL-16) that are located throughout the northern part of the Site (Figure 2).

Contaminant analyses of Site groundwater, wetland sediments, surface waters, biota, and air indicate that, on an average, contamination does not migrate in concentrations that represent a risk greater than 1×10^{-4}. Contamination at the Site is found primarily at the DA lagoon and SL areas. Figure 3 provides a location map of the soils, surface water, sediments, and groundwater sampled on and off-site, excluding the DA lagoon areas which are shown in Figure 4. Significant hazardous compounds identified at the Site include the following:

1. Heavy Metals, including lead (Pb), arsenic (As), chromium (Cr);
2. Volatile Organics (VOC), including xylenes and ethylbenzene;
3. Carcinogenic Polynuclear Aromatic Hydrocarbons (CPAH);
4. Non-Carcinogenic Polynuclear Aromatic Hydrocarbons (ncpah);
5. Poly-chlorinated Biphenols (PCBs);
6. Dioxins/Furans.

The significant findings of the RI are summarized below:

A. Soil

1. DA-1 Contamination

This is a 2.3 acre disposal area with an estimated 11,700 cu/yds of hazardous soil and sludge in at least five identifiable lagoons (figure 4). Sludge in these lagoons has an average depth of 7.5 feet and lies on the bedrock. The number and boundaries of lagoons within DA-1 has changed during the active life of Site disposal. Table 1 provides a summary of the data at the DA-1 lagoons. The sludge contaminants occurring within DA-1 lagoons appear to be randomly distributed - there are no apparent lateral or vertical trends within any of the lagoons, nor is there any indication of contaminant stratification or segregation by compound or class. Sludge materials throughout the five lagoons in DA-1 vary considerably in terms of observable physical properties (e.g., color, texture), and chemical constituents. A double layer HDPE liner presently caps these lagoons and a fence surrounds each DA area as a result of the ERA action taken by EPA in 1987.

The results of analyses obtained during the RI indicate that the sludge from the DA-1 lagoons contains petroleum hydrocarbons, semi-volatile, volatile substances, PCBs, and metals. Among the approximately twenty DA-1 sludge samples obtained, the concentration of total VOCs averaged 654 ppm (mg/kg), with a maximum value of 1,170 ppm. This is largely due to the presence of xylenes, highly ignitable compounds. The wastes in the five lagoons are classified as RCRA ignitable under 40 CFR 261.21.

Semi-volatile organic compounds (SVOCs) detected in DA-1 consist almost entirely of non-carcinogenic polynuclear aromatic hydrocarbons (ncPAH). The average and maximum concentrations of ncPAHs in DA-1 were 1,320 ppm and 3,600 ppm, respectively. The specific ncPAH compounds which were detected most frequently were naphthalene and 2-methylnaphthalene. CPAHs were not found in DA-1 lagoons and this is possibly due to the high detection limits. However, the presence of CPAH in DA-1 at concentrations lower than the detection limits cannot be ruled out.

PCBs (Aroclor 1254) were detected in 2 of 19 sludge samples from DA-1, in the low ppm range; the highest concentration of these samples (from Lagoon 1B) was 6.4 ppm. Dioxins were found in all five lagoons. The average concentration of dioxin was 4 ppb while the maximum was 8.4 ppb. The dioxin found in the lagoons has been treated as the toxic form of 2,3,7,8-TCDD to be as conservative as possible in the analysis of the Site risk.

Chromium is found in all five lagoons at concentrations within the range of 329 ppm to 1,780 ppm. Of 20 samples in DA-1, there are a total of 5 values above 900 ppm. The presence of this metal is indicative of the tannery wastes that were included in the sludges brought to the Site by SESD. No other metals are detected above Soil Cleanup Levels although arsenic and lead appear to be elevated (above non-contaminated areas sampled on the Site) and are detected at maximum values of 30 ppm and 236 ppm respectively.

2. DA-2 Contamination

This 2.3 acre disposal area is located 20 feet east of DA-1 and has three identifiable lagoons that were used for the disposal of liquid and semi-solid sludges. The lagoons, which contain an estimated 9,600 cubic yards of sludge, have an average depth of 6.5 feet. Table 2 provides a summary of the data at DA-2. As in DA-1, the lagoons in DA-2 are unlined and the sludge lies on top of bedrock. In general, the waste characteristics of DA-2 are similar to those of DA-1. There appears to be no clear spatial or vertical trends to the contamination within individual lagoons, nor is there any clearly definable differences among the three lagoons.

Similarities between DA-1 and DA-2 include samples with occasional high total VOC concentrations (maximum of 1,090 ppm), widespread occurrence and high concentration of ncPAHs, occasional PCBs below 6.0 ppm and dioxin at values above 1.0 ppb. There is also widespread occurrence and high concentration of total chromium, and a high organic content and associated ignitability of the waste. The three lagoons at DA-2 were capped individually with a double HDPE liner and fenced during the 1987 ERA. The chemical nature of the DA-2 waste is summarized below:

VOCs in the DA-2 lagoons have occasional high concentrations up to 1,090 ppm and the majority of the VOC is due to the highly ignitable compound xylene. The presence of xylene and additional presence of other ignitable organic compounds (oil and greases), as in DA-1, result in a waste that is classified as RCRA ignitable (40 CFR 261.21). The majority of semi-VOCs in DA-2 lagoons are made up mostly ncPAH compounds which are similar in nature to DA-1 compounds. In DA-2, however, CPAH were detected in two samples with a maximum concentration of 110 ppm. These compounds were not detected in DA-1, but because of the high detection levels in samples at DA-1 and because of the other similarities in chemical compounds between DA-1 and DA-2, the presence of CPAH at DA-1 is suspected at concentrations in the 10 to 100 ppm range.

PCB's are found in the majority of samples with a maximum concentration of 5.5 ppb. Dioxins are also present throughout the DA-2 lagoons. The maximum concentration of dioxins is 2.1 ppb. As in DA-1, the dioxin is treated as the most toxic species to be as conservative as possible in the analysis of Site risk.

Chromium (Cr) is found throughout the DA-2 lagoons with a maximum concentration of 3,440 ppm. Arsenic (As) and beryllium (Be) were not found in any of the samples, while lead (Pb) was found at a maximum value of 269 ppm.

3. Soil Areas

Five separate areas at the Site, located adjacent to or near the sludge disposal areas DA-1 and DA-2, have been identified as locations where past on-site waste disposal activities have resulted in soil contamination. The main COC in the SL soil areas are the CPAHs and elevated levels of metals. The table below summarizes the data and gives maximum values on the soil areas (see also Tables 3 through 7).

DATA ON SOILS FROM AREAS SL-1 THROUGH SL-5

AREA	CPAH	PCB	CR	Pb	Be
	UNITS ARE MG/Kg-Maximum Concentrations				
SL-1	5.17*	nd	18	152	0.6*
SL-2	6.7*	nd	20	327	0.8*
SL-3	10*	.3	1,870*	160	1.3*
SL-4	41*	nd	5,210*	3,220*	4.7*
SL-5	3,800*	nd	1,850*	3,240*	1.3*

nd - none determined
*** exceeds Soil Cleanup Levels (see Section X.A.)**

The areas designated SL-1 through SL-16 are discussed below:

(a) SL-1 and SL-2

Historical aerial photography indicates that waste disposal pits were not built at these locations and suggests that contamination is the result of past soil/sludge migration from DA-1 and DA-2 via surface drainage. Carcinogenic PAHs were detected in these areas with an average of 2.2 ppm and a maximum of 6.7 ppm. The contaminant exceeding Cleanup Levels is beryllium, which occurred

at concentrations ranging from 0.18 ppm to 0.80 ppm. Lead is found at a maximum concentration of 327 ppm and although below the Cleanup Levels, is a concern. This level is considered "elevated" above the background and may mean that lead levels above the Cleanup Level could be present. Tables 3 and 4 summarize the data on SL-1 and SL-2.

(b) SL-3

Relative to SL-1 and SL-2, high levels of contamination were encountered at the SL-3 area. These samples exhibited the physical characteristics and many of the chemical properties of the sludge within DA-1 and DA-2. These similarities include the presence of carcinogenic and non-carcinogenic PAHs, PCBs and high levels of chromium (Tables 3 through 7). Historical aerial photographs suggest that the DA-2 lagoon once extended into the SL-3 area and that the material of SL-3 is actually lagoon sludge. CPAH are found at levels up to 10.0 ppm and chromium is found at a maximum of 1,870 ppm. Further sampling in areas SL-1, SL-2, and SL-3 will be required during the design phase in order to delineate the extent of contamination. Table 5 summarizes the data on SL-3.

(c) SL-4 - Fly Ash Pile

This area is commonly referred to as the fly ash pile, an apparent reference to the former disposal of fly ash at this location. The fly ash pile is next to the old landfill and is located about 300 feet north of the Barcelona Avenue neighborhood. The total quantity of wastes in this 0.6 acre fly ash pile is estimated to be 9,600 cubic yards. Although the dominant chemical contaminants within this area are metals, (including arsenic, 124 ppm maximum; and chromium, 5,210 ppm maximum) there are other contaminants including CPAHs which occur at a maximum value of 41 ppm. Table 6 summarizes the data on SL-4.

(d) SL-5 - Old Landfill

This area is commonly referred to as the "old landfill" and it contains metal, wood, glass, brick, and miscellaneous debris in addition to contaminated soil. There is an estimated 3,600 cubic yards of general refuse disposed of in an area of 0.5 acres in SL-5. Although the primary physical form of contamination is general refuse, this area contains the highest levels of CPAH contamination found on the Site. CPAHs are found at concentrations that average 540 ppm with a maximum value of 3,800 ppm. The metals chromium, beryllium and lead are also elevated. The average concentration of chromium is 538 ppm and the maximum value is 1,850. Beryllium is found at average concentrations of

1.0 ppm with a maximum value of 1.3 ppm. Lead is found at an average of 1,140 ppm with a maximum value of 3,240 ppm. Table 7 summarizes the data on SL-5.

(e) Debris Piles SL-6 to SL-16

There are a series of 11 debris piles (SL-6 to SL-16) scattered north of DA-1 and DA-2 that contain a variety of trash and household waste in addition to demolition debris containing gravel, wood and masonry. The nearest of these piles is 200 feet from the DA areas while other piles SL-12 and 13 are 1/4 mile away. These piles were sampled for hazardous waste constituents including metals, PAHs and semi-volatile analytes, volatile compounds and PCBs. The metals, arsenic, chromium, and lead are detected at concentrations well below the Soil Cleanup Levels. Arsenic is present at average and maximum concentrations of 3.3 and 5.4 ppm, respectively. Chromium is present at average and maximum concentrations of 25 and 108 ppm respectively, while lead is found at average and maximum concentrations of 42 and 97 ppm respectively. Some low level PCB contamination (below 8.0 ppm, but above Soil Cleanup Levels), is detected at SL-6, SL-12 and SL-13. The debris piles do not appear to be related to the sludge disposal areas and soil areas and may constitute a separate disposal scenario. However, the debris piles at SL-6, SL-12 and SL-13 contain soil contamination above the Soil Cleanup Levels and are included in the Site remedy.

B. Ground Water

Twelve monitoring wells were installed at the Site in both bedrock and the overburden during the RI. Quarterly sampling and analyses were performed at these locations. Samples were analyzed for metals, PCB's, volatile and semi-volatile organics and pesticides. Analyses of samples collected from these wells indicate that the groundwater on site contains only trace levels of VOCs, SVOCs, and some metals. The most significant Contaminants of Concern (COC) found in the groundwater include the metals arsenic, antimony and manganese and the VOC benzene and 1,4 dichlorobenzene. All groundwater levels for these compounds, except antimony, are below the Maximum Contaminant Levels (MCLs), which are the EPA standards established for maintaining safe drinking water quality. For antimony, three samples out of a total of twenty-seven samples, exceeded the MCL. Table 9 summarizes the data on groundwater.

Three off-site residential wells were sampled for both organics and metals. With the exception of a trace concentration of chloroform in one drinking water well (not attributable to Site contamination), water from the three residential wells sampled

during the RI did not contain any levels of organic or metal contamination above trace levels.

C. Wetlands

1. Surface Water

There are 7 distinct wetland areas on the Site that range in size from 1 to 3 acres (WA-1 through WA-7). Surface water was collected at 16 locations on two separate sampling events at all wetland areas and analyzed for VOC, SVOC, pesticides, PCBs, and metals. Of a total of 32 samples collected from the 16 locations, only one sample contained organic contaminants at detectable levels. In this sample xylene is found at a concentration of 3.3 ppb, and 1,2-dichloroethane is recorded at a concentration of 1.7 ppb. Table 10 summarizes the data on surface water.

2. Sediments

Sediment samples were collected at 42 locations in Wetlands WA-1 to WA-7. Samples were analyzed for pesticides, SVOC, PCB, and metals. Analyses of these samples revealed generally trace levels of several metals and semi-volatile organic compounds. No pesticides or PCBs were detected in any of these sediment samples. Among the semi-volatile compounds, most of those detected were polynuclear aromatic hydrocarbons (PAHs) with an average total concentration of 6.1 ppm. Maximum CPAH in the sediments are recorded at 4.2 ppm. Table 11 summarizes the data on sediments.

3. Wetlands Biota

The WA-1 to WA-7 wetlands at the Site (Figure 2) were evaluated to determine the impact of Site contaminants upon wetland ecology. As part of this evaluation, the wetlands were classified and mapped using a combination of stereo aerial photograph analysis and field validation. Vegetation types were identified and evaluated and a bird survey was performed. Fish were captured and investigated (both visually and by laboratory tissue analysis) and benthic macroinvertebrates were sampled and evaluated. Acute bioassay tests were performed on several test organisms using sediment and surface water taken from the adjacent Site wetlands WA-1 and WA-4. The results of this wetlands ecological assessment may be briefly summarized as follows:

- There were no signs of chemically induced stress on wetlands vegetation.

- There was no evidence of contaminant-related impacts to the bird population.
- There was no evidence of lesions or tumors in captured fish.
- Benthic macroinvertebrate samples and resulting species indices were indicative of poor water quality. The poor water quality is attributed to the shallow and senescent aspect of the wetlands.
- All bioassay samples were non-toxic to daphnids and fathead minnows, with 100 percent survival after 48 hours of exposure. All Microtox test results were negative.

Based upon the above and the fact that wetland sampling of sediments and surface water through out WA-1 to WA-7 show only trace level contamination, contamination at the Site has not migrated into contiguous wetlands at concentrations that affect the wetlands ecology or that have a human health significance.

D. Air

Air sampling was conducted at six locations on and off the Site to determine the health risk to the public. Sampling occurred twice, during the spring and late summer of 1989, in order to assess contamination at times when dust is least and most likely to be generated. The samples were analyzed for PCBs and metals. PCBs were not detected during either sampling event and only a few samples contained trace levels of metals. Additionally, air sampling by EPA for volatile organics using portable equipment at various locations throughout the Site during June 1990 failed to demonstrate the presence of volatile organic air contamination.

VI. SUMMARY OF SITE RISKS

URS Consultants (consultants to SESD) together with input and oversight from EPA conducted a Risk Assessment (RA) to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site. The public health risk assessment 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 assessment, which considered the types and magnitude of adverse health 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. The results of the RA for the Site are discussed below.

Three semi-volatile organic compounds: PAHs, PCBs and dioxins/furans; and four metals: lead, chromium, arsenic and beryllium are identified in the RA as COC in soils/sludge, surface water, sediment and fish and were selected for evaluation in the RA. In addition, two pesticides (DDD and DDE) were evaluated in the fish ingestion pathway and two volatile compounds (1,4 dichlorobenzene and benzene) and two metals (antimony and manganese) were evaluated for the groundwater ingestion pathway. These COC represent potential Site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the COC can be found in Volume I of the RA, General Toxicity Profiles.

Potential human health effects associated with exposure to the COC in the RA are estimated quantitatively through the development of several hypothetical exposure pathways. These pathways reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. Present risk is based upon occasional Site use by trespassers. Future potential risk at the Site is based upon a residential use scenario. The Site is zoned for residential housing and the owners have proposed to develop the Site for single family dwellings. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in Volume I, Section IV of the RA. It is significant to note that the risk associated with the current use by trespassers is much less than the future potential risk associated with residential development and is due to the frequency of exposure.

Potential human health effects associated with exposure to the COC in the RA are estimated quantitatively through the development of the following hypothetical exposure pathways:

- Ingestion of groundwater
- Ingestion of soils/sludge
- Dermal contact with soils/sludge
- Ingestion of fish
- Ingestion of surface water
- Dermal contact with surface water
- Ingestion of sediment
- Dermal contact with sediment
- Inhalation of dust (qualitative assessment only)

A. Exposure Pathways

1. Groundwater

Currently groundwater is not being used. Therefore, the RA includes only future use of the groundwater as a drinking water supply and as a potential exposure pathway. A daily frequency and 70-year duration (lifetime) of consuming 2 liters of water were assumed to assess risks from exposure to carcinogenic and non-carcinogenic compounds. Exposure to children (age 2) is also assessed in the RA for non-carcinogens based on a daily frequency and one-year duration.

2. Soils/Sludge

The RA includes both present and future use exposures evaluations for soils and sludge. The present use exposure scenario was based on the assumption that nearby residents may use the Site for recreational activities and may be exposed as a result of direct contact with soil/sludge and subsequent incidental ingestion and dermal absorption. Exposure may also occur via inhalation of airborne particulates from the contaminated surface soils. The RA is based on the assumptions that recreational use may occur at a frequency of 2 days per week for 40 weeks per year over a 70 year lifetime for carcinogenic and non-carcinogenic compounds. Exposure to children aged 6 to 16 was evaluated for non-carcinogenic compounds based on the same frequency and a one-year exposure duration.

The future exposure scenario was based on residential use of the Site. A frequency of 100 days per year over a lifetime was assumed for assessing all compounds. A frequency of 150 days per year and duration of one year was assumed to assess childhood (age 2) exposure to non-carcinogenic compounds. Exposure via ingestion, dermal contact and inhalation were evaluated.

3. Fish Ingestion

Both present and future potential fish ingestion exposures were evaluated. Lifetime exposure was evaluated for carcinogenic and non-carcinogenic compounds assuming that 10% of an average daily fish consumption is from fish caught in the Site wetlands. A childhood exposure for children aged 6 to 16 was evaluated for non-carcinogenic compounds. The future exposure was based on the same assumptions with the exception of increasing the percent of the average daily fish consumption from the Site from 10% to 20%. This exposure scenarios considered to be very conservative because the fish in wetlands WA-1 and WA-4 are small, under 5 inches in length, and thus are unlikely to be used as a constant food supply.

4. Surface Water

Both present and future potential exposures via incidental ingestion of surface water while swimming were evaluated. The present Site use was assumed to be recreational. Risks from exposure to carcinogenic and non-carcinogenic compounds for the present use exposure scenario were based on a swimming frequency of 40 days per year and a duration of 70 years (lifetime). Risks from exposure to non-carcinogenic compounds were also evaluated for children (aged 6 to 16) based on the same frequency and a duration of one year. The future Site use was assumed to be residential. The exposure assumptions were the same as the present use scenario with the exception of increasing the frequency from 40 days to 50 days per year.

5. Sediment

Both present and future potential exposures via ingestion of and dermal contact with sediment were evaluated. The frequency and duration of exposure to sediment is the same as for the surface water scenario. For each pathway evaluated, an average and a reasonable maximum exposure estimate was generated corresponding to exposure to the average and the maximum concentration detected in that particular medium.

B. Summary of Baseline Risk Assessment

The excess lifetime cancer risks are determined for each exposure pathway by multiplying the exposure level with the chemical specific cancer potency factor. EPA developed cancer potency factors 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 very 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 individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of Site-related exposure to the compound at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

EPA also calculated the hazard index for each pathway as a measure of the potential for non-carcinogenic health effects. The hazard index is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects. Reference doses have been developed by EPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely

to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The hazard index is often expressed as a single value (e.g. 0.3) indicating the ratio of the stated exposure as defined to the reference dose value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard index is only considered additive for compounds that have the same or similar toxic endpoints (for example: the hazard index for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

Table 8 depicts the present and future carcinogenic and non-carcinogenic risk summary for the COC in soils and sludge. The Summary for groundwater, surface water, sediment, and fish consumption data can be found in the Health Risk Assessment Report dated May 29, 1992. Each medium is evaluated to reflect present and potential future risks corresponding to the average and the reasonable maximum exposure scenarios.

1. Groundwater

The average and reasonable worst case risks associated with the future potential ingestion of drinking water are 8.5×10^{-5} and 2.6×10^{-4}, respectively. Arsenic, antimony and manganese comprise the majority of the risk. The average and maximum Hazard Indices associated with antimony are 4.6 and 12, with manganese are 0.5 and 1.1 and with arsenic are 0.5 and 1.6 respectively. Antimony and manganese may cause damage to blood and the central nervous system, respectively.

2. Soils/Sludge

Exposure to soils and sludge in Lagoons DA-1, DA-2, and areas SL-3, SL-4, and SL-5 under the future residential use scenario are associated with the greatest significant risk to human health at this Site. Risks associated with future use are summarized below.

a. Lagoons at DA-1

The average and reasonable worst case risks are 8.7×10^{-4} and 1.7×10^{-3}. Arsenic and dioxin/furans comprised the majority of the risk. The average and maximum Hazard Quotients for chromium are 1.1 and 2.9.

b. Lagoons at DA-2

The average and reasonable worst case risks are 2.2×10^{-3} and 4.9×10^{-3}. Carcinogenic PAHs and dioxin/furans comprised the majority of the risk. The average and maximum Hazard Quotients associated with chromium are 1.7 and 5.6.

c. SL-1

The average and reasonable worst case risks are 1.55×10^{-6} and 1.72×10^{-6}. Carcinogenic PAHs comprise the majority of the risk. The Hazard Quotient is below one.

d. SL-2

The average and reasonable worst case risks are 1.5×10^{-5} and 3.2×10^{-5}. Carcinogenic PAHs comprise the majority of the risk. The Hazard Quotient is below one.

e. SL-3

The average and reasonable worst case risks are 4.7×10^{-4} and 7.3×10^{-5}. (The average risk is higher than the reasonable worst case risk because an artificial value of one half the detection level for samples with "non-detects" was used in calculating the average concentration, and in some cases, the detection limits were very high.) CPAHs comprise the majority of the risk. The average and maximum Hazard Quotients are 0.96 and 3.1 for chromium.

f. SL-4

The average and reasonable worst case risks are 6.6×10^{-5} and 3.3×10^{-4}. CPAHs and arsenic comprise the majority of the risk. The average and maximum Hazard Quotients are 2.2 and 8.5 for chromium.

g. SL-5

The average and reasonable worst case risks are 3.0×10^{-3} and 2.1×10^{-3}. CPAHs comprise the majority of the risk. The average and maximum Hazard Quotients are 0.88 and 3.0 for chromium.

h. Debris Piles

Most of the debris piles contained levels of contaminants which do not exceed the Soil Cleanup Levels. However, three areas, SL-6, SL-12, and SL-13 contain PCBs that are above Soil Cleanup Levels and are included in the remedy.

3. Fish Ingestion

The average and worst case risks associated with potential exposure via fish ingestion are 1.5×10^{-5} and 2.3×10^{-5}.

4. Surface Water

Based upon the available data, carcinogenic compounds are not detected in surface water and the Hazard Quotient for exposure to surface water is insignificant and less than 1.

5. Sediment

The average and reasonable worst case risks are 4.6×10^{-6} and 1.2×10^{-5}. CPAHs comprise the majority of the risk.

C. Remedial Implications

The baseline health risks calculated in this assessment have several important implications concerning the need for, and extent of, remedial action at the Site. These may be briefly summarized as follows:

Remediation of the wetlands sediments, surface waters, and groundwater at the Site is not warranted since risk associated with these areas (with one exception) is within the acceptable range of 1.0×10^{-4} to 1.0×10^{-6}. The exception is arsenic in groundwater for the maximum values only; the calculated maximum risk for arsenic is 2.6×10^{-4}. The maximum Site groundwater concentration for arsenic was recorded at 4.9 ppb which is well below the drinking water MCL of 50.0 ppb. Moreover, the future remediation of the Site, should reduce risk from arsenic to within the accepted risk range of 1.0×10^{-4}. Thus the major risks posed by the COC are from contact/ingestion with Site soils and sludges from the following waste areas on the Site:

1. SL-5 (old landfill)
2. SL-4 (ash pile)
3. DA-2 (sludge lagoons)
4. DA-1 (sludge lagoons)
5. SL-3 (suspected sludge lagoon)
6. SL-6, SL-12, and SL-13 (debris piles)

At a minimum, remediation of these soil and sludge waste areas will be required because they are outside the accepted risk range. The soil areas at SL-1 and SL-2 have a slightly elevated risk. These areas will have to be further delineated in a Soil Delineation Study to confirm the levels determined during the RI.

Any part of the Site confirmed to contain contaminants above the Soil Cleanup Levels, shall be included in the remedy.

In addition, there are two areas in wetland WA-1, which is west and adjacent to DA-1, that show slightly elevated levels of contaminants when compared to acceptable levels for "Aquatic Water Quality Criteria". These areas will be further evaluated in the design phase to confirm the area of contamination. It is not anticipated that these areas will require remediation. However, the presence of contaminants in sediments that result in a health risk greater than 1.0×10^{-4} or excessive ecological threat, to be determined by EPA in consultation with other Federal and State Agencies, will trigger these sediments for inclusion in the Remedy.

In summary, EPA has determined that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. The RA identified the waste areas DA-1, DA-2, SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 as posing health risks exceeding EPA risk management criteria. Therefore, these waste areas have been targeted as the focus of the remedial actions in this ROD. The areal extent of remediation at these areas will be based upon further waste delineation done during the design study. **All areas of the Site that are found to contain contaminants above the Soil Cleanup Levels shall be included in the remedy.**

VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

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

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. These response objectives were:

1. To prevent the ingestion of and direct contact with soils and sludges having a cancer risk greater than 1×10^{-4} and/or precluding contact with non-carcinogenic compounds with a toxic risk above a reference dose of 1;

2. To prevent ingestion of water with a cancer risk greater than 1×10^{-4} or ingestion of water with a reference dose greater than 1;

3. To prevent the migration of contaminants from the Site that would result in contamination of adjacent soils and wetland sediments with concentrations above Soil Cleanup Levels listed in Section X.A; and

4. To preclude the inhalation of carcinogenic and toxic compounds from contaminated dusts on the Site.

B. Technology and Alternative Development and Screening

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

With respect to source control, the Feasibility Study (FS) developed a range of alternatives in which treatment that reduces the toxicity, volume and mobility of the hazardous substances is a principal element. This range included an alternative for off-site disposal that removes the 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.

This alternative screening is based on the fact that contaminated soils and sludges are the only threats to public health and the environment at the Site. Groundwater and wetlands are not

included in the screening since contamination in these areas is not a threat to public health or the environment.

As described in Chapter 2 of the Feasibility Study (FS), the FS identified, assessed and screened technologies for source control based on implementability, effectiveness, and cost. Chapter 3 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 4 of the FS.

In summary, of the 15 source control remedial alternatives screened in Chapter 3 of the FS, nine alternatives were retained for detailed analysis. The nine alternatives that were retained through the screening process, as well as those that were eliminated from further consideration are listed below in Section VIII.A.

VIII. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each alternative evaluated. A detailed narrative assessment of each alternative can be found in Chapter IV table 4-12 of the Feasibility Study.

A. Source Control (SC) Alternatives Analyzed

The below list of source control alternatives includes those that were eliminated from further consideration (SC-8 TO SC-13) as well as those that were analyzed for detailed evaluation (SC-1 through SC-7B):

SC-1. No Action
SC-2. RCRA Subtitle C Capping
SC-3. Incineration with Stabilization
SC-4. Thermal Desorption/Dechlorination/Stabilization
SC-5. Solvent Extraction/Stabilization
SC-6. In-Situ Vitrification
SC-7. Immobilization
SC-7A. Immobilization with Off-Site Disposal
SC-7B. Sludge Fixation with Off-Site Disposal
SC-8. Subsurface Isolation
SC-9. In-Situ Steam/Hot Air Stripping
SC-10. Soil Washing/Soil Flushing
SC-11. In-Situ Vacuum Extraction
SC-12. Biological Treatment
SC-13. Off-Site Removal to RCRA Landfill

1. Alternative SC-1: No Action

Alternative SC-1 was evaluated in detail in the FS to serve as a baseline for comparison with the other remedial alternatives under consideration. Under this Alternative, no action would be taken except for long-term monitoring of groundwater. No treatment or containment of contaminated media would be conducted and no effort, other than current fencing, would be made to restrict Site access. Although DA-1 and DA-2 are capped and fenced, exposure to contaminated soil around these sludge lagoons and at areas SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 would continue to cause potential health risk to recreational Site users under existing land use conditions, and to on-Site residents under possible future land use conditions. In addition, although the present impact of the untreated and uncontained soil contaminants does not warrant remediation of the groundwater and wetland environment, the potential for release of contaminants would remain.

Because contaminants would remain in place, the area would be monitored periodically, to determine contaminant concentrations over time and to trace the extent of possible contaminant migration. After five years, Site conditions would be evaluated to determine whether cleanup activities would be required. Quarterly Site inspections and monitoring would be conducted for the first two years and semi-annually for 28 years or until compliance is achieved with all ARARs. Monitoring data would be evaluated every year.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: N/A
ESTIMATED TIME FOR OPERATION: 30 YEARS
ESTIMATED CAPITAL COST: NONE
ESTIMATED O & M (Present Worth): $330,000
ESTIMATED TOTAL COST (Present Worth): $330,000

2. Alternative SC-2: RCRA, Subtitle C, Capping

This Alternative involves the placement of a RCRA Subtitle C Cap (RCRA Cap/Capping) over the lagoons at DA-1 and DA-2, at soil areas SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 and those areas throughout the Site that are determined to exceed the Soil Cleanup Levels. All soils/sludges that exceed the Soil Cleanup Levels established in Section X, shall be included in the remedy. The following components of the Cap are listed below from the top of the Cap to the bottom:

1. A top soil layer of at least 24 inches thick planted with grass or other suitable vegetation that will not interfere with the underlying Cap. This layer shall contain a minimum layer of six inches of compacted top

soil. A flexible geomembrane will be placed between this layer and the next drainage layer.

2. A drainage layer of 12 inches to provide for drainage away from the underlying impermeable layers. The permeability (K) for this layer shall be 10^{-2} or greater. A geotextile of suitable drainage characteristics may replace this layer.

3. An impermeable flexible liner will lie directly beneath the drainage layer.

4. A 24 to 36 inch layer of compacted clay with a K value of 10^{-6} will underlie the flexible liner.

5. A layer of soil between the clay layer and the area of soil or sludge to be capped to provide a smooth layer for the clay cover as well as a layer for gas collection. The thickness and K value of this layer will be determined during design studies.

6. A gas venting system will be provided to the atmosphere.

This RCRA Subtitle C Cap would be designed and constructed in accordance with the Federal Resource Conservation and Recovery Act Subtitle "C" guidelines in effect at the time of design. Any future development in the areas of the RCRA Caps would be prohibited through Institutional Controls that would include deed restrictions. Drainage controls would be implemented to preclude run-on and potential erosion impacts of rain and snow melt on the RCRA Cap. Finally, a groundwater monitoring program would be developed to allow periodic evaluation of the RCRA Cap's effectiveness in preventing the migration of soil contaminants to groundwater. The combination of a RCRA Cap, security fence and Institutional Controls would control all risks associated with human exposure to contaminated soil, including those derived from ingestion, dermal contact and inhalation of airborne particulates. However, the contaminants would remain on-site and untreated under the RCRA Cap. As a result, there would be a potential residual risk if the RCRA Subtitle C Cap were to fail or, as a result of fence breaching or Institutional Control failure, be disturbed by future on-site activities. This remedy would call for operation and maintenance requirements and Institutional Controls to assure integrity of the RCRA Cap, fence, and monitoring well system.

In addition, if groundwater monitoring shows a risk greater than 1×10^{-4}, a Site Assessment will be initiated by the EPA. This Assessment will entail a review of all available groundwater and other Site information available to determine if additional

treatment and/or controls are necessary. These additional requirements may include, but are not limited to, source related controls, migration of contamination controls, Institutional Controls, and continued or additional monitoring requirements. The decision to institute additional Site actions shall be made by the EPA Regional Administrator.

Although Alternative SC-2 is effective in controlling Site risk, it is not a form of treatment and does not directly reduce the toxicity, mobility or volume of the waste and thus, does not provide for permanence. This Alternative calls for a continual program of monitoring and inspection and is not as preferable as a remedy that includes treatment to provide permanence. However, this Alternative would be easily implementable and involves a known technology that has been effectively employed at other hazardous waste sites in New England.

Management Regulations (40 CFR 260 through 268), MADEP Air Pollution Control regulations (310 CMR 6.00 and 7.00), OSHA Safety and Health Standards (29 CFR 1910 and 1926) and the MADEP Waste Regulations (310 CMR 30.00), RCRA (40 CFR 264 Subpart D,F,G,K, and N) would apply. The federal and state air quality regulations would additionally serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated.

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 USC 401 et seq. and 1344, 33 CFR 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be potentially applicable location-specific ARARs should construction activities disturb any of the nearby wetlands. RCRA standards for treatment and Land Ban requirements would not apply since the material consolidation under this option would not be considered removal from the original location during treatment.

Design considerations under RCRA (40 CFR 265.110-265.120; 265.220-265.230; and 265.250-265.260; and 265.300-265.316) for closure of lagoons, waste piles and landfills would be applicable.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 20 months
ESTIMATED TIME FOR OPERATION: 30 years
ESTIMATED CAPITAL COST: $3,841,000
ESTIMATED O & M COST: $569,000
ESTIMATED TOTAL COST (Present Worth): $4,410,000

3. Alternative SC-3: Incineration/Stabilization

This Alternative would involve excavation and pretreatment of contaminated soil, on-site incineration (using rotary kiln,

infrared, or fluidized bed), and on-site burial of all soils/sludges above the Soil Cleanup Levels. Pretreatment in this overall process is necessary to remove large objects and to screen, shred, and mix the remaining wastes to create a more uniform-sized soil/waste mixture which could be more efficiently incinerated and/or stabilized. Following pretreatment, at a minimum, 21,300 cu/yds of soil from areas DA-1 and DA-2, and at a minimum 3,000 cu/yds of soil from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 will be incinerated. An anticipated destruction efficiency of 99.99 percent for organic compounds may be achieved with incineration which would result in a permanent solution for organics.

Because incineration does not treat metals, this Alternative would be followed by immobilization (stabilization/ solidification) of a minimum of 24,300 cu/yds of incinerated soils, together with an additional minimum of 12,300 cu/yds of soil, contaminated primarily with metals from SL-3, SL-4, and SL-5. The immobilization would utilize a cement based stabilization process which would involve excavation of soils and mixing in tanks followed by reburial of the solidified material under a permeable cap. The immobilization process would add an additional 20% to 40% to the volume of the stabilized material. This process will effectively bind up the heavy metals in a matrix that would preclude leaching into groundwater. Institutional Controls including deed restrictions on the use of the capped area, fencing, and long term groundwater monitoring would be required under this Alternative.

Although incineration involves widely-used and readily available treatment technologies, there are some potential technical and administrative problems associated with its implementation. Some of these problems deal with community opposition to incineration and the possibility for volatilization of heavy metals and their potential for release into the atmosphere. One particular problem is the potential for conversion of chromium from trivalent into a very toxic form of hexavalent chromium at temperatures above 700^{0}F. These potential technical issues could be resolved through design/pilot study to control for the potential release of metals to the atmosphere.

Management Regulations (40 CFR 260 through 268), MADEP Air Pollution Control regulations (310 CMR 6.00 and 7.00), OSHA Safety and Health Standards (29 CFR 1910 and 1926) and the MADEP Waste Regulations (310 CMR 30.00), RCRA (40 CFR 264 Subpart O) would apply. Land Disposal Requirements under RCRA would also apply. The federal and state air quality regulations would additionally serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated.

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 USC 401 et seq. and 1344, 33 CFR 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be potentially applicable location specific ARARs should construction and/or excavation activities disturb any of the nearby wetlands. RCRA standards for treatment would apply under the Land Disposal Requirements since the material under this option would be removed from the original location during treatment.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 20 MONTHS
ESTIMATED TIME FOR OPERATION: 24 MONTHS
ESTIMATED CAPITAL COST: $30,502,000
ESTIMATED O & M Cost (Present Worth): $323,000
ESTIMATED TOTAL COST (Present Worth): $30,825,000

4. Alternative SC-4: Thermal Desorption/Dechlorination with Stabilization:

This Alternative would involve pretreatment, thermal desorption, dechlorination and on-site burial of all soils/sludges above the Soil Cleanup Levels. Pretreatment in this overall process is necessary to remove large objects and to screen, shred, and mix the remaining wastes to create a more uniform-sized soil/waste mixture which could be more efficiently desorpted and/or stabilized. Following pretreatment, at a minimum, 21,300 cu/yds of soil from areas DA-1 and DA-2, and, at a minimum, 3,000 cu/yds of soil from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 will be thermally desorpted. In this process distillation of the various contaminants would occur within a heated anaerobic environment of between 700° and 1,150 °F. Combustion is controlled and the decomposition of halogenated hydrocarbons does not occur.

The distilled organics would contain PAH primarily and would be concentrated and condensed to form a liquid stream of about 9,500 gallons. This liquid waste would be further treated on-site. A variety of aqueous waste treatment processes are available for this purpose; the final treatment selection would be based upon required process treatability studies. This process also results in the production of about 30 gallons of PCB and dioxin containing waste that would be treated by dechlorination, which is a chemical substitution process that renders the PCB/Dioxin waste non-toxic. Treated effluent, depending upon its quality, could be discharged either on-site or to the sanitary sewer system. Concentrated organic sludge would be disposed of off-site, by incineration. An anticipated destruction efficiency of 99.99 percent for organic compounds may be achieved with this process which would result in a permanent solution for organics.

Because thermal desorption does not treat metals, this Alternative would be followed by immobilization (stabilization/ solidification) of a minimum of 24,300 cu/yds of previously treated soils, together with an additional minimum of 12,300 cu/yds of soil, contaminated primarily with metals from SL-3, SL-4, and SL-5. The immobilization would utilize a cement based stabilization process which would involve excavation of soils and mixing in tanks followed by reburial of the solidified material under a permeable cap. The immobilization process would add an additional 20% to 40% to the volume of the stabilized material. This process will effectively bind up the heavy metals in a matrix that would preclude leaching into groundwater. Institutional Controls including deed restrictions on the use of the capped area, fencing, and long-term ground water monitoring would be required under this Alternative.

One potential problem with this Alternative is that some of the more volatile metals may change state and become volatile at temperatures above 700 ^{o}F. These issues would require evaluation in a design/pilot study, as in Alternative SC-3, to control for the potential release of metals to the atmosphere.

The regulations set forth by RCRA Subtitle C, and in 310 CMR 30.00, considered applicable action-specific ARARs, would be met, including: incineration, secondary containment of residual storage, tank inspections, temporary waste piles, contingency planning and proper adherence to transportation requirements once the concentrated organic waste is transported off-site for incineration. Discharge effluent limitations established by Massachusetts surface water discharge permit rules (314 CMR 3.00 et seq.) under the NPDES program (40 CFR 122 and 125) will be met through engineering controls. Other applicable regulations which will be met include state technical standards addressing the operation of wastewater treatment facilities at hazardous waste facilities (310 CMR 30.605). Any discharges to a POTW would conform to state standards for discharge to POTWs (314 CMR 12.00) under the CWA.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 20 MONTHS
ESTIMATED TIME FOR OPERATION: 24 MONTHS
ESTIMATED CAPITAL COST: $26,442,000
ESTIMATED O & M COST (Present Worth): $323,000
ESTIMATED TOTAL COST (Present Worth): $26,765,000

5. Alternative SC-5: Solvent Extraction/Immobilization

This Alternative would involve excavation and pretreatment of contaminated soil, on-site solvent extraction, and on-site burial of all soils/sludges above the Soil Cleanup Levels. Pretreatment in this overall process is necessary to remove large objects and

to screen, shred, and mix the remaining wastes to create a more uniform-sized soil/waste mixture which could be more efficiently treated by the solvent extraction process and stabilized. Following pretreatment, at a minimum, 21,300 cu/yds of soil from areas DA-1, DA-2, SL-6, SL-12, and SL-13 and at a minimum 3,000 cu/yds of soil from SL-3, SL-4, SL-5, will be placed into an enclosed mixing tank, and combined with a chemical solvent. The solvent extracts the organic contaminants from the soil and sludge. The solvent is then removed from the soil through a process of distillation.

Because solvent extraction may not be effective in removing metals, the 24,300 cu/yds of treated soil would be combined with a minimum of 12,300 cu/yds of additional soil from SL-3, SL-4, and SL-5 and undergo a stabilization /solidification process similar to that described in Alternative SC-3. The immobilization stage would utilize a cement based stabilization process that includes excavation of soils and mixing in tanks followed by reburial of the solidified material under a permeable cap. The immobilization process would add an additional 20% to 40% to the volume of the stabilized material. This process will effectively bind up the heavy metals in a matrix that would preclude leaching into groundwater. Institutional controls including deed restrictions on the use of the capped area, fencing, and long-term groundwater monitoring would also be required under this Alternative.

Laboratory performance data using the solvent process has shown consistent removal efficiencies for PCBs greater than 99.99%. However, actual field results with solvent extraction have not produced the high removal efficiencies of the laboratory tests in all cases. This is apparently due to complications presented from certain non-homogenous wastes that contain a variety of solvents, oils and clays.

Management Regulations (40 CFR 260 through 268), MADEP Air Pollution Control regulations (310 CMR 6.00 and 7.00), OSHA Safety and Health Standards (29 CFR 1910 and 1926) and the MADEP Waste Regulations (310 CMR 30.00), RCRA (40 CFR 264) would apply. Land Disposal Requirements under RCRA would also apply. The federal and state air quality regulations would additionally serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated.

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 USC 401 et seq. and 1344, 33 CFR 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be potentially applicable location specific ARARs should construction and/or excavation activities disturb any of the nearby wetlands. RCRA standards for treatment would apply under

the Land Disposal since the material under this option would be removed from the original location during treatment.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 20 MONTHS
ESTIMATED TIME FOR OPERATION: 24 MONTHS
ESTIMATED CAPITAL COST: $18,914,000
ESTIMATED O & M COST (Present Worth): $323,000
ESTIMATED TOTAL COST (Present Worth): $19,237,000

6. Alternative SC-6: In-Situ Vitrification

Under this Alternative, organic contaminants would be destroyed and inorganics immobilized through the process of vitrification. Vitrification would be achieved by the placement of electrodes into the soil at a desired depth and creating an electric current between the electrodes, resulting in the heating of adjacent soils to temperatures in the range of 1,600° to 2,000° centigrade. At this temperature the soils become a molten mass and form a glass matrix once cooled. The vitrified material would be stable for several thousand years. The soils/sediments volume would be reduced by 20 to 40 percent. After vitrification, a permeable cap would be placed over the vitrified soils, and the surface would be regraded and planted.

Alternative SC-6 would require an off-gas treatment system to treat the highly volatile constituents that may be emitted during vitrification. In addition, dewatering and treatment of ground water beneath the contaminated soils/sediments would be necessary. Alternative SC-6 would include the consolidation of DA lagoon and SL areas and all other areas above Soil Cleanup Levels prior to vitrification. This alternative would also include long-term monitoring of contaminated media, access restrictions (e.g., fencing), regrading, vegetation and Institutional Controls.

This Alternative, although carried through in the FS, was eliminated from consideration by EPA due to the high potential for fire hazard. This potential fire hazard results from the combination of ignitable waste in the lagoons with the extremely high temperatures required for the vitrification process.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 10 MONTHS
ESTIMATED TIME FOR OPERATION: 22 MONTHS
ESTIMATED CAPITAL COST: $44,600,000
ESTIMATED O & M Cost (Present Worth): $323,000
Estimated Total Cost (Present Worth): $44,923,000

7. Alternative SC-7: Immobilization

This Alternative would involve pretreatment, and two stage immobilization. Following immobilization, the treated material is placed under an on-site permeable cap. Pretreatment in this overall process is necessary to remove large objects and to screen, shred, and mix the remaining wastes to create a more uniform-sized soil/waste mixture which could be more efficiently stabilized. Following pretreatment, at a minimum, 21,300 cu/yds of soil from areas DA-1 and DA-2, and, at a minimum, 3,000 cu/yds of soil from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 would be excavated and placed in mixing chambers for two-stage immobilization. Following immobilization, the treated materials would be re-buried in their original excavations and covered with a permeable soil cap. Whereas Alternatives SC-3, SC-4, and SC-5 use immobilization to treat metals in conjunction with other processes to remove organic contamination, Alternative SC-7 uses immobilization as the sole means of soils treatment.

The exact materials and volumes required for immobilization would be determined by a treatability study. The first phase would employ certain chemicals to bind the organics while the second phase would use a cement based process to complete the immobilization. Organophillic clays and organic polymers are examples of the general types of chemical additives that have been developed to immobilize organic contaminants by first stage chemical binding and adsorption. Specific chemicals are proprietary as this technology is still in the developmental stages for organics.

Once the organics are stabilized, the second phase solidification step for metals control is achieved through the use of cement based materials as in Alternatives SC-3, SC-4, and SC-5. The net effect is to produce a solidified material with the contaminants immobilized by a complex network of bonding and encapsulation. In this Alternative, all contaminated soils/sludges above the Soil Cleanup Levels are included for treatment. Other components of Alternative SC-7, include pretreatment to remove large objects, on-site burial, Institutional Controls, and groundwater monitoring.

Although solidification is a widely used treatment, its applicability to organics is a relatively new technology. Treatability studies and pilot testing with suitable chemical additives such as organophillic clays, silica, and cement and other chemicals would be required to refine the amount and type of additives required under this remedy.

Hazardous Waste Management Regulations (40 CFR 260 through 268), MADEP Air Pollution Control regulations (310 CMR 6.00 and 7.00), OSHA Safety and Health Standards (29 CFR 1910 and 1926) and the MADEP Waste Regulations (310 CMR 30.00), RCRA (40 CFR 264) would

apply. Land ban requirements under RCRA would also apply. The federal and state air quality regulations would additionally serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated.

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 USC 401 et seq. and 1344, 33 CFR 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be potentially applicable location-specific ARARs should construction activities disturb any of the nearby wetlands. RCRA standards for treatment would apply under the Land Disposal Requirements since the material under this option would be removed from the original location during treatment.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 10 MONTHS
ESTIMATED TIME FOR OPERATION: 22 MONTHS
ESTIMATED CAPITAL COST: $14,873,000
ESTIMATED O & M COST (Present Worth): $569,000
ESTIMATED TOTAL COST (Present Worth): $15,442,000

8. Alterative SC-7A: Immobilization/Off-Site Disposal

Alternative SC-7A is similar to Alternative SC-7 and immobilization is the sole means of treatment for contaminated soils at DA-1, DA-2, SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13. However, instead of the treated material being left on-site, it would be disposed of off-site in a permitted landfill. The chemical immobilization component of Alternative SC-7A and the amount of contaminated sludges and soil treated would be identical to the immobilization process described for Alternative SC-7.

Because all of the contaminated soil above Soil Cleanup Levels would be excavated and removed from the Site, it would be necessary to backfill all of the excavated areas with clean fill. The Site would then be restored with topsoil, regraded, and vegetated. Pretreatment to remove large objects, would be required under this Alternative. Additionally, long-term monitoring, fencing and access control, and Institutional Controls would be required under this Alternative.

The regulations set forth by RCRA Subtitle C and in 310 CMR 30.00, considered applicable action-specific ARARs, would be met, including: secondary containment of residual storage, tank inspections, temporary waste piles, and contingency planning. In addition, because this Alternative will remove waste from the lagoons, the Land Disposal Requirements under RCRA would apply. The federal and state air quality regulations would serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated. Control

equipment is available for fugitive dust control during remediation. Air quality standards for organics can be met with vapor phase treatment as an integral component of the remediation technology.

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 USC sec. 401 et seq., 33 CFR 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be complied with since the construction activities during remediation will not disturb any of the nearby wetlands. Other ARARS include Management Regulations under 40 CFR 260 through 268 and MA Management rules provided in 310 CMR 30.00.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 10 MONTHS
ESTIMATED TIME FOR OPERATION: 22 MONTHS
ESTIMATED CAPITAL COST: $17,457,000
ESTIMATED O & M Cost (Present Worth): $569,000
ESTIMATED TOTAL COST (Present Worth): $18,026,000

9. Alternative SC-7B: Soil/Sludge Fixation/Off-Site Disposal

This Alternative would involve excavation and pretreatment of contaminated soils/sludges, on-site soil-fixation of all soils/sludges above the Soil Cleanup Levels and removal of the treated material to an off-site permitted landfill. Pretreatment in this overall process may be necessary to remove large objects and to screen, shred, and mix the remaining wastes to create a more uniform-sized soil/waste mixture which could be more efficiently treated by the soil-fixation process. Following pretreatment, a minimum of 21,300 cu/yds of lagoon sludges at DA-1 and DA-2 will undergo an in-situ process of soil-fixation with fly ash and possibly with other compounds such as silica and cement. Following soil-fixation, the treated soil-fixed sludge together with at least, and possibly more than, 15,300 cu/yds of untreated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 will be excavated, loaded on trucks, and taken to an off-site permitted landfill for disposal.

As for the other Alternatives, all contaminated soils and sludges above Soil Cleanup Levels will be included in this Alternative. This Alternative is technically easy to implement and would provide for a permanent Site solution. Alternative SC-7B, must satisfy the following three conditions in order to be implemented:

1. Treatability Studies utilizing bench tests and pilot scale field operational study must demonstrate that the soil-fixation process renders the sludges non-ignitable and non-toxic as defined under RCRA at 40 CFR 261.21 and 261.24 respectively.

2. All waste from the Site can be classified as a "Special Waste" under Massachusetts Solid Waste Regulations 310 CMR 19.00.

3. Treated lagoon sludges from DA-1 and DA-2 and treated soils from and untreated soils from the SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 areas and other areas above Soil Cleanup Levels can be disposed at a permitted landfill.

The major components of this Alternative are listed below:

1. Permitted landfill selection for off-site disposal;
2. Treatability studies to determine fixation material and mixing requirements, including bench scale laboratory tests and a field pilot test;
3. Additional soil delineation studies at hazardous waste areas including, but not limited to, DA and SL areas to determine cleanup boundaries based upon Site Soil Cleanup Levels;
4. Site preparation, including road construction, security measures, well closure, grading and grubbing activities, and decontamination pad construction;
5. Drainage control measures to protect wetlands and waste areas;
6. Air monitoring and engineering controls for dust, odors, and noise;
7. Existing cap removal and disposal;
8. Removal of lagoon water and treatment (if required);
9. Pretreatment of sludges at DA-1 and DA-2 (if required);
10. Fly ash preparation and mixing;
11. In-situ mixing with fly ash at DA-1 and DA-2;
12. Excavation of treated waste from DA-1 and DA-2
13. Excavation of untreated waste from SL-3, SL-4, and SL-5; SL-6, SL-12, and SL-13;
14. Excavation of other soils and sludges above Soil Cleanup Levels based on additional soil delineation studies at the Site;
15. Off-site disposal by truck of DA and SL wastes and other soils and/or sludges above Soil Cleanup Levels at the selected permitted landfill;
16. Other components include Site restoration to previous grade with clean fill, Site vegetation, and groundwater well installation and monitoring for a minimum of five years.

Hazardous Waste Management Regulations (40 CFR 260 through 268), MADEP Air Pollution Control regulations (310 CMR 6.00 and 7.00), OSHA Safety and Health Standards (29 CFR 1910 and 1926) and the MADEP Waste Regulations (310 CMR 30.00), RCRA (40 CFR 264) would apply. Land ban requirements under RCRA would also apply. The federal and state air quality regulations would additionally

serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated.

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 USC 401 et seq. and 1344, 33 CFR 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be potentially applicable location-specific ARARs should construction activities disturb any of the nearby wetlands. RCRA standards for treatment would apply under the Land Disposal since the material under this option would be removed from the original location during off-site disposal.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 8 MONTHS
ESTIMATED TIME FOR OPERATION: 13 MONTHS
ESTIMATED CAPITAL COST: $9,032,000
ESTIMATED O & M COST: $91,000
ESTIMATED TOTAL COST (Present Worth): $9,123,000

IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Evaluation Criteria

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

A detailed analysis was performed on the Alternatives using the nine evaluation criteria in order to select a Site remedy. The following is a summary of the comparison of each Alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

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

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

2. **Compliance with applicable or relevant and appropriate requirements (ARARS)** addresses whether or not a remedy will meet all of the ARARs of other Federal and State environmental laws and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

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

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

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

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

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

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

Modifying Criteria

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

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the

State's comments on ARARs or the proposed use of waivers.

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

A detailed assessment of each alternative according to the nine criteria can be found in Section 4.0 of the Feasibility Study (URS Consultants, Inc., June 4, 1992).

Following the detailed analysis of each alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Table ES-2, Volume I of the FS.

1. Overall Protection of Human Health and the Environment

The preferred Alternative, SC-7B, and Alternative SC-7A each provide a very high degree of overall protection by removing all Site waste above the Soil Cleanup Levels to an off-site permitted landfill. These two Alternatives would provide for complete protection from contact with contaminated soils and sludge and remove all risk associated with the Site.

Alternative SC-2, RCRA Subtitle C Capping, would also protect human health and the environment by preventing exposures to the Site contaminants. Although the RCRA Capping Alternative is not a treatment of waste, the RCRA Subtitle C Cap results in the control of the primary risk associated with the Site which is from contact with and ingestion of contaminated soil and sludge. The RCRA Subtitle C Capping Alternative will require ground water monitoring, periodic Site inspections, and Institutional Controls to assure the long-term protectiveness of the remedy.

Alternative SC-3 (Incineration/Stabilization), Alternative SC-4 (Desorption/Dechlorination/Stabilization), Alternative 5 (Solvent Extraction/Stabilization), and Alternative SC-7 (Immobilization), would all offer a high degree of overall protection by either destroying or removing organic contamination and contain metal contamination by further treatment through immobilization. The No-Action Alternative SC-1 would not protect human health and the environment over the long-term because the existing synthetic cap over the lagoons was only planned for use as an interim solution and would be expected to eventually fail. Additionally, the No-Action Alternative would not treat or control material in the contaminated soils areas at SL-1, SL-2, SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13. These untreated areas would continue to pose a health risk.

Alternative SC-6, In-Situ Vitrification was evaluated in the FS, but is not considered applicable due to the potential for fire hazard resultant from the high temperatures required for treatment and the ignitable nature of the sludges.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

All of the Alternatives, except for the No-Action SC-1 and In-Situ Vitrification, SC-6, would meet federal and state ARARs including state landfill regulations, air quality regulations, hazardous waste storage and transportation regulations, process discharge water regulations, wetlands regulations, and health and safety regulations. Alternatives SC-7A, and SC-7B, because of the off-site disposal of waste, would have the least impact on Site environmental media, but would have to meet ARARS for potential air emissions and RCRA standards for treatment of hazardous waste. Alternative SC-2, the RCRA Cap, would require long-term monitoring to assure compliance with groundwater ARARS.

3. Long-Term Effectiveness and Permanence

Alternatives SC-7B and SC-7A would achieve long-term effectiveness by removing all organic and metal contamination from the Site, and thus restore the Site to a state that could be used without restriction. These are the only two Alternatives that entail off-site removal of waste and that would provide for permanence through on-site treatment followed by the off-site waste removal requirement.

Alternatives SC-3, SC-4, SC-5, and SC-7 would also achieve long-term effectiveness and permanence by destroying or removing at least 99.99% of the organic contamination and by stabilizing metal contamination with immobilization. However, Alternatives SC-3, SC-4, SC-5, and SC-7 would leave immobilized hazardous waste on-site and would require Institutional Controls, fencing and long-term monitoring to assure long-term effectiveness.

Alternative SC-2 would also provide an effective solution by controlling exposures to soil and sludge; long-term effectiveness, however, would have to be assured through a program of groundwater monitoring and Institutional Controls. A series of operation and maintenance requirements to maintain the RCRA Subtitle C Cap and the monitoring well system integrity would also be required for this Alternative. Although an effective remedy, the RCRA Subtitle C Cap does not provide the same degree of permanence as does the off-site Alternative, SC-7B. The No-Action Alternative SC-1 would not provide long-term protection of human health and the environment; risks associated

with human exposures to contaminated soil and sludge would continue under SC-1.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

All the Alternatives, except Alternative SC-1, would eliminate or control the mobility of the contaminants. Overall, all the Alternatives except Alternatives SC-1 and SC-2, would add an overall 20 to 40% volume to the treated material as a result of the solidification process. All the Alternatives, except SC-1 and SC-2, would satisfy the statutory preference for treatment to reduce toxicity, mobility or volume under CERCLA. Alternatives SC-7B and SC-7A are the only Alternatives that would provide for the removal of the wastes off-site and thus achieve permanence without the requirements for Institutional and other controls except for short-term monitoring.

Alternatives SC-3, SC-4, and SC-5 would destroy at least 99.99% of the organic contamination, but would still require the immobilization of metals through stabilization. Stabilization would reduce mobility of the metals and provide permanence, but would increase the volume of treated soils by about 20% to 40%. This increased volume may present some logistical problems for disposal of the waste on-site. For example, the increase in volume may require special design considerations to prevent encroachment of the solidified material into the surrounding wetlands.

Alternative SC-2, RCRA Capping, although not a direct treatment of the waste, would control infiltration and, thus, reduce the probability of waste migration via groundwater. Alternative SC-2 would also indirectly result in a reduction of toxicity by providing a RCRA Subtitle C Cap that would prevent contact with the contaminated soils and sludges on Site.

5. Short-Term Effectiveness

The No-Action, Alternative SC-1, would not pose a risk to human health or the environment beyond existing risks for the short - term. Although air monitoring would be implemented on the Site to prevent unacceptable exposures, the potential exists for exposure of workers and adjacent residents to fugitive dusts generated during construction and excavation activities associated with Alternatives SC-2, SC-3, SC-4, SC-5, SC-7, SC-7A, and SC-7B. In order to preclude dust generation and exposure to air-born contaminants during construction activities, engineering controls, dust suppressant agents, and safety equipment would be employed. Additionally, measures to control noise during construction activities would also be required due to the proximity of the Barcelona Avenue neighborhood.

The potential for short-term impact to adjacent wetlands exists under Alternatives SC-2, SC-3, SC-4, SC-5, SC-7, SC-7A and SC-7B due to contaminated sediment runoff from disturbed areas. Therefore, measures to control sediment run-off and wastewater discharge during construction and waste treatment would be required. Such measures include sediment traps and drainage collection controls; the exact nature of the control measures to be employed will be determined during the design stages of the remedy.

6. Implementability

Alternative SC-1 would be the easiest to implement since it would only require monitoring. Alternatives SC-2 and SC-7B would involve the use of commonly available construction methods, equipment, and materials and would be easily implemented. Both of these Alternatives involve well established technologies - Capping and immobilization are techniques that have been utilized successfully at other Superfund Sites. However, Alternative SC-2 would require the construction of concrete barrier walls at DA-1 and DA-2 as well as at SL-4 and SL-5 to provide for side-slope stability and to preclude encroachment of the RCRA Subtitle C Cap into the surrounding wetlands. These barrier walls may extend the time to implement the remedy due to design considerations. Alternative 7B would likely be the shortest to implement and would only take a total of 20 months. Alternatives SC-7 and SC-7A involve technologies that are feasible to implement, but would take 32 months to design and construct; while Alternatives SC-3, SC-4, and SC-5 would take 44 months for design and construction. Alternative SC-2 will likely take an additional year to implement due to the design and construction of the barrier/stabilization walls.

Some technical difficulties may be encountered implementing Alternative SC-3 (incineration/stabilization) and Alternative SC-4 (desorption/dechlorination/stabilization) due to the non-uniform content of soils and sludges on the Site. This non-uniform nature may likely cause some delays in developing a uniform material for incineration and thermal desorption. Additionally the incineration Alternatives SC-3 and SC-4 would require trial burn tests to design controls for the potential release of metals that can be expected at temperatures above 700°F. Although these technical issues can be resolved by adequate study, they may extend the design phase and cause a delay in implementation. There may also be some difficulties implementing Alternative SC-5 as the solvent extraction process may not be highly effective in providing removal of contaminants in the complex soil types that exist on-site.

7. Cost

The most expensive of the options is Alternative SC-6, In Situ Vitrification at $44,923,000 (not considered feasible because of the potential for fire hazard) while the least expensive is the No-Action Alternative, SC-1, which costs $330,000. Although Alternative SC-1 is the lowest cost, it does not reduce Site risks or provide a permanent solution. Alternatives SC-3, and SC-4 and SC-5 involve treatment of the organics followed by stabilization for metals and cost $30,825,000, $26,765,000 and $19,237,000 respectively. Alternatives SC-3, SC-4, and SC-5 are not considered cost effective in lieu of the other available lower cost remedies (SC-2, SC-7, SC-7A, and SC-7B) that are as protective in removing the Site risk which is due to soil contact and/or ingestion.

Alternatives SC-7 and SC-7A are each a form of immobilization and cost between $15,000,000 and $18,000,000. The basic difference between Alternative SC-7 and SC-7A, is that in SC-7A the stabilized waste is taken off-site; in SC-7 the waste is stabilized and covered on-site with a permeable cap. In Alternative SC-7B, waste is treated with a fly ash, soil-fixation process and taken off-site for disposal. Alternative SC-7B is estimated to cost $9,123,000. Because Alternative SC-7B includes off-site waste removal for all contaminated soils above the Soil Cleanup Levels, this Alternative provides a permanent solution and precludes the need for Site controls such as long-term monitoring, Institutional Controls, and Operation and Maintenance. Implementation of Alternative SC-7B offers a permanent solution at a cost effective price and would result in unlimited future Site use. Alternative SC-7A also includes provision for off-site disposal of wastes after on-site immobilization and thus achieves permanence. However, Alternative 7A would cost almost twice that of Alternative SC-7B, and offers no significant environmental advantages over the lower cost Alternative SC-7B.

The contingent alternative to the preferred SC-7B remedy, is Alternative SC-2, a RCRA Subtitle C Cap which is estimated to cost $4,410,000. This Alternative would provide protectiveness that would be similar to the other on-site Alternatives. This is a result of the low migration potential of the contaminants of concern on the Site and the nature of the RCRA Subtitle C Cap that addresses the primary Site risk of contact/ingestion with Site soils and sludges. However, implementation of Alternative SC-2 would leave waste on-site, and therefore it is not as protective as the preferred remedy, SC-7B or the other Alternatives that include treatment of the wastes. Alternative SC-2, although a low cost and protective Alternative, would require a series of Institutional Controls to preclude

development and use of the RCRA Capped areas, long-term monitoring, and a maintenance plan to maintain the RCRA Subtitle C Cap integrity.

Following is a summary of costs for each of the Alternatives listed by Capital Cost, Operation and Maintenance, and Present Worth. It should be noted that these costs are estimates and are expected to provide an accuracy from - 30% to + 50% :

ALTERNATIVE		Direct Capital $	O & M $/yr.	Present Worth$
SC-1	NO ACTION	0	21,500	330,000
SC-2	RCRA CAPPING	2,561,000	37,000	4,410,000
SC-3	INCINERATION/ STABILIZATION	18,857,000	21,000	30,825,000
SC-4	THERMAL DESORPTION/ DECHLORINATION WITH STABILIZATION	15,844,000	21,000	26,765,000
SC-5	SOLVENT EXTRACTION/ STABILIZATION	11,160,000	21,000	19,237,000
SC-6	VITRIFICATION	44,923,000	21,000	44,923,000
SC-7	IMMOBILIZATION	8,602,000	37,000	15,442,000
SC-7A	IMMOBILIZATION/ OFF-SITE DISPOSAL	10,122,000	37,000	18,026,000
SC-7B	SLUDGE FIXATION/ OFF-SITE DISPOSAL	6,056,000	21,000	9,123,000

8. State Acceptance

Massachusetts DEP supports Alternative SC-7B, Soil-Fixation with fly ash (in-situ) with off-site disposal in a permitted landfill and the Contingent Remedy, SC-2 of a RCRA Subtitle C Cap. A copy of the Declaration of Concurrence is attached as Appendix D to this ROD.

9. Community Acceptance

Several comments have been made by the community at the public hearing held in Salem, Massachusetts on the Site on July 15, 1992. Comments mainly address community risks during implementation of the proposed plan. These comments are addressed in the Attachment A - The Responsiveness Summary. Generally, the people that attended the public meetings concerning the Site supported the proposed remedy SC-7B including the contingent remedy, SC-2, of a RCRA Cap. Several people declared their preference for the RCRA Subtitle C Cap over other alternatives.

X. THE SELECTED REMEDY

The selected remedy for the Site is source control Alternative SC-7B, soil-fixation with fly-ash (in-situ) and off-site disposal at a permitted landfill. This remedy includes remediation of all contaminated soils and sludges that are above the Soil Cleanup Levels. This remedy has to satisfy the following three conditions in order to be implemented:

1. Treatability testing by bench tests and pilot scale operation must demonstrate that the fly ash fixation process implemented at DA-1 and DA-2 renders the sludges non-ignitable and non-toxic under RCRA (40 CFR 261.21 and 261.24).

2. All waste from the Site can be classified as a "Special Waste" under Massachusetts Solid Waste Regulations 310 CMR 19.00.

3. Treated lagoon sludges (from DA-1 and DA-2 and untreated soils from SL-3, SL-4, and SL-5, SL-6, SL-12, and SL-13 and possibly other areas above Soil Cleanup Levels can be disposed of at a permitted landfill.

Unless all of the above conditions are met, a contingent remedy, Alternative SC-2, RCRA Subtitle C Capping will be the selected remediation for the Site. The RCRA Cap, at a minimum, will cover the lagoon areas DA-1 and DA-2 and contaminated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13. Pending design studies, these soil areas may be consolidated prior to Capping and additional soils from SL-1 and SL-2 and other areas may be included in the remedy. As described in Section V and VI of this ROD, contamination of groundwater, surface water, and sediments is within the limits established for cleanup and does not pose a health risk greater than 1×10^{-4} except for arsenic in groundwater which is just outside this range at 2.6×10^{-4}. Because of the minor off-site migration of contamination at the Site, the preferred and contingent remedies in the FS and in this ROD do not include Management of Migration Alternatives.

A. Soil Cleanup Levels

Soil Cleanup Levels for known and suspect carcinogens (Classes A, B, and C compounds) have been set at 1×10^{-4} to 1×10^{-6} excess cancer risk level considering exposures via dermal contact and incidental ingestion. Soil Cleanup Levels for compounds having non-carcinogenic effects (Classes D and E compounds) were derived for the same exposure pathway(s) and correspond to a level that represents an acceptable exposure level to which the human population including sensitive subgroups may be exposed without

adverse affect during a lifetime or part of a lifetime, incorporating an adequate margin of safety (hazard quotient = 1). Exposure parameters for ingestion, inhalation, and skin contact have been described in the HRA in Chapter 4. If a Soil Cleanup Level described above is not capable of being detected with good precision and accuracy or is below background values, then either the practical quantification limit or a background value was used as appropriate for the Soil Cleanup Level. Table 12 summarizes the Soil Cleanup Levels for carcinogenic and non-carcinogenic contaminants of concern.

TABLE 12: SOIL CLEANUP LEVELS
BASED ON INGESTION AND DERMAL CONTACT

Carcinogenic Contaminants of Concern (Class)	Soil Cleanup Levels		Basis	Risk Level
CPAHs (B2)	1.20	ppm	risk	6.7E-06
PCBs (B2)	1.00	ppm	risk	1.7E-06
Dioxins	1.00	ppb	risk	2.0E-04
Arsenic	40.00	ppm	risk	7.6E-05
Beryllium	0.42	ppm	risk	2.0E-06

Non-carcinogenic Hazard Contaminants				Target Endpoint Quotient
Chromium (D)	900	ppm	HQ	Not Defined
Lead	500	ppm	HQ	liver/kidney

B2 - Probable Human Carcinogen Based on Animal Studies
D - Not Classified
HQ - Hazard Quotient

These Soil Cleanup Levels must be met throughout the Site at the completion of the remedial action for all Site soils and sludges. The Soil Cleanup Levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective. The areas to be remediated to Soil Cleanup Levels include, but are not limited to: all of the soils and sludges at DA-1 and DA-2, the two large lagoon areas, and the soils at SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13. The cleanup at the two lagoon areas will be required from the ground surface to the bedrock surface. Additional delineation outside these DA and SL-4 and SL-5 areas include, but are not limited to, areas: SL-1, SL-2, and SL-3.

Based upon the information in the RI, it is expected that, at a minimum, 21,300 cu/yds of sludge and soil will have to be treated, excavated, and removed off-site to a permitted landfill from DA-1 and DA-2. Additionally, it is anticipated that, at a minimum, 15,300 cu/yds of soil contaminated primarily with metals will have to be excavated and removed off-site to a permitted landfill from the SL-3, SL-4, SL-5, Sl-6, SL-12, and SL-13. Depending upon further delineation testing at the Site during the design phase, additional amounts of material (soils and sludges above Soil Cleanup Levels) could be included in the remedy.

B. Description of Remedial Components

The preferred remedy, Alternative SC-7B, includes the in-situ (in place) soil-fixation treatment of a minimum of 21,300 cu/yds of lagoon sludges at DA-1 and DA-2 with fly ash and possibly with other compounds such as silica and cement. Following soil-fixation, the fixated sludge from DA-1 and DA-2 together with, at a minimum, an additional 15,300 cu/yds of untreated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 will be excavated, loaded on trucks, and taken to an off-site permitted landfill. All contaminated Site soils/sludges above Soil Cleanup Levels will be included in the remedy and will be completely defined as a result of design delineation studies. The preferred remedy, Alternative SC-7B, must satisfy the three conditions described above (Section X) in order to be implemented. If all of the conditions are not met, then a contingent remedy, Alternative SC-2, RCRA Subtitle C Capping, will be the remedy for the Site.

The RCRA Subtitle C Cap will cover at least, but not limited to, the lagoon areas DA-1 and DA-2 and contaminated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13. Pending design studies, these soil areas may be consolidated prior to Capping. As in the case of the preferred remedy, all contaminated Site soils/sludges above the Soil Cleanup Levels will be included in the remedy and will be completely defined as a result of design delineation studies. Both the preferred remedy and the contingent remedy will address the primary risk at the Site which is direct contact with and/or ingestion of Site soils and/or sludges. The components of the selected remedy, SC-7B and the contingent remedy SC-2 are described below:

1. Selected Remedy Components - SC-7B

At a minimum, the following components of Alternative SC-7B shall be performed by the party or parties responsible for the implementation of the remedial action:

a. Landfill Commitment Letter

As the initial step in the design, a commitment letter shall be obtained from the permitted landfill and sent to EPA. The letter from the landfill authority shall describe the costs for disposal, the amount of waste to be accepted, specific requirements for testing and any other requirements that the landfill authority may have. This letter shall be accompanied with an estimate for the cost for transportation and disposal of waste at the permitted landfill.

b. Treatability Studies

(1) Bench scale tests treatability studies: A treatability study will be performed during the design stage to determine the appropriate mix of fly ash with the various waste in the lagoons DA-1 and DA-2 on Site. Samples for this study will be collected from the lagoons at DA-1 and DA-2. Additional compounds such as portland cement or other compounds may be added to the fly ash to provide for additional "fixation" of the organic wastes, if required, to produce a treated material that meets the RCRA standards for toxicity and ignitability (40 CFR 261,21 and 261.24). Other tests or standards may be required by the Massachusetts DEP for total hydrocarbon content or by the landfill accepting the waste.

(2) After successful completion of the Bench scale tests, a pilot scale on-site test on not less than 300 cu/yds of material from DA-2 (in an area away from the wetlands and approved by EPA) shall be performed as part of the design study to demonstrate the feasibility of the remedy and to refine mixing requirements and requirements for odor, dust, noise and wetlands controls.

c. Site Preparation

Site preparation activities will be initiated with the construction of access roads necessary for the mobilization and use of excavation, treatment and disposal equipment. Roadway construction and decontamination pads would be constructed to minimize the impacts to wetlands in accordance to the design assumptions made on Appendix B of the FS. Design of the decontamination pad shall be at least 4 inch thick concrete with minimum dimensions of 12 feet wide and 25 feet long. The pad shall contain an adjacent sump pump and holding tank.

d. Drainage Control Plan

Site preparation work shall also include provisions for controlling Site drainage and provisions to assure that silt, soils and sludges do not drain into adjacent wetlands. This will be accomplished by the development and implementation of a "Site Wetlands and Drainage Control Implementation Plan".

Drainage control will be implemented to divert run-off from the disposal areas, in particular disposal areas DA-1 and DA-2, and to control sediment deposition in the wetlands. This plan shall include diversion ditches, sedimentation traps and other measures to control the potential adverse affects of water run-off from the waste Site areas into the adjacent wetlands.

e. Clean Area Delineation Study

Additional soil delineation testing in the areas between and outside the lagoons at DA-1 and DA-2 and at SL-3, SL-4, and SL-5 shall be done to determine the exact area and quantity of material that will be addressed by this remedy. This soil testing shall include tests for Soil Cleanup Levels established by EPA in Section X. In addition, soil testing shall also take place at SL-1, SL-2 (and possibly other areas) to further delineate the Site and determine if these and/or other areas should be included in this remedy. Sediment testing at WA-1 adjacent to the DA-1 disposal area shall also be included as part of this study. All Site soils/sludges shall be remediated up to Soil Cleanup Levels established in Section X.A. of this ROD.

f. Air Monitoring

An air monitoring program shall be implemented to determine if Site activities pose a threat to human health or the environment. The stations employed for monitoring shall be, at a minimum, similar to the stations utilized during the Remedial Investigation. Sampling shall include testing for compounds identified in Section X.A.

g. Existing Cap Removal and Disposal

The existing cap at DA-1 and DA-2 shall be removed immediately prior to the actual mixing with fly ash and other materials that have been identified during the treatability studies to control odor and run-off problems. If required, standing water in the lagoons will be pumped into temporary holding areas on site and tested. The water shall be treated, if required, and disposed of at a local permitted waste facility.

h. Pretreatment of Sludges and Soils

Pretreatment requirements will be determined by EPA during the pilot stage testing. If required, removal of large objects from the sludges and soils will precede mixing with fly ash. These objects will be decontaminated, tested, and disposed of in the off-site landfill.

i. Mixing

Fly ash and possibly other compounds such as silica and cement would be mixed in the lagoons (in-situ mixing) with, at a minimum, 21,300 cu/yds of lagoon sludge at DA-1 and DA-2. Approximately 26,000 tons of fly ash and possibly other additives determined during treatability studies will be required to immobilize the contaminants in the sludge. Approximately 7,000 tons of fly ash from SL-4 would be excavated and combined with about 19,000 tons of additional fly ash that would be purchased and transported to the site. Some pretreatment of the sludges may be required to remove large objects that would interfere with the soil fixation. Additionally dust suppression and odor controls will likely be required during and/or after the mixing stages with fly ash. These controls, as well as the method for mixing, will be determined during the pilot scale test. All soils/sludges above the Soil Cleanup Levels established in Section X.A of this ROD will be included in the remedy (The drums of hazardous waste at DA-1 will be mixed with fly ash and removed off-site with the other "fixed" waste).

j. Testing

The materials scheduled for shipment off-site would be subject to testing for RCRA Toxicity and Ignitability (40 CFR section 261.21 and 261.24), MA DEP requirements for disposal of solid waste, and those requirements of the permitted landfill.

k. Excavation

Following treatment with fly ash, the immobilized sludge would be excavated from the lagoons at DA-1 and DA-2, and combined with untreated soils from SL-3, SL-4, and SL-5, SL-6, SL-12, and SL-13 and other soils above Soil Cleanup Levels and loaded on trucks for off-site disposal in the permitted landfill.

l. Grading and Vegetation

Excavated areas would be backfilled, covered with clean soil, graded to pre-excavation levels, and seeded and maintained for a period of two years or until vegetation in the filled areas becomes reestablished.

m. Groundwater Monitoring

A groundwater monitoring system would be required for a minimum of at least five years to confirm the effectiveness of the remedial action at the Site. This groundwater monitoring system will be installed as one of the initial steps of the remedy. The monitoring system shall include wells in the overburden and bedrock in a minimum of least 12 locations on-site. Effectiveness of the remedy shall be based upon meeting ARARs and upon groundwater monitoring levels in a risk range of between 1×10^{-4} and 1×10^{-6} shall be considered proof of the effectiveness of the remedy.

n. Cost and Implementation Time for Alternative SC-7B

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 8 MONTHS
ESTIMATED TIME FOR OPERATION: 13 MONTHS
ESTIMATED CAPITAL COST: $9,032,000
ESTIMATED O & M COST: $91,000
ESTIMATED TOTAL COST (Present Worth): $9,123,000

2. Contingent Remedy Components, Alternative SC-2

In the event that soil-fixation, Alternative SC-7B, cannot be implemented due to the conditions described in the introduction of Section X of this ROD, a RCRA Subtitle C Cap will be placed over the lagoons at DA-1 and DA-2, and at soil areas SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 and other areas that exceed the Soil Cleanup Levels for the Site. Additional areas for RCRA Capping may be required and will be determined by soil delineation studies during the design stages. At a minimum, the following provisions of Alternative SC-2 shall be performed by the Party responsible for carrying out the remedial actions:

a. Similar Provisions with Alternative SC-7B

1. Site Preparation

Site preparation activities will be initiated with the construction of access roads necessary for the mobilization and use of excavation, treatment and disposal equipment. Roadway construction and decontamination pads would be constructed to minimize the impacts to wetlands in accordance to the design

assumptions made on Appendix B of the FS. Design of the decontamination pad shall be at least 4 inch thick concrete with minimum dimensions of 12 feet wide and 25 feet long. The pad shall contain an adjacent sump pump and holding tank.

2. Drainage Control Plan

Site preparation work shall also include provisions for controlling Site drainage and provisions to assure that silt, soils and sludges do not drain into adjacent wetlands. This will be accomplished by the development and implementation of a "Site Wetlands and Drainage Control Implementation Plan".

In general, drainage control will be implemented to divert run-off from the disposal areas, in particular disposal areas DA-1 and DA-2 and to control sediment deposition in the wetlands. This plan shall include diversion ditches, sedimentation traps and other measures to control the adverse affects of water runoff at the waste site areas into wetlands.

3. Clean Area Delineation Study

Additional soil delineation testing in the areas between and outside the lagoons at DA-1 and DA-2 and at SL-3, SL-4, and SL-5 shall be done to determine the exact area and quantity of material that will be addressed by this remedy. This soil testing shall include tests for Soil Cleanup Levels established by EPA in Section X.A.. In addition, soil testing shall also take place at SL-1, SL-2 (and possibly other areas) to further delineate the Site and determine if these and/or other areas should be included in this remedy. Sediment testing at WA-1 adjacent to the DA-1 disposal area shall also be included as part of this study. All Site soils/sludges shall be remediated up to Soil Cleanup Levels established in Section X.A. of this ROD.

4. Air Monitoring

An air monitoring program shall be implemented to determine if Site activities pose a threat to human health or the environment. The stations employed for monitoring shall be, at a minimum, similar to the stations utilized during the Remedial Investigation. Sampling shall include testing for compounds identified in Section X.A.

b. Feasibility Study for Soils/Sludge Consolidation

A Study to determine the feasibility of soil/sludge consolidation or soil consolidation alone shall be determined as an initial step in the design for the RCRA Caps. This study will determine which areas, if any, could be combined with other areas to reduce cost and increase the efficiency of the Remedy.

c. Existing Cap

A synthetic non-RCRA cap is presently in place and covers the lagoon areas of DA-1 and DA-2. The SL waste areas are not covered at present. This non-RCRA cap was installed as a result of the EPA Emergency Removal (ERA) in April, 1987 to control lagoon overflows into the adjacent wetlands. The design of the new RCRA Subtitle C Cap system will evaluate the feasibility of utilizing the present cap and slurry walls in the remedy (rather than removal) as a measure of additional protectiveness, but not as a substitute for the RCRA Subtitle C Cap.

d. RCRA Subtitle C Cap Components

The RCRA Subtitle C Cap shall include the following components from top to bottom:

1. A top soil layer of at least 24 inches thick to promote vegetative growth. This layer shall contain a minimum layer of six inches of compacted top soil. A flexible geotextile will separate this top layer from the drainage layer which is described next.

2. A drainage layer of 12 inches to provide for drainage away from the underlying impermeable layers. The permeability (K) for this layer shall be 10^{-2} or greater. A geotextile drainage layer may be added in instead of a soil drainage layer.

3. An impermeable flexible liner will lie directly beneath the drainage layer.

4. A 24 to 36 inch layer of compacted clay with a K value of 10^{-6} will underlie the flexible liner.

5. A layer of soil between the clay layer and the area of soil or sludge to be capped to provide a smooth layer for the clay cover. The thickness of this layer will be determined by design studies.

6. A layer of soil or geotextile shall be added to provide for gas collection. This gas shall be vented to the atmosphere.

This Cap would be designed and constructed in accordance with the current Federal Resource Conservation and Recovery Act (RCRA Subtitle C) guidelines in effect at the completion of the Cap Design. Grading and/or other measures will be provided to promote rapid drainage away from the Cap. (The drums of sludge samples at DA-1 will be emptied and added to the sludge at DA-1 prior to Capping.)

e. Concrete Barrier and Retaining Walls

In addition to the RCRA Cap, a concrete barrier wall would be constructed between area DA-1 and the adjacent wetlands at WA-1 and between area DA-2 and Wetlands WA-4, and concrete retaining walls would be constructed around the west side of areas SL-4 and SL-5. The walls would provide side slope stability in addition to preventing the migration of contaminants to the wetlands. Other areas may require barrier and or retaining wall construction and will be determined during the design of the RCRA Cap. If future ground water monitoring should indicate the RCRA Subtitle C Cap was not effective, additional controls may be applied. These controls include additional monitoring as well as additional treatment. The exact nature of the controls that may be implemented would depend upon the nature of the contamination and the specific problems associated with the contamination. This adds to the overall protectiveness of this remedy.

f. Fencing and Signs

Because this Alternative does not include any treatment, contaminated soil would remain on-site beneath the RCRA Subtitle C Cap. In order to protect this RCRA Subtitle C Cap and thereby provide continued, long-term reduction in human exposure to soil contaminants, access to the Capped areas would be restricted by fencing. Hazardous waste warning signs, with wording similar to the existing Site signs will be required to be posted both inside the fence as well as on the fence. These signs shall be made of weather resistant plastic and signs inside the fence shall be placed on fiberglass poles secured in a cement base. Posting inside the fence is required to reduce the opportunity for vandalism. The design of these warning signs shall be determined during design studies.

g. Institutional and Other Controls

Any future development in the southern portion of the Site would be prohibited through Institutional Controls. Drainage controls would also be implemented in order to preclude run-on and potential erosion impacts of rain and snow melt on the RCRA Cap. Finally, a groundwater monitoring program would be developed to allow periodic evaluation of the RCRA Cap's effectiveness in preventing the migration of soil contaminants into groundwater.

The Site is zoned for residential land use, and residential development of the Site has been proposed in the past. With an Alternative such as containment by RCRA Capping, it would not be appropriate to construct residential dwellings or other structures within, or in the immediate vicinity of the untreated contaminated soil areas on-site. Therefore, Institutional Controls, specifically the prohibition of any form of development in the southern 13 acres of the Site, would be a requirement with this Alternative.

h. Groundwater Monitoring

The purpose of groundwater monitoring would allow an indirect method for evaluating the effectiveness and permanence of the RCRA Cap. At least 12 new locations, with wells located in the overburden and in the bedrock would have to be installed in order to provide for comprehensive monitoring. Groundwater monitoring for the Contaminants of Concern, identified in Section X.A, and other hazardous compounds to be identified during the design phase shall be done on a quarterly basis for the first five years at a minimum, and thereafter twice a year.

i. Additional Site Remedial Measures

The combination of a RCRA Cap, security fence and Institutional Controls would eliminate, all risks associated with human exposure to contaminated soil, including those derived from ingestion, dermal contact and inhalation of airborne particulates. However, the contaminants would remain on-site in an untreated form under the RCRA Cap. As a result, there would be a potential residual risk if the RCRA Subtitle C Cap were to fail in the future or, as a result of fence breaching or Institutional Controls failures, be disturbed by future on-site activities and/or vandalism. This remedy would call for operation and maintenance requirements to assure RCRA Cap, fence, and monitoring well integrity, and Institutional Controls.

In addition, if groundwater monitoring shows a risk greater than 10^{-4} or a violation of ARARs, a Site Assessment will

be initiated by the EPA. This Assessment will review all available groundwater and other Site information available to determine if additional treatment and /or controls are necessary. These additional requirements may include one or more of the following: source related controls, migration of contamination controls, Institutional Controls, and continued or additional monitoring requirements and other controls considered applicable. The decision to institute additional Site actions shall be made by the EPA Regional Administrator.

ESTIMATED TIME FOR DESIGN AND CONSTRUCTION: 20 months
ESTIMATED TIME FOR OPERATION: 30 years
ESTIMATED CAPITAL COST: $3,841,000
ESTIMATED O & M COST: $569,000
ESTIMATED TOTAL COST (Present Worth): $4,410,000

XI. STATUTORY DETERMINATIONS

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

1. Alternative SC-7B Soil Fixation with Fly ash and Off-Site Disposal

The remedy at this Site, Alternative SC-7B, 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 off-site disposal of treated wastes; more specifically in-situ treatment with fly ash of contaminated sludges and soils at DA-1 and DA-2; excavation of these treated materials into trucks, and disposal of these wastes, together with untreated soils from SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 and all other soils and /or sludges above Soil Cleanup Levels, to a permitted landfill. This remedy includes all Site contaminated soils/sludges that are above the Soil Cleanup Levels and may include areas in addition to those mentioned above. These additional areas will be delineated during Site design studies as required in Section X.B.1(e) above. Thus this Alternative will eliminate the risk at the Site which is due to contact with and/or ingestion of contaminated soils and sludges.

The selected remedy is protective of human health and the environment and will include a monitoring program that will ensure the protective aspects of the remedy. Moreover, the selected remedy will attain potential human health risk levels that maintain the 1×10^{-4} to 1×10^{-6} incremental cancer risk range and a level protective of non-carcinogenic

endpoints. The remedy will also comply with ARARs and "To Be Considered" criteria. The solution of off-site disposal of Site waste offers a permanent remedy that will allow for the future unrestricted use of the Site.

Implementation of this remedy will not pose unacceptable short-term risks or cross-media impacts since the technologies are proven and will be field tested with a pilot program to reduce operational risks. Engineering controls will be used to minimize potential for noise, dust, and air releases of contaminants during construction activities.

2. The Contingent Remedy, Alternative SC-2 - RCRA Subtitle C Capping

As a contingency to Alternative SC-7B (in the event that one of the conditions in Section X.A. above cannot be met), Alternative SC-2 will be employed to remediate the Site. At a minimum, an on-site RCRA Subtitle C Cap will be placed over the disposal areas at DA-1 and DA-2, as well as at SL-3, SL-4, SL-5, SL-6, SL-12, Sl-13 and over other soils or sludges that are above the Soil Cleanup Levels. While the application of a RCRA Subtitle C Cap will not affect the volume or provide treatment of the waste, RCRA Capping will impede the mobility of the waste through the groundwater and will also control all the primary Site risks associated with exposure to the Site soils and sludges.

Moreover, the data from the Remedial Investigation and other information available in the Administrative Record demonstrate that health based risk associated with average values for Site groundwater, surface water, or sediments in the wetlands are within an average risk of 1×10^{-4} to 1×10^{-6} (Arsenic risk in groundwater for the maximum value is 2.6×10^{-4}). These findings are consistent with the type of wastes found on the Site; that is, the Contaminants of Concern are PAH's and metals, which, with some exceptions, migrate slowly in groundwater. Thus, the risk at the Site is controlled by RCRA Capping. The RCRA Capping Alternative would require engineering controls to assure the RCRA Subtitle C Cap integrity and to assure long-term protectiveness and include:

1. Institutional Controls
2. Long-term Monitoring of Groundwater
3. Periodic Site Inspections
4. Fencing and Posting with Keep Out Signs
5. Control for Precipitation Run-on and Run-Off

6. Periodic upkeep of the RCRA Cap, Including Repairs and Usual Operation and Maintenance

However, the RCRA Subtitle C Cap does not constitute treatment, and, thus, untreated waste remains on-site under implementation of this Alternative. In the event of alteration of the RCRA Cap, the possibility for off-site movement of contaminants in the groundwater exists. As an additional requirement of this Alternative, if the groundwater monitoring demonstrates that health related risk above 1.0×10^{-4} exists or if ARARs are exceeded, a "Site Assessment" will be initiated. This Assessment and a decision for additional Site controls and/or treatment will be made by the Regional Administrator of the EPA. Additional treatment/controls at the Site, if required, may consist of one or more of the following: source control, migration control, Institutional Controls, continued or additional monitoring, and or other measures and/or controls that are determined to be responsive to the particular issues at the Site. This additional requirement for a Site Assessment adds to the overall protectiveness of the RCRA Subtitle C Cap Alternative and for the above reasons EPA has determined that Alternative SC-2 will provide adequate risk reduction.

B. The Selected Remedy Attains ARARs

The Selected Remedy and the Contingent Remedy each will attain all applicable or relevant and appropriate federal and state requirements that apply to the Site. The ARARs for the selected remedial action are derived from substantive portions of environmental laws, and the specific ARARs include, among others, those listed below.

1. Alternative SC-7B Soil-Fixation and Off Site Disposal

(a) Chemical Specific ARARS

(1) Chemical Specific ARARS List

Massachusetts Ground Water Quality Standards - Applicable

- Standards include Ground Water Classification; Water Quality Criteria to Sustain the Designated Uses; and Regulations to Achieve Uses and Maintain Ground Water Quality - 314 CMR 6.00.

Massachusetts Operation and Maintenance and Pretreatment Standards for WasteWater, Treatment Works, and Indirect Discharges, 314 CMR 12.00 - Applicable

Federal Safe Drinking Water Act (SDWA) - Applicable

- National Primary Drinking Water Regulations (NPDWR) 40 CFR 0141.
- Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLG).

Massachusetts Drinking Water Regulations - Applicable

- Massachusetts Maximum Contaminant Levels (MMCLs).
- MMCLs for compounds detected at the Salem Acres Site include Federal MCLs Adopted by DEP - 310 CMR 22.00.

Massachusetts Surface Water Discharge Permit Requirements - Relevant and Appropriate

- Regulates discharges to surface waters and any treatment works associated with discharges. Applicable if any lagoon water requires treatment - 314 CMR 4.04.

Clean Water Act (CWA) - Applicable

- National Pollution Discharge Elimination System (NPDES) A NPDES permit is required if the lagoon water is discharged off-site, as defined in the NCP, to the surface waters of the United States - 40 CFR Parts 122 and 125.

Massachusetts Surface Water Quality Standards - Applicable

- Regulations recommend the use of Federal Ambient Water Quality Criteria (FAWQCs) to establish water quality for toxic pollutants. Applicable if the lagoon is discharged to surface waters of the United States - 314 CMR 4.00.

Clean Air Act (CAA) - Applicable

- National Ambient Air Quality Standards (NAAQS) - 40 CFR Part 50.
- National Emission Standards for Hazardous Air Pollutants (e.g., benzene and vinyl chloride) - 40 CFR Part 61.

Massachusetts Air Pollution Control Regulations - Standards for emissions of hazardous and non-hazardous air pollutants 310 CMR 6.0 through 8.0

(2) Chemical Specific ARARS Description

The groundwater aquifer at the compliance boundary is classified as a Class I source of potable water under the Federal Groundwater Protection Strategy and as Class I by the Commonwealth of Massachusetts. While Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) promulgated under the Federal Safe Drinking Water Act are not applicable to groundwater, they are relevant and appropriate to groundwater maintenance for the selected remedy. Site groundwater presently attains the MCL's (See 40 CFR 300.430(a)(iii)(F)). The Selected Remedy will attain MCLs by the removal of waste off-site which will eliminate discharges into the groundwater. Massachusetts groundwater quality standards for Class I groundwater issued in 314 CMR 6.00 are applicable requirements for the Site. The State drinking water standards that are relevant and appropriate for groundwater as a potential drinking water supply are the Massachusetts Maximum Contaminant Levels (MMCLs) issued under 310 CMR 22.00, which are the same as Federal MMCLs and MCLGs.

In addition to the Federal and State regulatory standards and guidelines for drinking water and groundwater, risk-based criteria are to be considered. These criteria include concentrations derived from EPA Reference Doses (RfDs) and risk-specific doses based on Carcinogenic Potency Factors (CPFs) and standard exposure assumptions for the ingestion of drinking water.

Alternative SC-7B, is not anticipated to have an adverse effect on the Site groundwater, and thus will maintain these ARARs as well as those regulations which have been identified as TBCs above. Moreover, the Site remedy will offer a permanent solution so that groundwater will be a source of future drinking water.

Federal Primary and Secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) exist for emissions of sulfur oxides, carbon monoxide, ozone, nitrogen oxides, lead and particulate matter (PM_{10}). Generation of fugitive dusts and air emissions from sediment excavation or capping operations and soil/sediment consolidation and treatment facilities (air and stabilization treatment systems) are subject to NAAQS. Best available control technologies will be utilized to promote and maintain public health and welfare.

Massachusetts air regulations include Ambient Air Quality Standards (310 CMR 6.00), Air Pollution Control Regulations (310 CMR 7.00) and requirements for the Abatement of Episodic and Incidental Air Pollution Emergencies (310 CMR

8.00). Certain provisions of 310 CMR 7.00 which require the best available emissions controls and specify ambient air quality standards are applicable and will be met by engineered controls. The remaining State standards for fugitive emissions from excavation and consolidation, and emissions from treatment equipment associated with this remedy are relevant and appropriate and will be met through the use of engineering controls. These controls will be completely identified during the design phases of the project.

These Federal and State air standards will guide mitigation measures designed to control the release of fugitive dust, particulate matter and VOCs during excavations at the Site. Odor and dust controls will be established during the pilot scale operation in order to meet all air requirements. These controls may include foams and/or other similar chemicals used to spray on areas to reduce odor and dust and or containment structures that capture dusts and odors and include treatment methods such as filtration, carbon columns, and thermal oxidation. There are a variety of controls that may be utilized and the final selection of dust, odor, and VOC controls shall be determined during the design phase of the pilot scale treatment test.

Massachusetts standards for the treatment of surface water discharges 314 CMR 3.00 and 4.00 and federal requirements under NPDES are relevant and appropriate in the event that lagoon water is collected, treated and discharged to surface waters of the United States via a permitted treatment facility (MTF). Prior to discharge into a MTF, treatment may be required for dissolved and suspended hazardous compounds. Treatment methods utilizing carbon and forms of precipitation for metals removal may be employed. The exact treatment methods to be employed will depend upon the nature of the lagoon water waste constituents.

(b) Location Specific ARARS

(1) Location Specific ARARS List

Massachusetts Wetlands Protection Act (WPA) Regulations - Applicable - 100 foot buffer zone of wetlands is regulated under WPA - 310 CMR 10.00.

Federal Executive Order 11990, Protection of Wetlands - Applicable - These regulations require minimization of wetland destruction.

Federal - Clean Water Act (CWA) - Relevant and Appropriate Requirements under these codes prohibit discharge of dredged or fill material into wetlands - CWA Section 404 (b)(1); 40 CFR part 230, 33 CFR parts 320-330.

Federal - US Fish and Wildlife Coordination Act - 16 USC 661 et. seq.- Applicable - Requirements to mitigate adverse impacts to natural resources including wetlands.

(2) Location Specific ARARS Description

Areas immediately adjacent to the east, north, and west of the Site are wetlands and protected under the Massachusetts Wetlands Protection Act (WPA) Regulations (310 CMR 10.00), the Federal Clean Water Act 404 (b)(1) Dredge and Fill Regulations, the Federal Executive Order 11990 requiring wetland protection, and the Federal Fish and Wildlife Coordination Act (16 USC 661). The Site lies within the 100-foot buffer zone under jurisdiction of the WPA for the wetlands. Activities associated with selected Source Control remedy within the 100-foot buffer zone are subject to the applicable requirements of the above regulations and will be met through the use of engineering controls. During excavation of DA-1 and DA-2 near the wetland areas, sediment traps and erosion control measures will be included as wetland control protection measures. These measures will be completely identified during the design phases of the project. Coordination with the US Fish and Wildlife will also be done to assure that the wetland natural resources are protected.

(c) Action Specific ARARS

(1) Action Specific ARARS List

Massachusetts Air Pollution Control Regulations - Applicable 310 CMR 6.00, 7.00, and 8.00

Massachusetts Hazardous Waste Regulations, 310 CMR 30.00 These regulations are consistent with RCRA and provide for the identification, handling, transport, and record keeping of hazardous waste including:

- 310 CMR 30.500, 30.561, 30.590, 30.610 - 30.633, 30.640, 30.660 are relevant and appropriate requirements
- 310 CMR 30.680 and 30.690 are applicable to material transferred to containers and tanks

Clean Air Act (CAA) - Relevant and Appropriate

- National Ambient Air Quality Standards (NAAQS) - 40 CFR Part 50
- NAAQS for Hazardous Air Pollutants - 40 CFR Part 61
- Utilize Best Available Control Technologies for emissions.

Resource Conservation and Recovery Act (RCRA) - Applicable

- RCRA Subtitle C, 40 CFR 260 - Regulates the Generation, Transport, Excavation, Storage, Treatment and Disposal of Hazardous Waste.
- RCRA Part 264 requirements that are applicable to this remedial action involving on-site treatment, storage and disposal of hazardous waste include standards for preparedness and prevention (Subpart C); contingency plan and emergency procedures (Subpart D); groundwater protection (Subpart F); and Closure and Post Closure (Subpart G).

Massachusetts Clean Water Act - Relevant and Appropriate
- Surface Water Discharge Permit Requirements - Regulates discharges to surface waters and any treatment works associated with discharges. Applicable if lagoon water requires treatment and is discharged via a permitted treatment facility to surface waters. - 314 CMR 3.00 and 4.00.

Federal National Pollutant Discharge Elimination System/CWA
- 40 CFR Part 122 and 125 Regulates discharges into surface waters and requires permit.

(2) Action Specific ARARS

Federal Primary and Secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) and Massachusetts Air Pollution Regulations (310 CMR 6.00-8.00) are action specific ARARs. The discussion of these requirements is found above under section B. 1(a), Chemical Specific ARARs. The in-place blending of the sludge with fly ash, and the subsequent excavation of wastefrom the Site will have significant potential for dust and VOC generation. Also grading of the soils and sludges will probably result in dust and VOC generation. The Federal and State air quality regulations would then serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated. Massachusetts Ambient Air Quality Standards (310 CMR 6.00) define a fugitive dust emission standard of 260 ug/m^3. Control equipment are available for fugitive dust control during remediation. Air quality standards for organics can be met with a variety of

treatment methods as an integral component of the remediation technology if required. The need for and use of dust, odor and VOC controls will be determined during the design phase of the pilot scale treatment test.

Under the Clean Water Act (CWA) 40 CFR 122 and 125 and Massachusetts Surface Water Discharge Permit Requirements (314 CMR 3.00) and Massachusetts Surface Water Quality Standards (314 CMR 4.04, 314 CMR 4.06(2)), substantive permit requirements for discharges are relevant and appropriate if any lagoon water is treated and discharged to surface waters via a permitted treatment facility. These requirements include compliance with technology-based standards, water quality criteria, and discharge monitoring systems. Federal water quality standards will be met through appropriate treatment systems such as carbon columns and metals removal if required. As discussed above under Chemical Specific ARARs, these regulations are ARARs and will be met through treatment and engineering controls.

RCRA regulations for waste characteristics under 261.21 are applicable to the Soil-Fixation process since the wastesludges in the DA areas have been defined to be a RCRA ignitable waste. Fly ash (and possibly other compounds to be determined during bench scale and pilot tests) will be mixed with the ignitable waste to result in a treated soil/sludge that is non-ignitable under RCRA. The resultant treated waste will require testing under RCRA 261.21 to assure that the treatment has been effective in removing the ignitable hazard. Other portions of RCRA that are applicable to on-site treatment, storage or disposal, include RCRA Part 264 Standards for Operators of Hazardous Waste Treatment Facilities. These standards will be attained through the application of engineering controls and will be identified during the design stages.

Massachusetts Hazardous Waste Regulations that pertain to above ground storage containers and tanks used to treat or store hazardous waste(310 CMR 30.680 and 30.690) are applicable and will be met through engineering controls including leak-proof enclosed storage containers if required. Additional Massachusetts Hazardous Waste Regulations that pertain to handling, storage, treatment and disposal of hazardous waste on-site are relevant and appropriate requirements and will be met through proper design controls that will be identified during the design stages.

The off-site disposal of wastes generated from the soil and sediment soil-fixation treatment system at this Site must

meet all substantive Federal and State requirements (administrative requirements are not ARARs). The soil-fixation process will result in waste that is no longer hazardous waste; specifically, the treatment with fly ash will render the waste non-toxic and non-ignitable (to be confirmed by specific tests under RCRA at 40 CFR Section 261 Appendix II for toxicity and at 261.21 for ignitability). The off-site disposal will comply with all RCRA Land Disposal Requirements for hazardous waste listed because of characteristics under 40 CFR Section 261 Subpart C.

(d) To Be Considered (TBC)

The following policies, criteria, and guidance (among others) are also to be considered (TBCs) during the implementation of the remedial action:

American Conference of Governmental Industrial Hygienists (ACGIH)- Threshold Limit Value (TLV), Time Weighted Average (TWA) and Short-Term Exposure Limit (STELs).

Clean Water Act (CWA) - Federal Ambient Water Quality Criteria (FAWQCs).

EPA Reference Doses (RfD) - For Non-carcinogens.

EPA Lifetime Health Advisories - For Certain Toxic Chemicals.

EPA Risk Specific Doses - For Carcinogens.

EPA Directive for Lead - OSWER Directive 9355.4-02.

Massachusetts Allowable Ambient Limits (AALs) and Threshold Effects Exposure Limits (TELs) Cited in Chemical Health Effects Assessment Methodology to Derive Ambient levels. Massachusetts DEP, 1989

Massachusetts Office of Research and Standards Drinking Water Guidelines (ORSGLs).

Federal SDWA NPDWR 40 CFR 141 Proposed MCLs

Federal Occupational Health and Safety Act (OSHA; 29 CFR Section 1910.1000) for air contaminants

(TBC is included in ARARS description above)

2. Contingent Remedy - Alternative SC-2, RCRA Capping

(a) Chemical Specific ARARS

(1) Chemical Specific ARARS List

Massachusetts Groundwater Quality Standards - Applicable 314 CMR 6.00.

Massachusetts Air Pollution Control Regulations - Applicable 310 CMR 7.00

Federal Safe Drinking Water Act (SDWA) - Relevant and Appropriate
- National Primary Drinking Water Regulations (NPDWR) 40 CFR 141.
- Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLG)

Massachusetts Drinking Water Regulations - Relevant and Appropriate. These regulations include Maximum Contaminant Levels (MMCLs). MMCLs for compounds detected at the Site include Federal MCLs Adopted by DEP - 310 CMR 22.00

Clean Air Act (CAA) - Applicable
- National Ambient Air Quality Standards (NAAQS)- 40 CFR Part 50.
- NAAQS for Hazardous Air Pollutants - 40 CFR part 60

(2) Chemical Specific ARARS

The groundwater aquifer at the Site is classified as a Class I source of potable water under the Federal Groundwater Protection Strategy and as Class I by the Commonwealth of Massachusetts. While Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) promulgated under the Federal Safe Drinking Water Act are not applicable to groundwater, they are relevant and appropriate to groundwater maintenance. Site groundwater presently attains the MCL's. See 40 CFR 300.430(a)(iii)(F).

Massachusetts groundwater quality standards for Class I groundwater issued in 314 CMR 6.00 are applicable requirements for the Site. The state drinking water standards that are relevant and appropriate for groundwater as a potential drinking water supply are the Massachusetts Maximum Contaminant Levels (MMCLs) issued under 310 CMR 22.00, which are the same as Federal MMCLs and MCLGs.

In addition to the Federal and State regulatory standards and guidelines for drinking water and groundwater, risk-based criteria are to be considered. These criteria include concentrations derived from EPA Reference Doses (RfDs) and

risk-specific doses based on Carcinogenic Potency Factors (CPFs) and standard exposure assumptions for the ingestion of drinking water. The contingent remedy Alternative 2, RCRA Capping will maintain these ARARs by the application of a RCRA Subtitle C Cap that will be protective by preventing migration of contaminants in groundwater.

Federal Primary and Secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) exist for emissions of sulfur oxides, carbon monoxide, ozone, nitrogen oxides, lead and particulate matter (PM_{10}). Generation of fugitive dusts and air emissions from sediment excavation or capping operations and soil/sediment consolidation and treatment facilities (air and stabilization treatment systems) are subject to NAAQS. Best available control technologies will be utilized to promote and maintain public health and welfare. Massachusetts air regulations include Ambient Air Quality Standards (310 CMR 6.00), Air Pollution Control Regulations (310 CMR 7.00) and requirements for the Abatement of Episodic and Incidental Air Pollution Emergencies (310 CMR 8.00). Certain provisions of 310 CMR 7.00 which require the best available emissions controls and specify ambient air quality standards are applicable and will be met. The remaining State standards for fugitive emissions from excavation and consolidation, and the substantive requirements will be met by the application of foams and or other chemicals. The need for such controls with the RCRA Subtitle C Cap option will be dependent upon the amount of materials that are moved for consolidation prior to capping. These Federal and State air standards will guide mitigation measures designed to control the release of fugitive dust, particulate matter and VOCs during excavations at the Site under the contingent remedy.

(b) Location Specific ARARS

(1) Location Specific ARARS List

Massachusetts Wetlands Protection Act (WPA) Regulations - Applicable - 100 foot buffer zone of wetlands is regulated under WPA - 310 CMR 10.00.

Federal Executive Order 11990, Protection of Wetlands - Applicable - These regulations require minimization of wetland destruction.

Federal - Clean Water Act (CWA) - Applicable - Requirements under these codes prohibit discharge of dredged or fill material into wetlands - CWA Section 404 (b)(1); 40 CFR part 230, 33 CFR parts 320-330

(2) Location Specific ARARS

Both federal and state wetland laws and regulations (Clean Water Act (CWA) 33 USC Section 404 (b)(1)., 33 CFR 320 to 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 would be complied with under this option. Areas immediately adjacent to the east ,north, and west of the Site are wetlands under the Massachusetts Wetlands Protection Act (WPA) Regulations (310 CMR 10.00). The Site lies within the 100-foot buffer zone under jurisdiction of the WPA for the wetlands. Activities associated with selected source control remedy within the 100-foot buffer zone are subject to the applicable requirements of the WPA and will be met through the use of engineering controls. During RCRA Capping at DA-1 and DA-2 near the wetland areas, sediment traps, erosion control and other measures may be required to protect wetlands. These measures will be completely identified during the design phases of the project. In order to prevent the RCRA Subtitle C Cap encroachment into wetlands, concrete retaining walls at the west and north side of DA-I and at the east side of DA-II will be required to protect wetlands and to provide side slope stability for the RCRA Cap. Concrete retaining walls will also be required in disposal areas SL-4 and SL-5 as well as other areas to be determined during design phase to provide for wetlands protection. Coordination with the US Fish and Wildlife Agency will also be done to assure that the remedy does not pose a threat to natural resources.

(c) Action Specific ARARS

(1) Action Specific ARARS

Massachusetts Air Pollution Control Regulations - Applicable
- 310 CMR 7.01, 7.02 (2)(a), 7.06, 7.09, 7.10, and 7.18

Massachusetts Hazardous Waste Regulations, Applicable
- 310 CMR 30.00 - These regulations are consistent with RCRA and provide for the identification, handling, transport, and record keeping of hazardous waste.
- 310 CMR 30.500, 30.561, 30.590, 30.610 - 30.633, 30.640, 30.660 are relevant and appropriate requirements
- 310 CMR 30.680 and 30.690 are applicable to material transferred into containers and tanks.

Clean Air Act (CAA) - Relevant and Appropriate
- National Ambient Air Quality Standards (NAAQS) - 40 CFR Part 50.
- NAAQS for Hazardous Air Pollutants 40 CFR 1 to 99.

Resource Conservation and Recovery Act - Applicable
- RCRA Subtitle C, 40 CFR 260 - Regulates the Generation, Transport, Excavation, Storage, Treatment and Disposal of Hazardous Waste.
- RCRA Part 264 requirements that are applicable appropriate to this remedial action involving on-site treatment, storage and disposal of hazardous waste include standards for preparedness and prevention (Subpart C); contingency plan and emergency procedures (Subpart D); groundwater protection (Subpart F); closure and post-closure requirements (Subpart G); and landfills (Subpart N).

Massachusetts Clean Water Act - Surface Water Discharge Permit Requirements - Applicable - Regulates discharges to surface waters and any treatment works associated with discharges. Applicable if lagoon water requires treatment and is discharged via a permitted treatment facility to surface waters. - 314 CMR 3.00 and 4.00.

Federal National Pollutant Discharge Elimination System/CWA 40 CFR Part 124 and 125 Regulates discharges into surface waters and requires permit.

(2) Action Specific ARARS

Federal Primary and Secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) and Massachusetts air pollution regulations (310 CMR 6.00-8.00) are action specific ARARs. The discussion of these requirements is found above under Chemical Specific ARARs. Alternative SC-2 may involve some waste consolidation prior to actual RCRA Capping. The excavation of wastefrom one area to another will have significant potential for dust and VOC generation. Also, grading of the soils and sludges will probably result in dust and VOC generation. The federal and state air quality regulations would then serve as applicable action-specific ARARs for excavation activities when fugitive dust or particulate matter is generated. Massachusetts Ambient Air Quality Standards (310 CMR 6.00) define a fugitive dust emission standard of 260 ug/m^3. Control equipment are available for fugitive dust control during remediation. Air quality standards for organics can be met with vapor phase treatment as an integral component of the remediation technology if required.

Under the Clean Water Act (CWA) and Massachusetts Surface Water Discharge Permit Requirements (314 CMR 3.00) and Massachusetts Surface Water Quality Standards (314 CMR 4.04, 314 CMR 4.06(2)), substantive permit requirements for point-

source discharges are relevant and appropriate if any lagoon water is present and requires treatment. Treatment may be required to remove metals and organics prior to discharge. If required, treatment methods may employ the use of carbon columns, flocculation, filtration and other methods to be determined during the design stage. These requirements include compliance with technology-based standards, water quality criteria, and discharge monitoring systems. Federal water quality standards will be met through treatment and testing. Treated lagoon water will be disposed of in a local permitted treatment system.

RCRA regulations are relevant and appropriate since the wastesludges have been defined to be a RCRA ignitable waste. The portions of RCRA Subtitle C that are relevant and appropriate to RCRA Capping include releases from solid waste management units (Subpart F), closure and post-closure requirements (Subpart G); and landfills (Subpart N). The contingent remedy provides a RCRA Subtitle C Cap which covers the contaminated soils, and therefore meets the closure requirements of 40 CFR 264.310(a) and 310 CMR 30.620 et seq. A post-closure monitoring plan that can be used to monitor the effectiveness of the RCRA Subtitle C Cap for the protection of human health and the environment will also be implemented including periodic monitoring as required by SARA regulations (40 CFR 264.90-264, 109, and 310 CMR 30.660).

The Land Disposal Restrictions (LDR) of the Hazardous and Solid Waste Amendments of RCRA will not apply to the remedy. EPA has determined that the movement of contaminated materials for consolidation at the Site does not constitute placement under the LDR. The contaminants of the soil areas (SL-1, SL-2 SL-3) are contiguous to the DA areas and have been caused by activities at the DA areas. Movement of these soil areas to the DA areas therefore constitutes "consolidation within the unit". Likewise the soil areas at SL-4 and SL-5 are contiguous with no clear separation between SL-4 and SL-5 and movement of soils from SL-4 to SL-5 constitutes "consolidation within the unit".

Both federal and state wetlands laws and regulations (Clean Water Act (CWA) 33 U.S.C. 401(b)(1), 33 CFR 320 to 330, and MADEP 310 CMR 10.00) and the Wetlands Executive Order 11990 are potentially applicable location-specific ARARs should construction activities disturb any of the nearby wetlands. These regulations control development activities within and around designated wetland areas and require the minimization of destruction, loss or degradation of wetlands. Compliance with wetlands ARARs would be met with minimization and/or

mitigation of any wetland impacts, although permits and notification requirements do not apply. All Site activities,, would be carried out pursuant to OSHA standards (29 CFR 1910 and 1926), which specify both safe working procedures and the types of safety equipment to be used during all remedial activities. Chemical specific ARARs for groundwater and surface water will be met by RCRA Capping as long as the RCRA Subtitle C Cap remains intact. RCRA Subtitle C Cap integrity will be assured through a process of Operational and Maintenance requirements.

(d) To Be Considered

The following policies, criteria, and guidance (among others) will also be considered (TBCs) during the implementation of the remedial action:

EPA Reference Doses (RfD) - For non-carcinogens.

EPA Lifetime Health Advisories - For certain toxic chemicals

EPA Risk Specific Doses - For carcinogens.

EPA Directive for Lead - OSWER Directive 9355.4-02.

Agency for Toxic Wastes and Disease Registry (ATSDR), - For dioxins.

Massachusetts Allowable Ambient Limits (AALs) and Threshold Effects Exposure Limits (TELs).

Massachusetts Office of Research and Standards Drinking Water Guidelines (ORSGLs).

C. The Selected Remedial Action is Cost-Effective

1. Selected Remedy - SC-7B

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 assessing the relevant three criteria-long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short term effectiveness, in combination. The

relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs. The costs of this remedial alternative are:

COST COMPARISON OF SOURCE CONTROL ALTERNATIVES

ALTERNATIVE		Direct Capital $	O & M $ yr.	$ Present Worth
SC-1	NO ACTION	0	21,500	330,000
SC-2	RCRA CAPPING	2,561,000	37,000	4,410,000
SC-3	INCINERATION/ STABILIZATION	18,857,000	21,000	30,825,000
SC-4	THERMAL DESORPTION/ DECHLORINATION WITH STABILIZATION	15,844,000	21,000	26,765,000
SC-5	SOLVENT EXTRACTION/ STABILIZATION	11,160,000	21,000	19,237,000
SC-6	VITRIFICATION	44,923,000	21,000	44,923,000
SC-7	IMMOBILIZATION	8,602,000	37,000	15,442,000
SC-7A	IMMOBILIZATION/ OFF-SITE DISPOSAL	10,122,000	37,000	18,026,000
SC-7B	SLUDGE FIXATION/ OFF-SITE DISPOSAL	6,056,000	21,000	9,123,000

The most expensive of the options is Alternative SC-6, In-Situ Vitrification at $44,923,000 (not considered feasible because of the potential for fire hazard) while the least expensive is the No-Action Alternative SC-1 which involves costs of $330,000 for groundwater monitoring. Alternatives SC-3, and SC-4 involve thermal decomposition of the organics followed by stabilization for metals and cost $30,825,000 and $26,765,000 respectively. Alternatives SC-3 and SC-4, are not considered cost effective in lieu of the other available lower cost Alternatives SC-2, SC-5, SC-7, SC-7A, and SC-7B that are as protective in removing the Site risk which is due to soil contact and/or ingestion.

Alternative SC-5 involves solvent extraction combined with immobilization and costs $19,237,000. Due to potential problems with implementation, Alternative SC-5 is not as protective as the remaining Alternatives, SC-7, SC-7A, SC-7B and SC-2, and also costs significantly more. Alternatives SC-7 and SC-7A are each a

form of immobilization and cost between $15,000,000 and $18,000,000. Alternative SC-7B, soil fixation with fly ash, is also a form of immobilization and is estimated to cost about $9,123,000. Alternative SC-7B provides for Site protection that is similar or equal to Alternatives SC-7 and SC-7A, but costs significantly less. Alternative SC-7B provides for removal of wastes from the Site; offers a permanent Site solution at $9,123,000 and would result in unlimited future Site use. Additionally, under alternative SC-7B the waste would undergo further controls that are required by law at an off-site permitted landfill. No other remedy provides the same level of Site protectiveness and permanence at such a cost effective price.

2. The Contingent Remedy - SC-2

The contingent remedy to SC-7B is Alternative SC-2, a RCRA Subtitle C Cap at a cost of $4,410,000. Next to the No-Action Alternative SC-1, the RCRA Subtitle C Cap is the lowest cost of all the Alternatives, but it does not provide a permanent solution or reduce Site related risks. Because implementation of Alternative SC-2 would result in untreated waste remaining on-site, SC-2 is not as permanent or as protective as the off-site remedy under SC-7B. However, Alternative SC-2 does provide for protectiveness because the Cap prevents contact with the underlying wastes and because the wastes on-site do not migrate in the groundwater at levels that pose a risk above 1.0×10^{-4} based upon average levels[3]. This has significance when evaluating cost effectiveness, as the amount of risk reduction attained by the RCRA Subtitle C Cap is similar to those options that include treatment - Alternatives SC-3, SC-4, SC-5, SC-6 and SC-7 and leave waste on-site. However, because there is no treatment of waste with Alternative SC-2, the RCRA Subtitle C Cap will require long-term monitoring and operation and maintenance requirements, and Institutional Controls to assure its integrity.

Thus, the selected remedy of Alternative SC-7B, soil-fixation with fly ash, with a contingent remedy for a RCRA Subtitle C Cap, Alternative SC-2, is the most cost effective solution for the Site.

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

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[3] For maximum values, three of 25 values for Antimony showed a risk of 1.3×10^{-4}.

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; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

1. Selected Remedy - SC-7B

The selected remedy of Soil-Fixation and off-site disposal provides a solution that is cost effective, technically easy to implement, and provides for a permanent solution to the Site by removing all waste that presents a risk, and meets all ARARs. This remedy results in a permanent on-site solution and attains off-site permanence through the Institutional Controls and treatment (leachate controls and capping) required by regulations to be provided by an off-site permitted landfill. No other remedy provides the same level of Site protectiveness and permanence at such a low cost. The remedy cost, except for SC-1, no action, and SC-2, RCRA Cap, is the least expensive, yet most Site protective of the Alternatives. The only other Alternative that is provides comparable protectiveness by completely removing waste(and associated Site risk) is Alternative SC-7A, Immobilization with off-site disposal. However, Alternative SC-7A is twice the cost of the selected remedy and would not provide for any greater Site protectiveness.

The selected remedy is also one of the technically easiest to implement and, except for SC-1, the No-Action Alternative, can be completed 12 months faster than Alternatives SC-7A or SC-7 and 24 months faster than Alternatives SC-3, SC-4, or SC-5.

(2) The Contingent Remedy - SC-2

The contingent remedy, the RCRA Subtitle C Capping option, also provides for a cost effective solution in addressing the primary Site risk of contact/ingestion of Site soils and sludges. The RCRA Subtitle C Cap is cost effective and except for SC-1 is the least expensive alternative to implement. The RCRA Subtitle C Cap is based upon proven technology, one of the fastest alternatives to implement, complies with ARARS, and meets all the

short-term requirements. However, Alternative SC-2 does not directly reduce toxicity, volume, or mobility of the contaminants or provide for treatment of the wastes.

Even though the RCRA Subtitle C Cap does not provide for direct treatment, when compared to most alternatives, (except for SC-7A and SC-7B which are the most protective because of the associated off-site waste removal) Alternative SC-2 does provide for similar risk reduction by precluding contact with on-site contaminated soils and wastes in the lagoons and in the contaminated soil areas. As evidence of this risk reduction, the High Density Polyethylene Cap which presently covers the lagoon areas at DA-1 and at DA-2 has been effective in mitigating groundwater contamination (see RI/FS results and Administrative Record) since it was installed as a temporary solution under an EPA Emergency Removal Action in 1987. Also, the contingent remedy requires a series of Institutional Controls and monitoring requirements that provide for RCRA Subtitle C Cap maintenance and long-term protectiveness.

Additionally, in the event that groundwater monitoring shows an elevated risk (above 1×10^{-4} based on average contaminant concentrations for COC) a "Site Assessment" to determine additional controls will be initiated by EPA. These additional controls may be one or more of the following: Institutional Controls, additional monitoring requirements, source treatment, migration control treatment such as a pump and treat options, and/or other additional controls that are determined to be appropriate by the EPA Regional Administrator. Although this requirement adds to the long-term permanence of the contingent remedy, Alternative SC-2 does not provide for a permanent Site solution as does Alternative SC-7B and will always require long-term monitoring, inspections, and operational and maintenance to maintain the protectiveness of the RCRA Cap.

E.1 The Selected Remedy, SC-7B, Satisfies the Preference for Treatment Which Permanently and Significantly reduces the Toxicity, Mobility or Volume of the Hazardous Wastes as a Principal Element

The principal element of the selected remedy SC-7B is the treatment of on-site sludges and soils above Soil Cleanup Levels which includes at a minimum, the removal of the DA treated materials, along with the non-RCRA wastes from the SL areas, to an off-site permitted landfill. This remedy addresses the health risk at the Site which results from potential contact and ingestion of contaminated soils and sludges. The Selected Remedy satisfies the statutory preference for treatment of the RCRA hazardous wastes in the lagoons as a principal element by soil-fixation and off-site disposal in a permitted landfill.

E.2 The Contingent Remedy , Alternative SC-2, Does Not Satisfy the Preference for Treatment as the Principal Element

In the event that the selected remedy SC-7B, Soil Fixation with off-site disposal is not implementable, at a minimum, a RCRA Subtitle C Cap will be applied over the waste areas at DA-1 and DA-2 and at SL-3, SL-4, SL-5, SL-6, SL-12, and SL-13 and at all other areas of soil/sludges that are found above Soil Cleanup Levels during soil delineation design studies. The RCRA Subtitle C Cap does not satisfy the preference for treatment of the wastes as the principal element. **Because Alternative SC-2 does not satisfy the statutory preference for treatment, EPA will not institute this Alternative unless the selected remedy SC-7B cannot be implemented.**

However,the RCRA Subtitle C Cap does control the risk at the Site which results from contact with, and ingestion of contaminated soils and lagoon sludges. Moreover, despite the fact that the waste has been on-site since the mid 1940's and exposed to the potential for migration, the RI data demonstrated that there is not an off-site migration of contaminants that pose an elevated risk and additionally that on-site groundwater is not highly contaminated. The average risk associated with drinking groundwater, eating fish from the nearby wetlands and swimming is within EPA acceptable limits of between 1×10^{-4} and 1×10^{-6}. This is due to the fact that the primary waste contaminants on Site, metals and CPAH, are not highly soluble in water. This has significance in evaluating the appropriate solution to the Site. The RCRA Capping Alternative with effective Institutional Controls and monitoring provides for an effective Site remedy even though it is not considered treatment.

Additionally, through a system of Institutional Controls, the long-term integrity of the RCRA Subtitle C Cap can be maintained. These Institutional Controls include long-term monitoring, fencing, deed restrictions, and periodic Site inspections of the site. In the event that the monitoring of groundwater demonstrates that contaminants are migrating in concentrations that present a risk above 1×10^{-4} or are above the MCLs for drinking water, further controls and treatment at the Site will be evaluated. The additional controls that may be implemented include one or more of the following: additional source controls, migration controls, additional monitoring requirements and Institutional Controls. These additional requirements add to the protectiveness of the and for the above reasons EPA has determined that the RCRA Subtitle C CAP will provide adequate risk reduction.

XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA presented a proposed plan (preferred alternative) for remediation of the Site on **June 24, 1992.** The preferred remedy SC-7B and the contingent remedy SC-2 contain no significant changes from those recommended in the proposed plan.

XIII. STATE ROLE

The Massachusetts Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State Environmental laws and regulations. The State of Massachusetts concurs with the selected remedy for the Salem Acres Site. A copy of the declaration of concurrence letter is attached as Appendix D.

APPENDICES

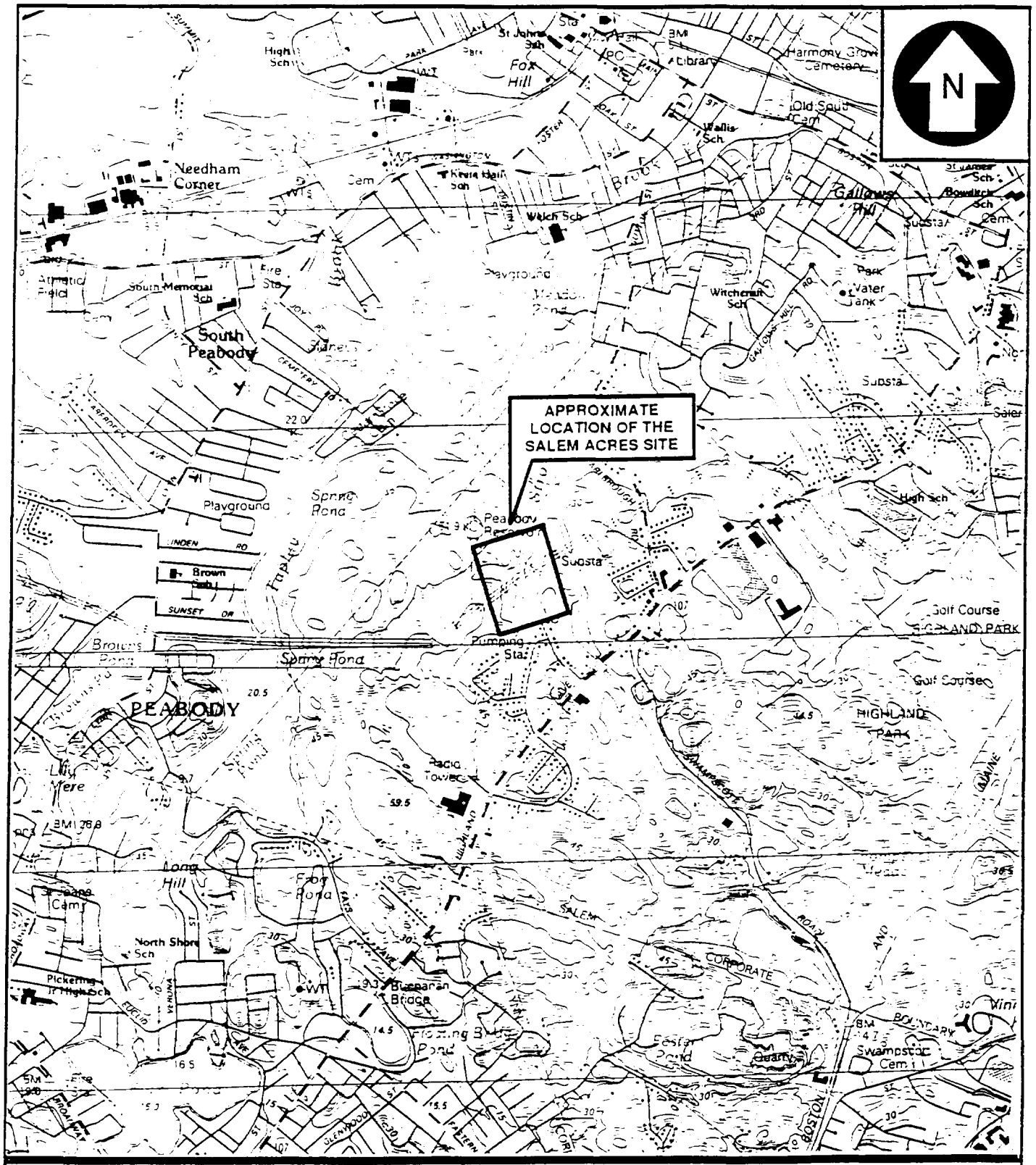
APPENDIX - A - FIGURES

APPENDIX - A

LIST OF FIGURES

Figure 1.

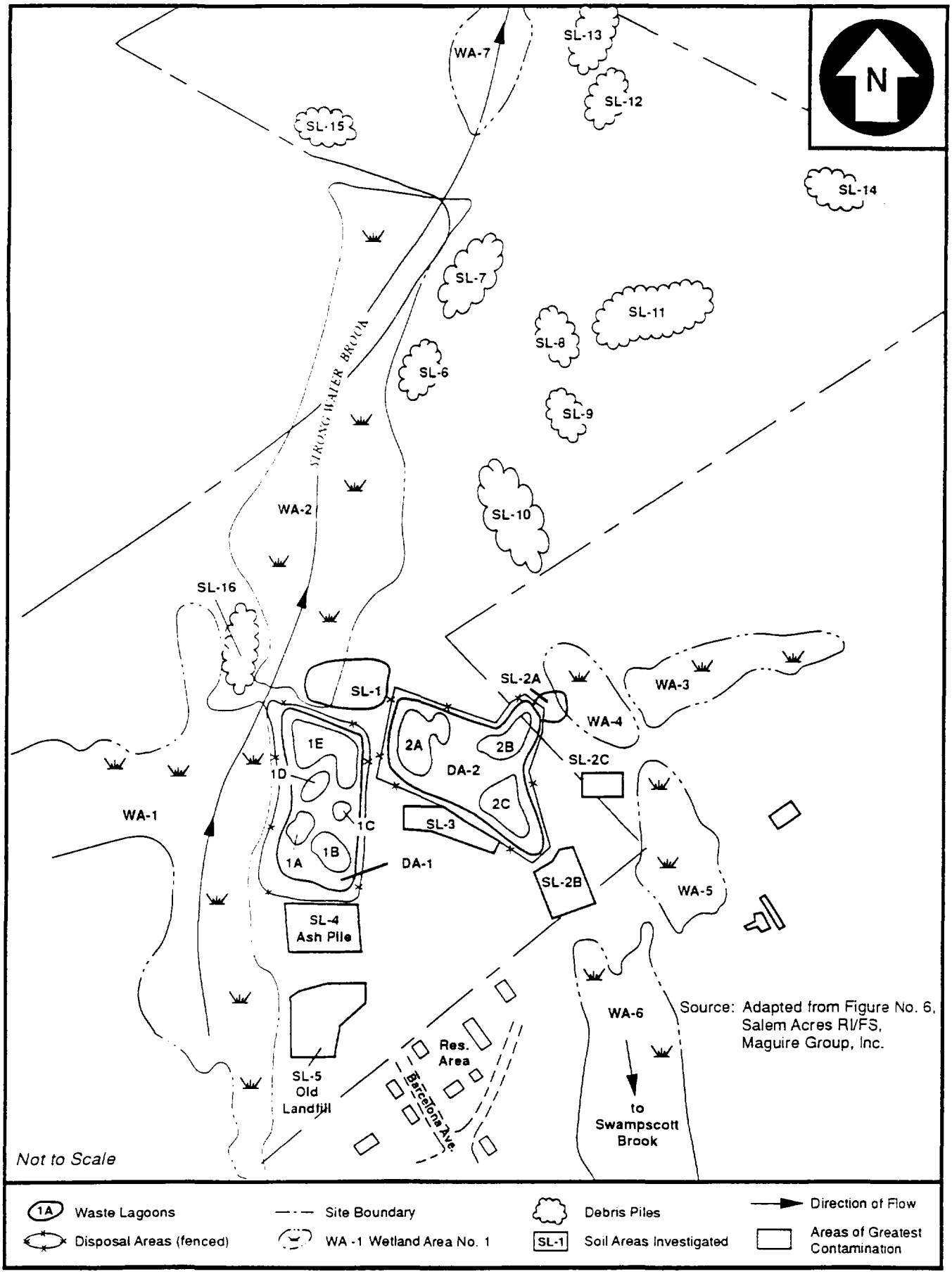
Salem Acres Location Map



BASE MAP IS A PORTION OF THE FOLLOWING USGS 7.5 x 15' SERIES QUADRANGLES:
LYNN, MA, 1985; SALEM, MA, 1985

Figure 2.

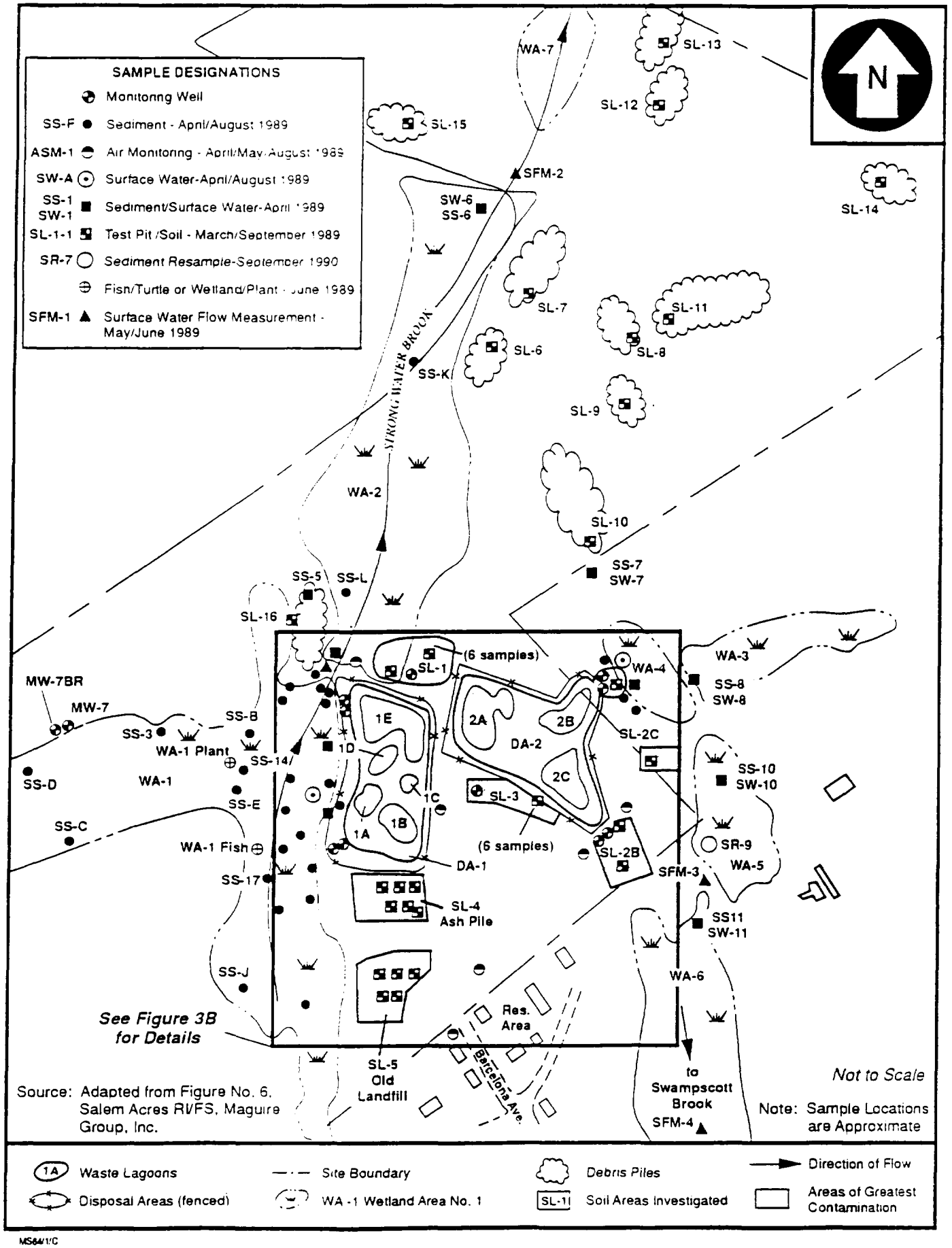
Salem Acres Site Map



MS64/1/B

Figure 3A.

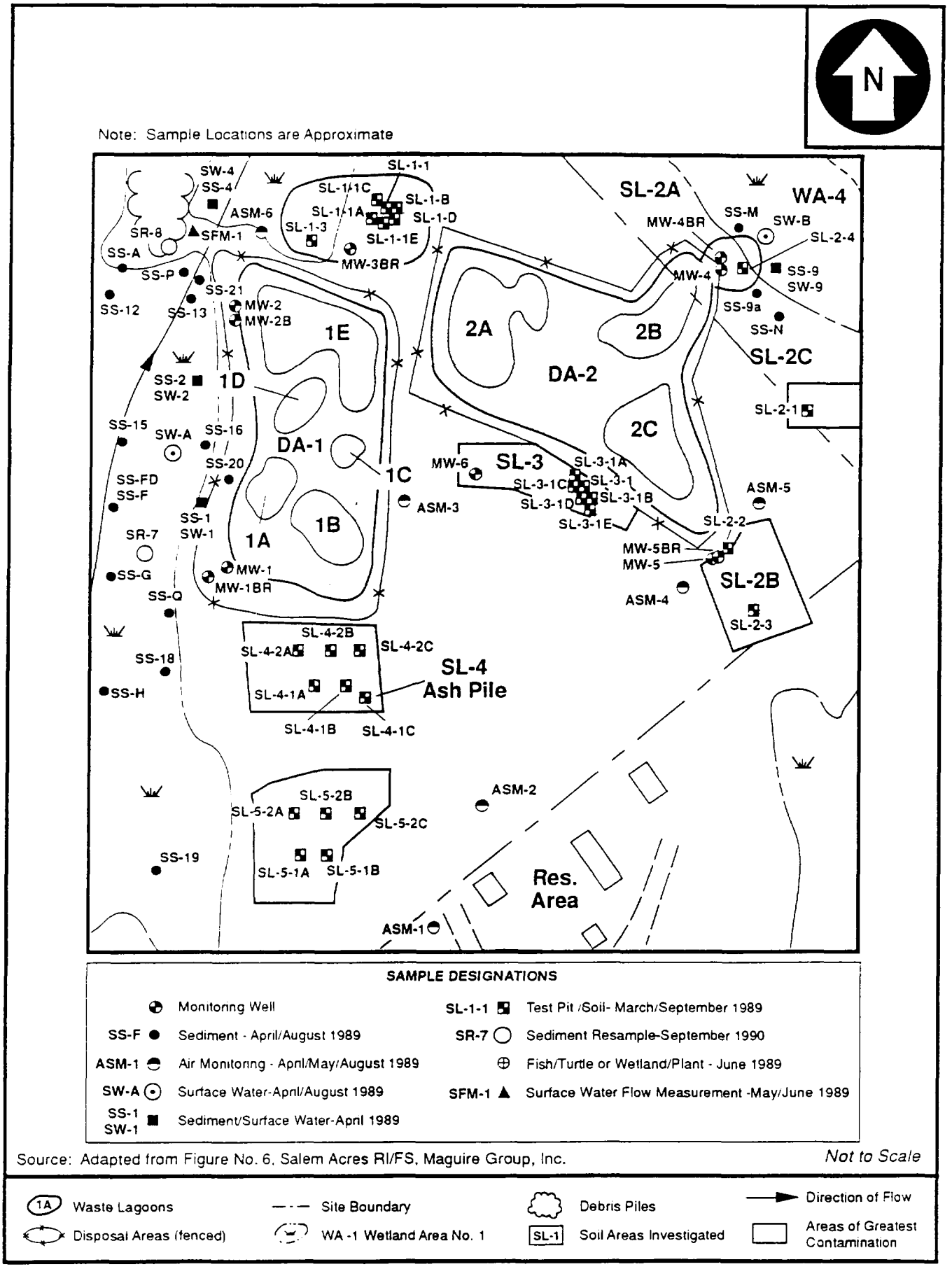
Salem Acres Sampling Locations



MS64/1/C

Figure 3B.

Salem Acres Sampling Locations



Source: Adapted from Figure No. 6, Salem Acres RI/FS, Maguire Group, Inc.

Not to Scale

1A Waste Lagoons

Disposal Areas (fenced)

Site Boundary

WA -1 Wetland Area No. 1

Debris Piles

SL-1 Soil Areas Investigated

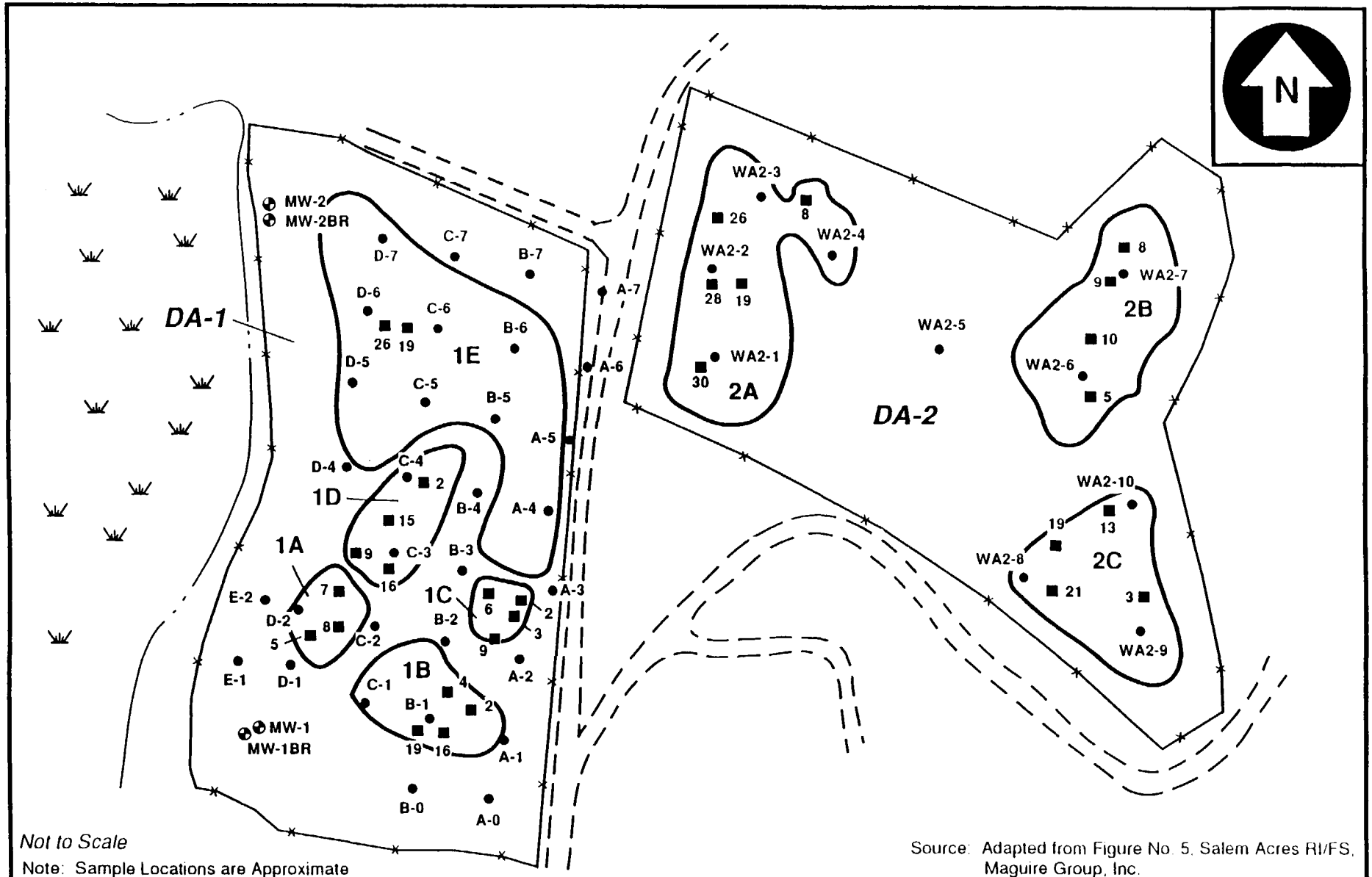
Direction of Flow

Areas of Greatest Contamination

MS64/1:0

Figure 4.

Disposal Area (DA) Sampling Locations



MS63 3 M

APPENDIX - B - TABLES

APPENDIX - B

LIST OF TABLES

TABLE 1
SLUDGE CONTAMINATION LEVELS: DA-1 LAGOONS

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	17	16	7.55E+00	1.10E+01
[mg/kg]	Acetone	20	15	1.94E+01	5.10E+01
	trans-1,2-Dichloroethene	20	4	6.30E+00	1.20E+01
	2-Butanone	20	0	ND	ND
	Trichloroethene	20	6	4.03E+00	1.10E+01
	Benzene	12	7	2.24E+00	3.90E+00
	Tetrachloroethene	20	6	5.15E+00	1.30E+01
	Toluene	7	6	3.78E+01	8.70E+01
	Ethylbenzene	7	2	4.95E+01	5.80E+01
	Total Xylenes	7	6	5.22E+02	1.10E+03
Semi-VOCs	Naphthalene	27	8	6.05E+02	2.00E+03
[mg/kg]	2-Methylnaphthalene	27	6	6.32E+02	1.60E+03
	Fluorene	27	2	2.30E+01	2.60E+01
	4-Nitroaniline	27	1	2.80E+01	2.80E+01
	N-Nitrosodiphenylamine	27	1	3.40E+01	3.40E+01
	Phenanthrene	27	3	3.57E+01	3.80E+01
	Fluoranthene	27	1	9.50E+00	9.50E+00
	Pyrene	27	1	1.30E+01	1.30E+01
	bis(2-Ethylhexyl) phthalate	27	2	4.69E+01	8.70E+01
	Di-n-octyl phthalate	27	0	ND	ND
	Benzo (b) Fluoranthene	27	0	ND	ND
	Benzo (k) Fluoranthene	27	0	ND	ND
Dioxins/Furans	2,3,7,8-TCDD Equivalent [ug/kg]	5	5	4.13E+00	8.44E+00
Pesticides/	4,4'-DDE	19	1	1.30E-01	1.30E-01
PCBs	4,4'-DDD	19	2	1.08E+00	1.50E+00
[mg/kg]	Aroclor 1254	19	2	3.68E+00	6.40E+00
Metals	Aluminum	20	20	2.34E+04	8.44E+04
[mg/kg]	Arsenic	20	2	2.55E+01	3.00E+01
	Barium	20	19	3.15E+02	9.40E+02
	Cadmium	20	0	ND	ND
	Calcium	20	20	1.28E+04	3.23E+04
	Chromium	20	17	7.01E+02	1.78E+03
	Copper	20	4	6.88E+01	1.17E+02
	Iron	20	20	1.17E+04	5.00E+04
	Lead	20	4	1.52E+02	2.36E+02
	Magnesium	20	13	3.27E+03	7.71E+03
	Manganese	20	13	3.32E+02	7.85E+02
	Mercury	20	0	ND	ND
	Sodium	20	13	1.30E+04	3.20E+04
	Titanium	20	19	2.60E+03	9.64E+03
	Zinc	20	20	1.70E+02	6.10E+02

Notes: (1) Unlisted analytes were not detected in sludge samples from any of the lagoons. (2) ND = Not detected (i.e., below sample detection limit) in all samples from lagoon. NA = Not analyzed or analyte rejected during data validation.

TABLE 2

SLUDGE CONTAMINATION LEVELS: DA-2 LAGOONS

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	6	2	4.28E+01	7.80E+01
[mg/kg]	Acetone	12	1	5.60E-02	5.60E-02
	trans-1,2-Dichloroethene	12	0	ND	ND
	2-Butanone	12	1	2.00E+02	2.00E+02
	Trichloroethene	12	0	ND	ND
	Benzene	12	0	ND	ND
	Tetrachloroethene	12	0	ND	ND
	Toluene	12	1	1.30E+01	1.30E+01
	Ethylbenzene	12	9	1.75E+02	2.80E+02
	Total Xylenes	12	9	4.57E+02	8.10E+02
Semi-VOCs	Naphthalene	18	11	2.21E+02	1.20E+03
[mg/kg]	2-Methylnaphthalene	18	5	7.29E+01	1.60E+02
	Fluorene	18	0	ND	ND
	4-Nitoraniline	18	0	ND	ND
	N-Nitrosodiphenylamine	18	2	2.59E+01	4.40E+01
	Phenanthrene	18	1	2.30E+00	2.30E+00
	Fluoranthene	18	2	2.40E+00	2.40E+00
	Pyrene	18	0	ND	ND
	bis(2-Ethylhexyl)phthalate	18	6	6.81E+01	2.10E+00
	Di-n-octylphthalate	18	1	5.80E+00	5.80E+00
	Benzo(b)Fluoranthene	18	2	2.87E+01	5.50E+01
	Benzo(k)Fluoranthene	18	2	2.87E+01	5.50E+01
Dioxins/Furans	2,3,7,8-TCDD Equivalent [ug/kg]	3	3	8.97E+00	2.10E+01
Pesticides/	4,4'-DDE	3	0	ND	ND
PCBs	4,4'-DDD	3	0	ND	ND
[mg/kg]	Aroclor 1254	3	3	3.91E+00	5.90E+00
Metals	Aluminum	12	12	1.11E+04	5.18E+04
[mg/kg]	Arsenic	12	0	ND	ND
	Barium	12	12	3.30E+02	6.66E+02
	Cadmium	12	1	1.70E+01	1.70E+01
	Calcium	12	12	1.41E+04	1.92E+04
	Chromium	12	12	1.03E+03	3.44E+03
	Copper	12	3	7.23E+01	1.04E+02
	Iron	12	12	4.48E+03	2.09E+04
	Lead	12	6	1.52E+02	2.69E+02
	Magnesium	12	3	3.39E+03	4.65E+03
	Manganese	12	4	2.74E+02	4.79E+02
	Mercury	12	2	5.75E-01	8.50E-01
	Sodium	12	3	1.40E+04	2.04E+04
	Titanium	12	9	1.57E+03	4.28E+03
	Zinc	12	12	1.95E+02	4.63E+02

Notes: (1) Unlisted analytes were not detected in sludge samples from any of the lagoons. (2) ND = Not detected (i.e., below sample detection limit) in all samples from lagoon. NA = Not analyzed or analyte rejected during data validation.

TABLE 3
SOIL CONTAMINATION LEVELS: SL-1

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	10	0	2.71E-02	ND
[mg/kg]	Acetone	10	1	2.64E-02	1.90E-02
	1,1,1-Trichloroethane	10	0	5.43E-03	ND
	Benzene	10	0	5.43E-03	ND
	Toluene	10	0	5.43E-03	ND
	Ethylbenzene	10	0	5.43E-03	ND
	Total Xylenes	10	0	5.43E-03	ND
Semi-VOCs	Benzyl alcohol	10	0	2.17E-01	ND
[mg/kg]	2-Methylphenol	10	0	2.17E-01	ND
	4-Methylphenol	10	0	2.17E-01	ND
	Benzoic acid	10	0	1.09E+00	ND
	Naphthalene	10	2	2.04E-01	1.90E-01
	2-Methylnaphthalene	10	1	2.03E-01	5.90E-02
	Dimethyl phthalate	10	0	2.17E-01	ND
	Acenaphthylene	10	2	1.90E-01	6.80E-02
	Acenaphthene	10	2	1.99E-01	1.10E-01
	Dibenzofuran	10	2	2.04E-01	1.70E-01
	Diethyl phthalate	10	0	2.17E-01	ND
	Fluorene	10	2	2.07E-01	1.70E-01
	N-Nitrosodiphenylamine	10	0	2.17E-01	ND
	Hexachlorobenzene	10	0	2.17E-01	ND
	Phenanthrene	10	4	5.19E-01	1.90E+00
	Anthracene	10	2	2.22E-01	2.20E-01
	Di-n-butyl phthalate	10	3	3.09E-01	6.30E-01
	Fluoranthene	10	4	5.97E-01	2.00E+00
	Pyrene	10	4	5.36E-01	1.70E+00
	Butyl benzyl phthalate	10	0	2.17E-01	ND
	Benzo(a)anthracene	10	4	3.09E-01	7.20E-01
	Chrysene	10	4	3.26E-01	7.90E-01
	bis (2-Ethylhexyl) phthalate	10	0	2.17E-01	ND
	Benzo (b) Fluoranthene	10	4	4.43E-01	1.20E+00
	Benzo (k) Fluoranthene	10	4	4.43E-01	1.20E+00
	Benzo (a) pyrene	10	4	2.83E-01	6.20E-01
	Indeno(1,2,3-cd)pyrene	10	4	2.37E-01	4.70E-01
	Dibenzo(a,h)anthracene	10	3	1.75E-01	1.40E-01
	Benzo(g,h,i)perylene	10	4	2.21E-01	4.00E-01
Pesticides/	Endosulfan I	10	0	5.29E-03	ND
PCBs	4,4'-DDE	10	0	1.06E-02	ND
[mg/kg]	4,4'-DDD	10	0	1.06E-02	ND
	4,4'-DDT	10	0	1.06E-02	ND
	Aroclor 1260	10	0	1.06E-01	ND

TABLE 3
SOIL CONTAMINATION LEVELS: SL-1

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
Metals	Aluminum	8	8	5.92E+03	9.94E+03
[mg/kg]	Arsenic	8	8	1.86E+00	3.40E+00
	Barium	8	8	1.67E+01	4.58E+01
	Beryllium	8	8	4.09E-01	6.00E-01
	Cadmium	8	0	6.06E-01	ND
	Calcium	8	8	4.98E+03	2.58E+04
	Chromium	8	4	6.13E+00	1.48E+01
	Cobalt	8	8	4.71E+00	1.00E+01
	Copper	8	8	1.12E+01	2.36E+01
	Iron	8	8	1.04E+04	1.82E+04
	Lead	8	8	3.08E+01	1.52E+02
	Magnesium	8	8	1.81E+03	3.16E+03
	Manganese	8	8	1.24E+02	2.60E+02
	Mercury	8	1	6.53E-02	1.00E-01
	Nickel	8	5	1.71E+01	1.06E+02
	Potassium	8	5	2.63E+02	4.60E+02
	Selenium	8	1	2.46E-01	2.80E-01
	Silver	8	0	6.06E-01	ND
	Sodium	8	0	3.63E+00	ND
	Thallium	8	0	2.42E-01	ND
	Vanadium	8	8	1.73E+01	3.20E+01
	Zinc	8	8	5.90E+01	1.59E+02
	Cyanide (Total)	8	0	1.51E-01	ND

Notes: (1) Unlisted analytes were not detected in soil samples from any of the five soil areas. (2) ND = Not detected (i.e., below sample detection limit) in all samples from a soil area. NA = Not analyzed or analyte rejected during data validation.

TABLE 4

SOIL CONTAMINATION LEVELS: SL-2

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	3	0	2.92E-02	ND
[mg/kg]	Acetone	3	0	2.92E-02	ND
	1,1,1-Trichloroethane	3	0	5.83E-03	ND
	Benzene	3	0	5.83E-03	ND
	Toluene	3	0	5.83E-03	ND
	Ethylbenzene	3	0	5.83E-03	ND
	Total Xylenes	3	0	5.83E-03	ND
Semi-VOCs	Benzyl alcohol	5	0	2.60E-01	ND
[mg/kg]	2-Methylphenol	5	0	2.60E-01	ND
	4-Methylphenol	5	0	2.60E-01	ND
	Benzoic acid	5	1	1.71E+00	3.20E+00
	Naphthalene	5	0	2.60E-01	ND
	2-Methylnaphthalene	5	0	2.60E-01	ND
	Dimethyl phthalate	5	0	2.60E-01	ND
	Acenaphthylene	5	0	2.60E-01	ND
	Acenaphthene	5	0	2.60E-01	ND
	Dibenzofuran	5	0	2.60E-01	ND
	Diethyl phthalate	5	1	2.21E-01	5.80E-02
	Fluorene	5	0	2.60E-01	ND
	N-Nitrosodiphenylamine	5	0	2.60E-01	ND
	Hexachlorobenzene	5	0	2.60E-01	ND
	Phenanthrene	5	4	1.12E-01	9.40E-02
	Anthracene	5	0	2.60E-01	ND
	Di-n-butyl phthalate	5	0	2.60E-01	ND
	Fluoranthene	5	4	1.56E-01	1.60E-01
	Pyrene	5	4	1.52E-01	1.60E-01
	Butyl benzyl phthalate	5	0	2.60E-01	ND
	Benzo(a)anthracene	5	3	1.51E-01	7.10E-02
	Chrysene	5	4	1.16E-01	1.00E-01
	bis (2-Ethylhexyl) phthalate	5	2	1.75E-01	6.90E-02
	Benzo (b) Fluoranthene	5	4	1.48E-01	1.70E-01
	Benzo (k) Fluoranthene	5	4	1.48E-01	1.70E-01
	Benzo (a) pyrene	5	4	1.06E-01	8.50E-02
	Indeno(1,2,3-cd)pyrene	5	1	2.29E-01	7.90E-02
	Dibenzo(a,h)anthracene	5	0	2.60E-01	ND
	Benzo(g,h,i)perylene	5	1	2.28E-01	7.40E-02
Pesticides/	Endosulfan I	5	0	9.20E-03	ND
PCBs	4,4'-DDE	5	0	1.84E-02	ND
[mg/kg]	4,4'-DDD	5	0	1.84E-02	ND
	4,4'-DDT	5	0	1.84E-02	ND
	Aroclor 1260	5	0	1.84E-02	ND

TABLE 4
SOIL CONTAMINATION LEVELS: SL-2

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
Metals	Aluminum	4	4	1.18E+04	1.29E+04
[mg/kg]	Arsenic	4	4	3.85E+00	4.40E+00
	Barium	4	4	5.44E+01	7.47E+01
	Beryllium	4	4	6.03E-01	8.10E-01
	Cadmium	4	0	5.63E-01	ND
	Calcium	4	4	2.56E+03	5.06E+03
	Chromium	4	4	1.46E+01	2.00E+01
	Cobalt	4	4	9.25E+00	1.27E+01
	Copper	4	2	1.95E+01	6.55E+01
	Iron	4	4	2.66E+04	4.17E+04
	Lead	4	4	1.22E+02	3.27E+02
	Magnesium	4	4	1.62E+03	2.51E+03
	Manganese	4	4	4.88E+02	8.41E+02
	Mercury	4	2	2.39E-01	7.00E-01
	Nickel	4	4	1.52E+01	3.46E+01
	Potassium	4	4	3.66E+02	6.53E+02
	Selenium	4	4	5.08E-01	8.20E-01
	Silver	4	0	5.63E-01	ND
	Sodium	4	0	2.08E+02	ND
	Thallium	4	0	2.82E-01	ND
	Vanadium	4	4	3.95E+01	4.61E+01
	Zinc	4	4	7.60E+01	1.29E+02
	Cyanide (Total)	4	3	6.66E-01	1.20E+00

Notes: (1) Unlisted analytes were not detected in soil samples from any of the five soil areas. (2) ND = Not detected (i.e., below sample detection limit) in all samples from a soil area. NA = Not analyzed or analyte rejected during data validation.

TABLE 5
SOIL CONTAMINATION LEVELS: SL-3

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	15	0	9.39E-01	ND
[mg/kg]	Acetone	15	2	9.35E-01	2.80E-01
	1,1,1-Trichloroethane	15	0	1.88E-01	ND
	Benzene	15	0	1.88E-01	ND
	Toluene	15	8	3.89E-01	2.80E+00
	Ethylbenzene	15	4	7.15E-01	5.80E+00
	Total Xylenes	15	8	5.14E+00	4.10E+01
Semi-VOCs	Benzyl alcohol	15	0	1.12E+01	ND
[mg/kg]	2-Methylphenol	15	0	1.12E+01	ND
	4-Methylphenol	15	1	1.12E+01	1.00E-01
	Benzoic acid	15	0	5.62E+01	ND
	Naphthalene	15	14	2.56E+01	2.40E+02
	2-Methylnaphthalene	15	10	3.41E+01	4.10E+02
	Dimethyl phthalate	15	1	1.12E+01	5.30E-02
	Acenaphthylene	15	0	1.12E+01	ND
	Acenaphthene	15	1	1.12E+01	5.80E-01
	Dibenzofuran	15	1	1.13E+01	6.00E-01
	Diethyl phthalate	15	2	1.12E+01	9.90E-02
	Fluorene	15	1	1.13E+01	7.40E-01
	N-Nitrosodiphenylamine	15	0	1.12E+01	ND
	Hexachlorobenzene	15	0	1.12E+01	ND
	Phenanthrene	15	11	1.12E+01	5.10E+00
	Anthracene	15	1	1.13E+01	1.50E+00
	Di-n-butyl phthalate	15	10	1.06E+01	4.40E+00
	Fluoranthene	15	7	1.13E+01	3.80E+00
	Pyrene	15	7	1.13E+01	4.00E+00
	Butyl benzyl phthalate	15	1	1.12E+01	1.20E-01
	Benzo(a)anthracene	15	7	1.11E+01	1.90E+00
	Chrysene	15	7	1.11E+01	1.90E+00
	bis (2-Ethylhexyl) phthalate	15	8	1.12E+01	2.30E+00
	Benzo (b) Fluoranthene	15	7	1.12E+01	2.40E+00
	Benzo (k) Fluoranthene	15	7	1.12E+01	2.40E+00
	Benzo (a) pyrene	15	5	1.13E+01	1.40E+00
	Indeno(1,2,3-cd)pyrene	15	5	1.12E+01	6.70E-01
	Dibenzo(a,h)anthracene	15	2	1.12E+01	1.90E-01
	Benzo(g,h,i)perylene	15	5	1.12E+01	2.60E-01
Pesticides/	Endosulfan I	15	1	1.09E-02	1.00E-02
PCBs	4,4'-DDE	15	1	2.12E-02	1.10E-02
[mg/kg]	4,4'-DDD	15	2	2.70E-02	6.50E-02
	4,4'-DDT	15	0	2.11E-02	ND
	Aroclor 1260	15	13	3.99E-01	2.60E+00

TABLE 5
SOIL CONTAMINATION LEVELS: SL-3

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
Metals	Aluminum	13	13	8.56E+03	1.99E+04
[mg/kg]	Arsenic	13	13	2.72E+00	8.00E+00
	Barium	13	13	1.71E+02	7.96E+02
	Beryllium	13	11	5.30E-01	1.30E+00
	Cadmium	13	10	1.13E+00	1.80E+00
	Calcium	13	13	7.42E+03	1.63E+04
	Chromium	13	13	5.85E+02	1.87E+03
	Cobalt	13	11	4.78E+00	1.00E+01
	Copper	13	11	2.28E+01	3.90E+01
	Iron	13	13	1.29E+04	3.07E+04
	Lead	13	13	7.75E+01	1.60E+02
	Magnesium	13	13	2.19E+03	4.78E+03
	Manganese	13	12	1.36E+02	4.01E+02
	Mercury	13	11	5.57E-01	1.50E+00
	Nickel	13	9	1.31E+01	7.60E+01
	Potassium	13	6	3.84E+02	1.29E+03
	Selenium	13	2	3.50E-01	6.00E-01
	Silver	13	3	9.10E-01	2.00E+00
	Sodium	13	0	4.71E+00	ND
	Thallium	13	0	3.14E-01	ND
	Vanadium	13	12	2.63E+01	5.40E+01
	Zinc	13	12	1.31E+02	4.25E+02
	Cyanide (Total)	13	1	2.08E-01	3.00E-01

Notes: (1) Unlisted analytes were not detected in soil samples from any of the five soil areas. (2) ND = Not detected (i.e., below sample detection limit) in all samples from a soil area. NA = Not analyzed or analyte rejected during data validation.

TABLE 6
SOIL CONTAMINATION LEVELS: SL-4

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	11	5	4.90E-02	1.70E-01
[mg/kg]	Acetone	11	0	2.88E-02	ND
	1,1,1-Trichloroethane	11	2	1.12E-02	5.60E-02
	Benzene	11	1	5.62E-03	5.60E-03
	Toluene	11	1	5.64E-03	5.80E-03
	Ethylbenzene	11	0	5.75E-03	ND
	Total Xylenes	11	0	5.75E-03	ND
Semi-VOCs	Benzyl alcohol	11	0	2.91E-01	ND
[mg/kg]	2-Methylphenol	11	0	2.91E-01	ND
	4-Methylphenol	11	1	2.47E-01	3.10E-01
	Benzoic acid	11	0	1.46E+00	ND
	Naphthalene	11	4	3.61E-01	1.90E+00
	2-Methylnaphthalene	11	1	2.96E-01	8.50E-01
	Dimethyl phthalate	11	0	2.91E-01	ND
	Acenaphthylene	11	0	2.91E-01	ND
	Acenaphthene	11	1	3.82E-01	1.80E+00
	Dibenzofuran	11	1	3.46E-01	1.40E+00
	Diethyl phthalate	11	0	2.91E-01	ND
	Fluorene	11	1	3.91E-01	1.90E+00
	N-Nitrosodiphenylamine	11	0	2.91E-01	ND
	Hexachlorobenzene	11	1	2.74E-01	1.80E-02
	Phenanthrene	11	4	1.54E+00	1.50E+01
	Anthracene	11	2	5.20E-01	3.50E+00
	Di-n-butyl phthalate	11	2	2.56E-01	5.60E-02
	Fluoranthene	11	4	1.64E+00	1.60E+01
	Pyrene	11	3	1.29E+00	1.20E+01
	Butyl benzyl phthalate	11	0	2.91E-01	ND
	Benzo(a)anthracene	11	3	8.07E-01	6.80E+00
	Chrysene	11	4	7.61E-01	6.40E+00
	bis (2-Ethylhexyl) phthalate	11	0	2.91E-01	ND
	Benzo (b) Fluoranthene	11	4	1.03E+00	9.20E+00
	Benzo (k) Fluoranthene	11	3	1.11E+00	1.00E+01
	Benzo (a) pyrene	11	3	6.62E-01	5.20E+00
	Indeno(1,2,3-cd)pyrene	11	3	4.75E-01	3.20E+00
	Dibenzo(a,h)anthracene	11	1	2.98E-01	8.70E-01
	Benzo(g,h,i)perylene	11	3	4.49E-01	2.90E+00
Pesticides/	Endosulfan I	11	0	6.73E-02	ND
PCBs	4,4'-DDE	11	0	1.35E-01	ND
[mg/kg]	4,4'-DDD	11	0	1.35E-01	ND
	4,4'-DDT	11	0	1.35E-01	ND
	Aroclor 1260	11	0	1.35E+00	ND

TABLE 6
SOIL CONTAMINATION LEVELS: SL-4

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
Metals	Aluminum	10	10	1.01E+04	1.39E+04
[mg/kg]	Arsenic	10	10	4.63E+01	1.24E+02
	Barium	10	10	3.85E+02	1.39E+03
	Beryllium	10	10	1.64E+00	4.70E+00
	Cadmium	10	2	8.11E-01	2.50E+00
	Calcium	10	10	3.07E+04	1.48E+05
	Chromium	10	10	1.41E+03	5.21E+03
	Cobalt	10	10	9.72E+00	2.01E+01
	Copper	10	10	1.33E+02	5.58E+02
	Iron	10	10	2.55E+04	9.46E+04
	Lead	10	10	7.53E+02	3.22E+03
	Magnesium	10	10	1.58E+03	3.09E+03
	Manganese	10	10	1.52E+02	5.68E+02
	Mercury	10	9	7.17E-01	1.80E+00
	Nickel	10	10	2.46E+01	5.60E+01
	Potassium	10	10	1.03E+03	2.18E+03
	Selenium	10	8	2.70E+00	6.60E+00
	Silver	10	3	1.35E+00	4.00E+00
	Sodium	10	4	7.34E+02	3.63E+03
	Thallium	10	4	6.12E-01	1.70E+00
	Vanadium	10	10	5.70E+01	1.10E+02
	Zinc	10	10	3.18E+02	9.56E+02
	Cyanide (Total)	10	6	1.17E+00	3.20E+00

Notes: (1) Unlisted analytes were not detected in soil samples from any of the five soil areas. (2) ND = Not detected (i.e., below sample detection limit) in all samples from a soil area. NA = Not analyzed or analyte rejected during data validation.

TABLE 7
SOIL CONTAMINATION LEVELS: SL-5

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
VOCs	Methylene Chloride	8	0	3.27E-02	ND
[mg/kg]	Acetone	8	0	3.27E-02	ND
	1,1,1-Trichloroethane	8	0	6.53E-03	ND
	Benzene	8	0	6.53E-03	ND
	Toluene	8	0	6.53E-03	ND
	Ethylbenzene	8	0	6.53E-03	ND
	Total Xylenes	8	0	6.53E-03	ND
Semi-VOCs	Benzyl alcohol	8	1	1.08E+01	1.10E-01
[mg/kg]	2-Methylphenol	8	1	1.08E+01	5.10E-02
	4-Methylphenol	8	1	1.09E+01	1.10E-01
	Benzoic acid	8	2	5.46E+01	2.00E+00
	Naphthalene	8	4	1.05E+01	4.50E+00
	2-Methylnaphthalene	8	3	1.05E+01	1.90E+00
	Dimethyl phthalate	8	0	1.09E+01	ND
	Acenaphthylene	8	5	3.41E+00	2.20E+01
	Acenaphthene	8	4	1.09E+01	6.00E+00
	Dibenzofuran	8	4	1.05E+01	4.60E+00
	Diethyl phthalate	8	0	1.09E+01	ND
	Fluorene	8	4	1.09E+01	5.60E+00
	N-Nitrosodiphenylamine	8	1	1.10E+01	8.00E-01
	Hexachlorobenzene	8	0	1.09E+01	ND
	Phenanthrene	8	6	3.56E+01	1.60E+02
	Anthracene	8	5	7.72E+00	3.30E+01
	Di-n-butyl phthalate	8	1	1.09E+01	7.00E-01
	Fluoranthene	8	6	9.20E+01	5.90E+02
	Pyrene	8	6	9.04E+01	5.90E+02
	Butyl benzyl phthalate	8	0	1.09E+01	ND
	Benzo(a)anthracene	8	6	7.79E+01	5.50E+02
	Chrysene	8	6	8.97E+01	6.40E+02
	bis (2-Ethylhexyl) phthalate	8	3	1.06E+01	1.70E+00
	Benzo (b) Fluoranthene	8	6	1.29E+02	9.20E+02
	Benzo (k) Fluoranthene	8	6	9.36E+01	6.40E+02
	Benzo (a) pyrene	8	6	9.65E+01	7.10E+02
	Indeno(1,2,3-cd)pyrene	8	6	3.29E+01	2.40E+02
	Dibenzo(a,h)anthracene	8	3	1.52E+01	1.10E+02
	Benzo(g,h,i)perylene	8	5	3.25E+01	2.40E+02
Pesticides/	Endosulfan I	8	0	6.40E-02	ND
PCBs	4,4'-DDE	8	2	8.00E-01	5.40E+00
[mg/kg]	4,4'-DDD	8	4	2.44E-01	8.50E-01
	4,4'-DDT	8	2	2.51E+00	1.90E+01
	Aroclor 1260	8	0	1.28E+00	ND

TABLE 7
SOIL CONTAMINATION LEVELS: SL-5

FRACTION	PARAMETER	# SAMPLES	# DETECTS	AVG CONC	MAX CONC
Metals	Aluminum	5	5	9.78E+03	1.23E+04
[mg/kg]	Arsenic	5	5	2.77E+01	3.45E+01
	Barium	5	5	3.64E+02	7.65E+02
	Beryllium	5	5	9.98E-01	1.30E+00
	Cadmium	5	1	9.47E-01	2.10E+00
	Calcium	5	5	1.10E+04	1.99E+04
	Chromium	5	5	5.38E+02	1.85E+03
	Cobalt	5	5	7.64E+00	1.08E+01
	Copper	5	5	5.23E+01	9.00E+01
	Iron	5	5	1.49E+04	1.80E+04
	Lead	5	5	1.14E+03	3.24E+03
	Magnesium	5	5	1.41E+03	1.94E+03
	Manganese	5	5	2.05E+02	3.24E+02
	Mercury	5	4	6.13E-01	1.00E+00
	Nickel	5	5	3.69E+01	7.91E+01
	Potassium	5	5	6.00E+02	9.85E+02
	Selenium	5	5	2.05E+00	2.60E+00
	Silver	5	0	6.80E-01	ND
	Sodium	5	0	2.52E+02	ND
	Thallium	5	2	4.16E-01	5.70E-01
	Vanadium	5	5	2.75E+02	7.40E+02
	Zinc	5	5	6.27E+02	1.52E+03
	Cyanide (Total)	5	5	5.12E+00	2.08E+01

Notes: (1) Unlisted analytes were not detected in soil samples from any of the five soil areas. (2) ND = Not detected (i.e., below sample detection limit) in all samples from a soil area. NA = Not analyzed or analyte rejected during data validation.

TABLE 8 (cont'd)

SALEM ACRES

SLUDGE LAGOONS - CURRENT LAND USE

Potential Carcinogenic and Noncarcinogenic Risks from Exposure to Surface Soils via Incidental Ingestion and Dermal Contact

Major Contaminant*	Frequency of Detection	Concentration (mg/kg) Avg.	Max.	Cancer Risk Avg.	Max.	Hazard Index Avg.	Max.
LAGOON DA1							
Chromium	17/20	700	1800	Z	Z	7.7E-02	2.0E-01
Arsenic	2/20	2.6	30	1.4E-05	1.6E-05	4.7E-02	5.5E-02
Lead	4/20	150	240	Z	Z	Z	Z
Dioxins/Furans**	5/5	0.004	0.008	7.0E-04	1.4E-03	Z	Z
PCBs	3/6	2.3	6.4	5.5E-06	9.4E-06		
		Total Risk (All Chemicals)		7.0E-04	1.4E-03		
LAGOON DA2							
Chromium	12/12	1000	3400	Z	Z	1.1E-01	3.8E-01
cPAHs	2/18	58	110	2.6E-04	5.2E-04	NA	NA
Dioxins/Furans**	3/3	0.009	0.021	1.4E-03	3.5E-03		
PCBs	3/3	5	5.5	5.8E-06	9.8E-06		
		Total Risk (All Chemicals):		1.7E-03	4.0E-03		

TABLE 8

SALEM ACRES

SLUDGE LAGOONS - FUTURE LAND USE

Potential Carcinogenic and Noncarcinogenic Risks from Exposure via Incidental Ingestion and Dermal Contact

Major* Contaminant	Frequency of Detection	Concentration (mg/kg) Avg.	Max.	Cancer Risk Avg.	Max.	Hazard Index Avg.	Max.
LAGOON DA1							
Dioxins/Furans	5/5	0.004	0.008	8.5E-04	1.7E-03	Z	Z
Chromium	17/20	700	1780	Z	Z	1.1E+00	2.9E+00
Arsenic	2/20	2.6	30	1.7E-05	2.0E-05	7.0E-01	8.0E-01
PCBs	2/19	3.7	6.4	3.4E-06	5.9E-06	Z	Z
Lead	4/20	152	236	Z	Z	Z	Z
Total Risk (All Chemicals):				8.7E-04	1.7E-03		
LAGOON DA2							
Chromium	12/12	1000	3440	Z	Z	1.7E+00	5.6E+00
Dioxins/Furans	3/3	0.009	0.021	1.8E-03	4.3E-03	Z	Z
cPAHs	2/18	58	110	3.2E-04	6.2E-04	Z	Z
PCBs	3/3	4	6	6.0E-06	1.0E-05	Z	Z
Lead	6/12	150	270	Z	Z	Z	Z
Total Risk (All Chemicals):				2.2E-03	4.9E-03		

TABLE 8 (cont'd)

SALEM ACRES

SOIL AREAS (SL-1 AND SL-2) - FUTURE LAND USE

Potential Carcinogenic and Noncarcinogenic Risks from Exposure via Incidental Ingestion and Dermal Contact

Major Contaminant*	Frequency of Detection	Concentration (mg/kg) Avg.	Max.	Cancer Risk Avg.	Max.	Hazard Index Avg.	Max.
AREA SL-1							
cPAHs	4/10	2.2	5.14	1.2E-05	2.9E-05	NA	NA
Arsenic	8/8	1.9	3.4	1.3E-06	2.3E-06	5.1E-02	9.3E-02
Beryllium	8/8	0.41	0.6	6.9E-07	1.0E-06	6.7E-04	9.8E-04
Chromium	4/8	6.1	15	Z	ND	1.0E-02	2.4E-02
Lead	8/8	31	152	SEE NOTE BELOW		Z	Z
Total Risk (All Chemicals):				1.5E-05	3.2E-05		
AREA SL-2							
cPAHs	4/5	10.73	6.75	5.4E-06	4.7E-06	NA	NA
Arsenic	4/4	3.8	4.4	2.6E-06	3.0E-06	1.1E-01	1.2E-01
Beryllium	4/4	0.6	0.8	1.0E-06	1.4E-06	9.9E-04	1.3E-03
Chromium	4/4	14.6	20.0	Z	Z	2.4E-02	3.3E-02
Lead	4/4	122	327				
Total Risk (All Chemicals):				1.7E-05	8.2E-06		

TABLE 8 (cont'd)

SALEM ACRES

SOIL AREAS (SL3,SL4,SL5) - FUTURE LAND USE

Potential Carcinogenic and Noncarcinogenic Risks from Exposure via Incidental Ingestion and Dermal Contact

Major Contaminant*	Frequency of Detection	Concentration (mg/kg) Avg.	Max.	Cancer Risk Avg.***	Max.	Hazard Index Avg.	Max.
AREA SL-3							
cPAHs	8/18	77	10.9	4.6E-04	7.3E-05	NA	NA
Arsenic	13/13	2.7	8	1.9E-06	5.5E-06	7.4E-02	2.2E-01
Beryllium	11/13	0.53	1.3	8.9E-07	2.2E-06	8.7E-04	2.1E-03
Chromium	13/13	590	1870	Z	Z	9.6E-01	3.1E+00
		Total Risk (All Chemicals):		4.7E-04	7.3E-05		
AREA SL-4							
cPAHs	4/11	5.1	41.67	2.9E-05	2.4E-04	NA	NA
Arsenic	10/10	46	120	3.2E-05	8.5E-05	1.3E+00	3.4E+00
Beryllium	10/10	1.6	4.7	2.8E-06	7.9E-06	2.7E-03	7.5E-03
Chromium	10/10	1410	5210	Z	Z	2.2E+00	8.5E+00
Lead	10/10	750	3200				
		Total Risk (All Chemicals):		6.6E-05	3.3E-04		
AREA SL-5							
cPAHs	6/8	537	3800	3.0E-03	2.1E-02	NA	
Arsenic	5/5	28	35	1.9E-05	2.4E-05	7.6E-01	9.4E-01
Beryllium	5/5	1	1.3	1.7E-06	2.2E-06	1.6E-03	2.1E-03
Chromium	5/5	538	1850	Z	Z	8.8E-01	3.0E+00
Lead	5/5	1140	3240				
		Total Risk (All Chemicals):		3.0E-03	2.1E-02		

TABLE 8 (cont'd)

ND = nondetect

cPAH = carcinogenic polycyclic aromatic hydrocarbons

PCB = polychlorinated hydrocarbons

Z = Dose response data is inadequate for a quantitative risk assessment

* contaminants contributing to the majority of the risk

** Average risk are higher than maximums where there were nondetect samples with high detection limits; 1/2 the detection limit was greater than the maximum detected concentration.

*** Expressed as 2,3,7,8 TCDD equivalents

TABLE 8 (cont'd)

SOIL AREAS (SL3,SL4,SL5) - CURRENT LAND USE

Potential Carcinogenic and Noncarcinogenic Risks from Exposure via Incidental Ingestion and Dermal Contact

Major Contaminant*	Frequency of Detection	Concentration (mg/kg) Avg.	Max.	Cancer Risk Avg.***	Max.		Hazard Index Avg.	Max.
AREA SL-3								
cPAHs	8/15	77	10.9	3.5E-04	4.8E-05		Z	Z
Arsenic	13/13	2.7	8	1.5E-06	4.3E-06		5.0E-03	1.5E-02
Beryllium	11/13	0.53	1.3	7.1E-07	1.7E-06		5.8E-05	1.4E-04
Chromium	13/13	585	1870	Z	Z		6.4E-02	2.1E-01
		Tota Risk (All Chemicals):		3.8E-04	5.8E-05			
AREA SL-4								
cPAHs	4/11	5.1	41.67	2.2E-05	1.9E-04		NA	NA
Arsenic	10/10	46	124	2.5E-06	6.7E-05		8.5E-02	2.3E-01
Beryllium	10/10	1.6	4.7	2.2E-06	6.3E-06		1.8E-04	5.2E-04
Chromium	10/10	1410	5210	Z	Z		1.6E-01	5.7E-01
Lead	5/5	750	3200					
		Total Risk (All Chemicals):		5.3E-05	2.6E-04			
AREA SL-5								
cPAHs	6/8	537	3800	1.00E-07	2.4E-03	1.7E-02	6.9E-07	NA NA
Arsenic	5/5	28	35	1.15E-07	1.5E-05	1.9E-05	5.5E-07	5.1E-02 6.3E-02
Beryllium	5/5	1	1.3	1.15E-07	1.3E-06	1.7E-06	5.5E-07	1.1E-04 1.4E-04
Chromium	5/5	538	1850	Z	Z	Z	5.5E-07	5.9E-02 2.0E-01
Lead	5/5	1140	3240					
		Total Risk (All Chemicals):		2.4E-03	1.7E-02			

TABLE 8 (cont'd)

SALEM ACRES

SOIL AREAS (SL-1 AND SL-2) - CURRENT LAND USE

Potential Carcinogenic and Noncarcinogenic Risks from Exposure via Incidental Ingestion and Dermal Contact

Major Contaminant*	Frequency of Detection	Concentration (mg/kg) Avg.	Max.	Cancer Risk Avg.	Max.	Hazard Index Avg.	Max.
AREA SL-1							
cPAHs	4/10	2.2	5.14	1.00E-05	1.4E-05	Z	Z
Arsenic	8/8	1.9	3.4	1.0E-06	1.8E-06	3.4E-03	6.2E-03
Beryllium	8/8	0.41	0.6	5.5E-07	8.0E-07	4.5E-05	6.6E-05
Chromium	4/8	6.1	15	Z	Z	6.7E-04	1.6E-03
Lead	8/8	31	152	Z	Z	Z	Z
Total Risk (All Chemicals):				1.20E-05	2.60E-06		
AREA SL-2							
cPAHs	4/5	10.73	6.75	5.1E-06	3.0E-06	NA	NA
Arsenic	4/4	3.85	4.4	2.1E-06	2.4E-06	7.1E-03	8.1E-03
Beryllium	4/4	0.6	0.8	8.0E-07	1.1E-06	6.6E-05	8.9E-05
Chromium	4/4	15	20	Z	Z	1.6E-03	2.2E-03
Lead	4/4	122	327				
Total Risk (All Chemicals):				8.60E-06	6.50E-06		

TABLE 9
ONSITE GROUNDWATER CONTAMINATION LEVELS

FRACTION	PARAMETER	# Samples	# Detects	Avg Conc	Max Conc
VOCs	Acetone	27	1	1.27E+01	1.80E+01
[ug/l]	Carbon Disulfide	27	2	2.65E+00	7.60E+00
	Trichloroethene	27	1	2.45E+00	1.10E+00
	Benzene	27	5	2.37E+00	3.10E+00
	Toluene	27	2	2.41E+00	1.30E+00
	Chlorobenzene	27	7	1.29E+01	7.30E+01
	Ethylbenzene	27	11	1.09E+01	7.00E+01
	Total Xylenes	27	7	4.33E+00	2.20E+01
Semi-VOCs	1,3-Dichlorobenzene	13	3	5.26E+00	3.00E+00
[ug/l]	1,4-Dichlorobenzene	13	5	6.13E+00	8.50E+00
	1,2-Dichlorobenzene	13	3	6.09E+00	1.10E+01
	Benzoic acid	13	1	3.38E+01	6.40E+01
	Naphthalene	13	3	7.51E+00	3.00E+01
	2-Methylnaphthalene	13	4	9.00E+00	1.70E+01
Pesticides/PCBs	Endosulfan I	10	1	2.80E-02	8.00E-02
[ug/l]					
Metals	Aluminum	26	3	1.65E+01	4.45E+01
[ug/l]	Antimony	27	3	1.82E+01	4.92E+01
	Arsenic	27	8	1.53E+00	4.90E+00
	Barium	27	27	4.79E+01	1.37E+02
	Calcium	27	27	7.18E+04	1.51E+05
	Chromium	27	1	2.11E+00	4.10E+00
	Cobalt	27	10	3.90E+00	1.12E+01
	Copper	27	2	3.04E+00	1.19E+01
	Iron	23	22	3.00E+04	1.05E+05
	Lead	27	3	1.24E+00	7.70E+00
	Magnesium	27	27	1.07E+04	2.73E+04
	Manganese	27	26	3.07E+03	7.78E+03
	Nickel	27	2	6.32E+00	1.09E+01
	Potassium	27	27	4.99E+03	1.05E+04
	Selenium	27	3	1.13E+00	3.90E+00
	Sodium	27	27	1.90E+04	7.73E+04
	Vanadium	27	1	2.56E+00	6.70E+00
	Zinc	18	17	2.62E+01	1.52E+02

Notes: (1) Unlisted analytes, including Pesticides and PCBs, were not detected in any monitoring well during any of the sampling rounds.

(2) ND = Not detected. NA = Not analyzed.

TABLE 10
ONSITE SURFACE WATER CONTAMINATION LEVELS

FRACTION	PARAMETER	Adjacent and Downgradient Wetland Areas			
		# Samples	# Detects	Avg Conc	Max Conc
VOCs [ug/l]	Total Xylenes	13	1	2.56E+00	3.30E+00
Metals [ug/l]	Aluminum	11	10	1.34E+02	4.01E+02
	Barium	11	10	1.77E+01	2.87E+01
	Calcium	11	10	1.87E+04	4.51E+04
	Chromium	11	1	2.73E+00	5.00E+00
	Copper	11	9	7.96E+00	3.12E+01
	Iron	11	10	1.59E+03	9.74E+03
	Lead	11	5	1.38E+00	5.00E+00
	Magnesium	11	10	3.23E+03	6.44E+03
	Manganese	11	10	1.88E+02	8.28E+02
	Potassium	11	10	2.06E+03	5.77E+03
	Selenium	11	1	3.08E+00	2.89E+01
	Silver	11	1	2.20E+00	4.20E+00
	Sodium	11	10	1.63E+04	3.94E+04
	Vanadium	11	1	1.83E+00	5.10E+00
	Zinc	1	1	3.38E+01	3.38E+01

Notes:
(1) Unlisted VOC and metal analytes were not detected in any surface water sample.
(2) SVOCs and Pesticides/PCBs were analyzed but not detected in any surface water samples.
(3) ND = Not detected. NA = Not analyzed.

TABLE 11
SEDIMENT CONTAMINATION LEVELS

FRACTION	PARAMETER	Adjacent and Downgradient Wetland Areas			
		# Samples	# Detects	Avg Conc	Max Conc
Semi-VOCs	4-Methylphenol	8	3	3.17E-01	1.70E-01
[mg/kg]	2,4-Dimethylphenol	8	1	3.63E-01	2.50E-01
	Benzoic acid	8	2	1.62E+00	9.10E-01
	Naphthalene	8	2	3.15E-01	5.70E-02
	2-Methylnaphthalene	8	1	3.40E-01	6.30E-02
	Acenaphthylene	8	1	3.44E-01	9.60E-02
	Fluorene	8	2	3.23E-01	9.50E-02
	Phenanthrene	8	6	3.56E-01	8.50E-01
	Anthracene	8	1	3.48E-01	1.30E-01
	Fluoranthene	8	6	4.79E-01	1.50E+00
	Pyrene	8	6	4.41E-01	1.30E+00
	Benzo(a)anthracene	8	5	3.19E-01	5.90E-01
	Chrysene	8	5	3.50E-01	7.20E-01
	Benzo (b) Fluoranthene	8	6	4.04E-01	1.20E+00
	Benzo (k) Fluoranthene	8	6	4.04E-01	1.20E+00
	Benzo (a) pyrene	8	4	3.33E-01	5.40E-01
	Indeno(1,2,3-cd)pyrene	8	2	3.38E-01	2.40E-01
	Dibenzo(a,h)anthracene	8	1	3.40E-01	6.50E-02
	Benzo(g,h,i)perylene	8	1	3.56E-01	1.90E-01
Metals	Aluminum	9	9	7.67E+03	1.35E+04
[mg/kg]	Arsenic	9	9	3.43E+00	1.19E+01
	Barium	9	9	5.60E+01	1.50E+02
	Beryllium	6	3	4.35E-01	7.40E-01
	Calcium	9	9	4.01E+03	9.32E+03
	Chromium	8	8	1.63E+01	3.26E+01
	Cobalt	9	9	1.10E+01	3.99E+01
	Copper	9	9	5.31E+01	3.48E+02
	Iron	9	9	1.55E+04	2.69E+04
	Lead	9	8	9.29E+01	3.65E+02
	Magnesium	8	8	1.96E+03	4.41E+03
	Manganese	9	9	3.17E+02	1.20E+02
	Nickel	9	7	1.15E+01	3.81E+01
	Potassium	9	7	4.78E+02	1.15E+03
	Selenium	9	2	7.18E-01	2.50E+00
	Vanadium	9	9	4.92E+01	1.63E+02
	Zinc	9	9	9.64E+01	3.92E+02

Notes:

(1) Unlisted SVOC and metal analytes were not detected in any sediment samples.

(2) VOCs were not analyzed; Pesticides/PCBs were analyzed but not detected.

(3) ND = Not detected. NA = Not analyzed.

APPENDIX - C - ARARS TABLES

TABLE SC-7B
CHEMICAL SPECIFIC ARARs, CRITERIA , ADVISORIES, AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Ground water	Federal Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations (NPDWR) – 40 CFR 141	Applicable	Maximum Contaminant Levels (MCLs) are enforceable standards that are applicable to drinking water supplies. MCLGs are non-enforceable levels for such systems.	Remedy of contaminated soils will eliminate any discharge of contaminants to groundwater by the removal of waste off-site. MCLs and non-MCLGs will be attained in groundwater following the remedy.
	Massachusetts Groundwater Quality Standards – 314 CMR 6.00	Applicable	Massachusetts groundwater standards have been promulgated for a number of contaminants. When the state levels are more stringent than federal levels, the state levels will be used.	Remedy of contaminated soils will eliminate discharge of any contaminants to groundwater by the removal of waste off-site. The State standards will be attained after the completion of remedial activities.
Ground water (cont'd)	Massachusetts Drinking Water Regulations – 310 CMR 22.00	Applicable	Massachusetts Drinking Water Regulations include Massachusetts Maximum Contaminant Levels (MMCLs). If state MMCLs are more stringent they will supersede federal MCLs.	Remedy of contaminated soils will eliminate discharge of contaminants to groundwater by the removal of waste off-site.
	Federal SDWA, NPDWR – 40 CFR 141	To Be Considered	Proposed MCLs may become potential ARARs, when promulgated, and are considered in the absence of MCLs.	Remedy of contaminated soils will eliminate discharge of contaminants to groundwater by the removal of waste off-site.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
	EPA Reference Doses (RfD) for Non-carcinogens	To Be Considered	Reference doses and standard exposure assumptions for body weight and daily drinking water ingestion rate are used to derive cleanup goals protective of noncarcinogenic effects.	EPA Reference Doses will be met by the removal of waste off-site.
	EPA Lifetime Health Advisories (HAs), Office of Drinking Water	To Be Considered	These are non-regulatory concentration limits for contaminants in drinking water that are considered protective of adverse non-carcinogenic health effects over a lifetime.	Lifetime HAs will be met by the removal of waste off-site.
Ground water (cont'd)				
	Massachusetts Office of Research and Standards Drinking Water Guidelines (ORSGLs)	To Be Considered	ORSGLs provide guidance for chemicals other than those with MMCLs in drinking water.	ORSGL standards will be met by the removal of waste off-site.
Surface Water	Massachusetts Surface Water Discharge Permit Requirements – 314 CMR 3.00	Relevant and Appropriate	These standards regulate discharges of pollutants to surface waters, outlets for such discharges and any treatment works associated with these discharges.	If lagoon water is discharged to surface waters, the water will be treated in conformance with Massachusetts surface water discharge permit requirements.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Surface water	Massachusetts Surface Water Quality Standards – 314 CMR 4.04	Relevant and Appropriate	These requirements are for the antidegradation of surface waters and provide for control of eutrophication and establish discharge criteria.	If lagoon water is discharged to surface waters, the water will be treated in conformance with all water quality criteria.
	Massachusetts Operation and Maintenance and pre-treatment Standards for Wastewater, Treatment Works, and Indirect Discharges. 314 CMR 12.00	Relevant and Appropriate	These regulations ensure proper operation and maintenance of wastewater treatment facilities and sewer systems within the State.	Remedial activities will comply with all provisions of this regulation. Lagoon water will receive pretreatment to remove hazardous compounds prior to discharge into any municipal treatment facility.
Surface Water cont'd)	Federal Clean Water Act-National Pollution Discharge Elimination System (NPDES)	Relevant and Appropriate	These standards regulate the discharge of pollutants to surface waters of the United States.	If lagoon water treatment is required, the water will be treated to meet the applicable standards prior to discharge.
	Federal Clean Water Act (CWA) – Federal Ambient Water Quality Criteria (FAWQC)	Relevant and Appropriate	FAWQC are non-regulatory concentrations for the protection of aquatic life, and of human health from water ingestion and fish consumption.	If lagoon waters are required to be treated, water will be treated to meet FAWQC.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance
(cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air	Massachusetts Ambient Air Quality Standards – 310 CMR 6.00	Applicable	These regulations specify primary and secondary ambient air quality standards to protect public health and welfare for certain pollutants.	Mitigative measures using engineering controls, including foams, will be taken to control fugitive dust released during excavation and construction activities.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air (cont'd)	Massachusetts Air Pollution Control Regulations – 310 CMR 7.00	Applicable	These regulations pertain to the prevention of emissions in excess of Massachusetts or national ambient air quality standards or in excess of emission limitations in those regulations.	Mitigative measures using engineering controls, including foams, will be taken to control emissions from excavation and construction activities.
	310 CMR 7.06	Applicable	These regulations specify requirements to prevent visible emissions, not to exceed the criteria set forth in the regulations.	Mitigation measures using engineering controls, including foams, will be taken to control visible emissions.
	310 CMR 7.09	Applicable	These regulations specify requirements to prevent dust and odors generated during remedial actions which contribute to air pollution.	Mitigation measures using engineering controls, including foams, will be taken to control odors and dusts during excavation and construction.
	310 CMR 7.10	Applicable	These regulations specify requirements on construction equipment to suppress sound. Massachusetts DEP policy requires that the site perimeter noise levels not exceed 10 decibels above ambient noise levels.	Equipment with sound suppression will be used to reduce noise levels to below the regulated level.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air (cont'd)	Massachusetts Prevention and/or Abatement of Air Pollution Episode and Air Pollution Incident Emergencies 310 CMR 8.00	Relevant and Appropriate	These regulations specify requirements to prevent ambient air contaminant concentrations of any location from reaching levels which would constitute significant harm or imminent and substantial endangerment to public health.	Mitigative measures using engineering methods, including foams and water will be taken to control fugitive dust released during excavation and construction activities.
	Clean Air Act (CAA) NAAQS for Total Suspended Particulates – 40 CFR 50	Applicable	This regulation specifies maximum primary and secondary 24-hour concentrations. Fugitive dust emissions from site excavation must be below a 24-hour average of 150 $\mu g/m^3$ for particles having a mean diameter of 10 microns or less.	Fugitive dust emissions will be controlled during excavation and construction activities by the use of foam and or other engineering methods.
	NAAQS for Hazardous Air Pollutants – 40 CFR part 61	Applicable	These regulations specify amounts of emissions for pollutants such as NO_x, SO_2, CO, lead, mercury, and particulates for stationary sources.	Action levels for hazardous air pollutants will be determined during design stages and engineering controls will be implemented to control emissions during remedial activities.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
	Federal - Occupational Health and Safety Act (OSHA; 29 CFR Section 1910.1000-Air Contaminants)	To Be Considered	TLVs are issued as criteria for controlling air quality for occupational settings. STELs are fifteen minute time-weighted concentrations. TWAs are based on an 8-hour per day, 40-hour work week.	Action levels for volatile and semi-volatile air contaminants will be established during the design stage and engineering controls will be implemented to control emissions during remedial activities.
Air (cont'd)	State Massachusetts Guidance on Allowable Ambient Levels (AALs) cited in Chemical Health Effects Assessment Methodology and Methodology to Derive Ambient Levels, DEP 1989	To Be Considered	This guidance evaluates acute and chronic toxicity and sets draft AALs for volatile and semi-volatile chemicals. AALs chemicals are considered in conjunction with BACT to meet the action specific applicable requirements at 310 CMR 6.0 through 8.0.	AALs will be attained during all on-site remediation activities if technically feasible.
Soil				
	EPA Directive for Lead (OSWER Directive 9355.4-02)	To Be Considered	Interim guidance on establishing soil lead cleanup levels of Superfund Sites recommends a concentration of total lead of 500 to 1,000 mg/kg.	All soil with lead above 500 ppm will be excavated and moved off-site as part of the remedy.

TABLE SC-7B

Location-Specific ARARs, Criteria, Advisories, and Guidance

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Wetlands	Massachusetts Wetland Protection Act (WPA) Regulations – 310 CMR 10.00	Applicable	These regulations include standards on dredging, filling, altering, or polluting inland wetlands. Work within 100 feet of a wetland is regulated under these requirements.	All work, including installation of groundwater monitoring wells, to be performed within the 100-foot buffer zone will be done in accordance with these regulations.
Waste Siting Regulations	Massachusetts Hazardous Waste Facility Siting Regulations - 990 CMR 1.00	Applicable	Requirements for the expeditious and safe siting of hazardous waste facilities in the Commonwealth, which include controls on the construction, operation, and maintenance of new facilities for storage treatment or disposal of hazardous waste.	Any remedial activities to occur within the 100-foot buffer zone of Site Wetlands will meet these requirements.

(cont'd)

Location-Specific ARARs, Criteria, Advisories, and Guidance

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Rivers/CWA	Federal- 16 USC 661 et.seq. Fish and Wildlife Coordination Act	Applicable	Mitigative actions must be taken to minimize potential adverse impacts to natural sources such as wetlands. Restoration of damaged natural features are required.	Relevant federal agencies will be contacted to help analyze impacts of the implementation of remedial alternatives on wildlife in wetlands and rivers. If required, restoration of impacted wetlands will occur once all excavation and stabilization activities are completed.
Wetlands/CWA	Federal-Clean Water Act (CWA) Section 404(b)(1); 40 CFR part 230, 33 CFR parts 320-330	Applicable	Requirements under these codes prohibit the discharge of dredged or fill material into wetlands unless those actions comply with the substantive requirements which are identified under these regulations.	Discharges to wetlands around the Site will comply with these requirements.
Wetlands/CWA	Federal Executive Orders 11990	Applicable	Under this regulation, Federal agencies are required to minimize the destruction, loss or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.	Wetlands protection considerations will be incorporated into the planning and implementation of this selected remedy.

TABLE SC-7B
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Treatment Facility Operations/ RCRA	Federal-40 CFR Part 264.10-264.18(Subpart B)General Facility Standards	Relevant and Appropriate	This subpart applies to all owners and operators of hazardous waste facilities. The subpart identifies procedures which must be followed for the operation and maintenance of a hazardous waste TSD facility.	The selected remedy will comply with all substantive portions of this requirement during on-site treatment of contaminated materials.
TSD Facility Prepared-ness and Prevention/ RCRA	Federal-40 CFR Part 264.30-37 (Subpart C) Preparedness and Prevention	Relevant and Appropriate	These ARARS identify requirements which must be met during design, construction, and operation of TSD Facilities to minimize possibility of fires, explosions or unplanned releases of waste.	All waste will be treated to conform with standards to minimize the danger of fire or unplanned releases of hazardous compounds.
National Pollutant Discharge Elimination System/CWA	Federal-40 CFR Parts 122 and 125 National Pollutant Discharge Elimination System.	Applicable	These ARARs cover the EPA administered permit program which allows private parties to discharge pollutants from a point source into the "Waters of the United States."	All discharges of lagoon water to surface water will comply with all NPDES substantive requirements.

TABLE SC-7B (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Treatment and Disposal/ RCRA	State-310 CMR 30.00 Hazardous Waste Regulations.310 CMR 30.00 is enforceable under M.G.L. CH.21Css.4 and 6.and M.G.L.Ch.211 s.6.	Applicable	The Hazardous Waste Regulations 310 CMR 30.00 govern the generation, listing, handling, storage, transporting and disposal of hazardous wastes.	The selected remedy will comply with the substantive requirements under each sub-part that pertains to on-site or off-site activities.
Treatment and Disposal RCRA	Federal-40 CFR 260 to 264 Hazardous Waste Regulations	Applicable	These ARARs regulate the treatment of RCRA hazardous wastes handling and storage.	The selected remedy will comply with the substantive requirements under each sub-part that pertains to on-site or off-site activities.
Groundwater Protection/ RCRA	State-310 CMR 30.660Ground-water Protection. This citation includes the requirements of 310 CMR 30.661 thru 30.673.	Applicable	Groundwater Protection requirements (310 CMR 30.660)apply to monitoring requirements and closure of surface impoundments. Groundwater protection programs must be conducted after closure if required by the approved operating permit. Groundwater monitoring or corrective action monitoring(310 CMR 30.672)are required anytime concentrations of chemicals in the groundwater exceed levels established by the department in accordance with 310 CMR 30.667.	A groundwater monitoring program which meets the requirements of 310 CMR 30.660 and 310 CMR 30.672 will be implemented throughout the post-closure period for the site.

TABLE SC-7B (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air Discharges/ CAA	State-310 CMR 6.0-8.0 Air Quality Control Regulations	Applicable	These regulations govern emissions to the air from new sources. Sources must not cause a condition of air pollution. In addition there are specific standards for PICs, CO^x, O^3, pb and SO^x. The state applies this standard by examining AALs and other air modeling and monitoring data and by requiring standard controls available for some of the more common remedial technologies.	The selected remedy will comply with the use of Best Available Control Technologies (BACT) and will not contribute to a condition of air pollution.
Noise	State-310 CMR 7.10 Noise	Applicable	This regulation requires that all equipment,machinery and/or operations which generate noise (sound),be operated in a manner which minimizes the generation of sound or be fitted and accommodated with noise reducing equipment and measures.	On-site construction/ remediation activities will be conducted during normal working hours and comply with the requirements of this regulation.
Air/ Discharges	State-310 CMR 7.09 Dust,Order,Construction, and Demolition	Applicable	Any operation which generates dust and odors shall be performed in a manner which does not generate significant quantities of dust which if generated would cause or contribute to a condition of air pollution	On-site remedial activities will be performed in a manner which minimized dust generation. If significant quantities of dust are generated, then mitigative measures will be employed to reduce the levels of dust generated

TABLE SC-7B (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air Discharge/ CAA	State-Mass. Guidance on Allowable Ambient Levels(AALs), cited in Chemical Health Effects Assessment Methodology and Methodology to Derive Allowable Ambient Levels, DEP, 1989.	To be considered	This guidance evaluates acute and chronic toxicity and sets draft AALs for volatile and semi-volatile chemicals. AALs have been issued by the DEP for 108 chemicals to date. The AALs to be considered,modeled, and monitored for are considered in conjunction with BACT to meet the action specific applicable requirements at 310 CMR 6.0 thru 8.0 in "not causing a condition of air pollution."	The selected remedy will attain AALs during on-site remediation activities if technically feasible.
RCRA-Closure Requirements Federal	TSD Facility Closure and Post Closure Subpart G -40 CFR 264.110 to .120 and 264.228	Applicable	Identifies the requirements for closure of surface impoundments and provides for monitoring requirements.	The selected remedy will comply with all the closure and monitoring requirements for surface impoundments.

TABLE 8C-7B (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Surface Water Protection/ CWA	State-314 CMR 3.00 (Promul-gated under MGL Chapter 21.s.27 and s.43)	Applicable	Discharges of any pollutant to any surface water in the State of Massachusetts must have a valid discharge permit from the Division of Water Pollution Control(DWPC)-314 CMR 3.04. This discharge permit (called a National Pollutant Discharge Elimination System(NPDES)permit) is issued jointly by the EPA and the DEP.	Any remedial activities conducted on-site will be conducted under CERCLA Sections 104 or 106; therefore, no federal or state permits will be required. However, the selected remedy will comply with the standards or discharge limits and activities covered by any permits which would normally be required.
Surface Water/CWA	Massachusetts Operation and Maintenance and Pretreat-ment Standards for Wastewater Treatment Works and Indirect Discharge 314 CMR 12.00	Applicable	Regulations to ensure proper operation and maintenance of wastewater treatment facilities and sewer systems within the Commonwealth.	Remedial activities will comply with all provisions of this regulation.
Air/CAA	Federal-CAA-National Ambient Air Quality Standards (NAAQA)(40 CFR 50 & 61)	Applicable	NAAQS define levels of primary and secondary levels for six common air contaminants(sulfur dioxide,particulate matter "PM^{10}", carbon monoxide, ozone, nitrogen dioxide and lead).	The levels established for these six air contaminants will be used as target levels which may not be exceeded by air release from on-site activities.

TABLE SC-2
CHEMICAL SPECIFIC ARARs, CRITERIA , ADVISORIES, AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Ground water	Federal Safe Drinking Water Act (SDWA) National Primary Drinking Water Regulations (NPDWR) – 40 CFR 141	Applicable	Maximum Contaminant Levels (MCLs) are enforceable standards that are applicable to drinking water supplies. MCLGs are non-enforceable levels for such systems.	Remedy of contaminated soils will eliminate any discharge of contaminants to groundwater by the application of a RCRA Subtitle C Cap. Groundwater presently meets the MCL's for drinking water standards.
	Massachusetts Groundwater Quality Standards – 314 CMR 6.00	Applicable	Massachusetts groundwater standards have been promulgated for a number of contaminants. When the State levels are more stringent than federal levels, the State levels will be used.	Remedy of contaminated soils will eliminate discharge of any contaminants to groundwater by the application of a RCRA Subtitle C Cap. The State standards are presently being attained.
Ground water (cont'd)	Massachusetts Drinking Water Regulations – 310 CMR 22.00	Applicable	Massachusetts Drinking Water Regulations include Massachusetts Maximum Contaminant Levels (MMCLs). If MMCLs are more stringent they will supersede federal MCLs.	Remedy of contaminated soils will eliminate discharge of contaminants to groundwater by the application of the RCRA Subtitle C Cap.
	Federal SDWA, NPDWR – 40 CFR 141	To Be Considered	Proposed MCLs may become potential ARARs, when promulgated, and are considered in the absence of MCLs	Remedy of contaminated soils will eliminate discharge of contaminants to groundwater by the application of a RCRA Subtitle C Cap.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
	EPA Reference Doses (RfD) for Non-carcinogens	To Be Considered	Reference doses and standard exposure assumptions for body weight and daily drinking water ingestion rate are used to derive cleanup goals protective of non-carcinogenic effects.	EPA Reference Doses will be met by the application of the RCRA Subtitle C Cap.
	EPA Lifetime Health Advisories (HAs), Office of Drinking Water	To Be Considered	Non-regulatory concentration limits for contaminants in drinking water that are considered protective of adverse non-carcinogenic health effects over a lifetime.	Lifetime HAs will be met by the application of a RCRA Subtitle C Cap.
Ground water (cont'd)				
	Massachusetts Office of Research and Standards Drinking Water Guidelines (ORSGLs)	To Be Considered	Guidance for chemicals other than those with MMCLs in drinking water.	ORSGL standards will be met by the application of a RCRA Subtitle C Cap.
Surface Water	Massachusetts Surface Water Discharge Permit Requirements – 314 CMR 3.00	Relevant and Appropriate	Standards regulate discharges of pollutants to surface waters, outlets for such discharges and any treatment works associated with these discharges.	If lagoon water is discharged to surface waters, the water will be treated in conformance with Massachusetts surface water discharge permit requirements.
	Massachusetts Surface Water Quality Standards – 314 CMR 4.04	Relevant and Appropriate	Requirements for the antidegradation of surface waters. These provide for control of eutrophication and establish discharge criteria.	If lagoon water is discharged to surface waters, the water will be treated in conformance with all water quality criteria.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Surface water	Massachusetts Operation and Maintenance and pre-treatment Standards for Wastewater, Treatment Works, and Indirect Discharges. 314 CMR 12.00	Relevant and Appropriate	Regulations to ensure proper operation and maintenance of wastewater treatment facilities and sewer systems within the State.	Remedial activities will comply with all provisions of this regulation. Lagoon water will receive pretreatment to remove hazardous compounds prior to discharge into any municipal treatment facility.
Surface Water cont'd)	Federal Clean Water Act-National Pollution Discharge Elimination System (NPDES)	Relevant and Appropriate	Standards that regulate the discharge of pollutants to surface waters of the United States	If lagoon water treatment is required, the water will be treated to meet the applicable standards prior to discharge.
	Federal Clean Water Act (CWA) – Federal Ambient Water Quality Criteria (FAWQC)	Relevant and Appropriate	FAWQC are non-regulatory concentrations for the protection of aquatic life, and of human health from water ingestion and fish consumption.	If lagoon waters are required to be treated, water will be treated to meet FAWQC.
Air	Massachusetts Ambient Air Quality Standards – 310 CMR 6.00	Applicable	Regulations specify primary and secondary ambient air quality standards to protect public health and welfare for certain pollutants.	Mitigative measures using engineering controls, including foams, will be taken to control fugitive dust released during excavation and construction activities.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air (cont'd)	Massachusetts Air Pollution Control Regulations – 310 CMR 7.00	Applicable	Regulations pertain to the prevention of emissions in excess of Massachusetts or national ambient air quality standards or in excess of emission limitations in those regulations.	Mitigative measures using engineering controls, including foams, will be taken to control emissions from excavation activities.
	310 CMR 7.06	Applicable	Regulations specify requirements to prevent visible emissions, not to exceed the criteria set forth in the regulations.	Mitigation measures using engineering controls, including foams, will be taken to control visible emissions.
	310 CMR 7.09	Applicable	Regulations specify requirements to prevent dust and odors – generated during remedial actions – which contribute to air pollution.	Mitigation measures using engineering controls, including foams, will be taken to control odors and dusts.
	310 CMR 7.10	Applicable	Regulations specify requirements on construction equipment to suppress sound. Massachusetts DEP policy requires that the site perimeter noise levels not exceed 10 decibels above ambient noise levels.	Equipment with sound suppression will be used to reduce noise levels to below the regulated level.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air (cont'd)	Massachusetts Prevention and/or Abatement of Air Pollution Episode and Air Pollution Incident Emergencies 310 CMR 8.00	Relevant and Appropriate	Regulations specify requirements to prevent ambient air contaminant concentrations of any location from reaching levels which would constitute significant harm or imminent and substantial endangerment to public health.	Mitigative measures using engineering methods including foams and water will be taken to control fugitive dust released during excavation and construction activities.
	Clean Air Act (CAA) NAAQS for Total Suspended Particulates – 40 CFR 50	Applicable	Regulation specifies maximum primary and secondary 24-hour concentrations. Fugitive dust emissions from site excavation must be below a 24-hour average of 150 $\mu g/m^3$ for particles having a mean diameter of 10 microns or less.	Fugitive dust emissions will be controlled during excavation and construction activities with engineering methods including foams and water.
	NAAQS for Hazardous Air Pollutants – 40 CFR part 61	Applicable	Regulations specify amounts of emissions for pollutants such as NO_x, SO_2, CO, lead, mercury, and particulates for stationary sources.	Engineering controls will control emissions during remedial activities.
	Federal - Occupational Health and Safety Act (OSHA; 29 CFR Section 1910.1000-Air Contaminants)	To Be Considered	TLVs are issued as criteria for controlling air quality for occupational settings. STELs are fifteen minute time-weighted concentrations. TWAs are based on an 8-hour per day, 40-hour work week.	Action levels for volatile and semi-volatile air contaminants will be established during the design stage and met by the application of engineering controls.

Chemical-Specific ARARs, Criteria, Advisories, and Guidance (cont'd)

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air (cont'd)	State Massachusetts Guidance on Allowable Ambient Levels (AALs) cited in Chemical Health Effects Assessment Methodology and Methodology to Derive Ambient Levels, DEP 1989	To Be Considered	This guidance evaluates acute and chronic toxicity and sets draft AALs for volatile and semi-volatile chemicals. AAls chemicals are considered in conjunction with BACT to meet the action specific applicable requirements at 310 CMR 6.0 through 8.0	AALs will be attained during all on -site remediation activities if technically feasible.
Soil				
	EPA Directive for Lead (OSWER Directive 9355.4-02)	To Be Considered	Interim guidance on establishing soil lead cleanup levels of Superfund Sites recommends a concentration of total lead of 500 to 1,000 mg/kg.	All soil with lead above 500 ppm will be placed under the RCRA Cap.

TABLE SC-2

Location-Specific ARARs, Criteria, Advisories, and Guidance

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Wetlands	Massachusetts Wetland Protection Act (WPA) Regulations – 310 CMR 10.00	Applicable	These regulations include standards on dredging, filling, altering, or polluting inland wetlands. Work within 100 feet of a wetland is regulated under these requirements.	All work, including installation of groundwater monitoring wells, to be performed within the 100-foot buffer zone will be done in accordance with these regulations.
Waste Siting Regulations	Massachusetts Hazardous Waste Facility Siting Regulations - 990 CMR 1.00	Applicable	Requirements for the expeditious and safe siting of hazardous waste facilities in the Commonwealth, which include controls on the construction, operation, and maintenance of new facilities for storage treatment or disposal of hazardous waste.	Any remedial activities to occur within the 100-foot buffer zone of Site Wetlands will meet these requirements.

(cont'd)

TABLE SC-2
Location-Specific ARARs, Criteria, Advisories, and Guidance

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Rivers/CWA	Federal- 16 USC 661 et.seq. Fish and Wildlife Coordination Act	Applicable	Mitigative actions must be taken to minimize potential adverse impacts to natural sources such as wetlands. Restoration of damaged natural features are required.	Relevant federal agencies will be contacted to help analyze impacts of the implementation of remedial alternatives on wildlife in wetlands and rivers. If required, restoration of impacted wetlands will occur once all excavation and stabilization activities are completed.
Wetlands/CWA	Federal-Clean Water Act (CWA) Section 404(b)(1); 40 CFR part 230, 33 CFR parts 320-330	Applicable	Requirements under these codes prohibit the discharge of dredged or fill material into wetlands unless those actions comply with the substantive requirements which are identified under these regulations.	Discharges to wetlands around the site will comply with these requirements.
Wetlands/CWA	Federal Executive Orders 11990	Applicable	Under this regulation, Federal agencies are required to minimize the destruction, loss or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.	Wetlands protection considerations will be incorporated into the planning and implementation of this selected remedy.

TABLE SC-2
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Treatment Facility Operations/ RCRA	Federal-40 CFR Part 264.10-264.18(Subpart B)General Facility Standards	Relevant and Appropriate	This subpart applies to all owners and operators of hazardous waste facilities. The subpart identifies procedures which must be followed for the operation and maintenance of a hazardous waste TSD facility.	The selected remedy will comply with all substantive portions of this requirement during the application of the RCRA Cap.
TSD Facility Prepared-ness and Prevention/ RCRA	Federal-40 CFR Part 264.30-37 (Subpart C) Preparedness and Prevention	Relevant and Appropriate	Identifies requirements which must be met during design, construction, and operation of TSD Facilities to minimize possibility of fires, explosions or unplanned releases of waste.	All waste will be handled to conform with standards to minimize the danger of fire or unplanned releases of hazardous compounds.
National Pollutant Discharge Elimination System/CWA	Federal-40 CFR Parts 122 and 125 National Pollutant Discharge Elimination System.	Applicable	EPA administered permit program which allows private parties to discharge pollutants from a point source into the "Waters of the United States."	All discharges of lagoon water to surface water will comply with all NPDES substantive requirements.

TABLE SC-_Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Treatment and Disposal/ RCRA	State-310 CMR 30.00 Hazardous Waste Regulations.310 CMR 30.00 is enforceable under M.G.L. CH.21Css.4 and 6.and M.G.L.Ch.211 s.6.	Applicable	The Hazardous Waste Regulations 310 CMR 30.00 govern the generation of,listing,handling, storage,transporting and disposal of hazardous wastes.	The selected remedy will comply with the substantive requirements under each sub-part that pertains to on-site or off-site activities.
Treatment and Disposal RCRA	Federal-40 CFR 260 to 264 Hazardous Waste Regulations	Applicable	Regulates the treatment of RCRA hazardous wastes handling and storage.	The selected remedy will comply with the substantive requirements under each sub-part that pertains to on-site or off-site activities.
Groundwater Protection/ RCRA	State-310 CMR 30.660Ground-water Protection. This citation includes the requirements of 310 CMR 30.661 thru 30.673.	Applicable	Groundwater Protection requirements (310 CMR 30.660)apply to monitoring requirements and closure of surface impoundments. Groundwater protection programs must be conducted after closure if required by the approved operating permit. Groundwater monitoring or corrective action monitoring(310 CMR 30.672)are required anytime concentrations of chemicals in the groundwater exceed levels established by the department in accordance with 310 CMR 30.667.	A groundwater monitoring program which meets the requirements of 310 CMR 30.660 and 310 CMR 30.672 will be implemented throughout the post-closure period for the site.

TABLE SC-2 (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air Discharges/ CAA	State-310 CMR 6.0-8.0 Air Quality Control Regulations	Applicable	These regulations govern emissions to the air from new sources. Sources must not cause a condition of air pollution. In addition there are specific standards for PICs, CO^x, O^3, pb and SO^x. The state applies this standard by examining AALs and other air modeling and monitoring data and by requiring standard controls available for some of the more common remedial technologies.	The selected remedy will comply with the use of Best Available Control Technologies(BACT)and will not contribute to a condition of air pollution.
Noise	State-310 CMR 7.10 Noise	Applicable	This regulation requires that all equipment,machinery and/or operations which generate noise (sound),be operated in a manner which minimizes the generation of sound or be fitted and accommodated with noise reducing equipment and measures.	On-site construction/ remediation activities will be conducted during normal working hours and comply with the requirements of this regulation.
Air/ Discharges	State-310 CMR 7.09 Dust,Order,Construction, and Demolition	Applicable	Any operation which generates dust and odors shall be performed in a manner which does not generate significant quantities of dust which if generated would cause or contribute to a condition of air pollution	On-site remedial activities will be performed in a manner which minimized dust generation. If significant quantities of dust are generated, then mitigative measures will be employed to reduce the levels of dust generated

TABLE SC-2 (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Surface Water Protection/ CWA	State-314 CMR 3.00 (Promulgated under MGL Chapter 21.s.27 and s.43)	Applicable	Discharges of any pollutant to any surface water in the State of Massachusetts must have a valid discharge permit from the Division of Water Pollution Control(DWPC)-314 CMR 3.04. This discharge permit (called a National Pollutant Discharge Elimination System(NPDES)permit) is issued jointly by the EPA and the DEP.	Any remedial activities conducted on-site will be conducted under CERCLA Sections 104 or 106;therefore, no federal or state permits will be required. However, the selected remedy will comply with the standards or discharge limits and activities covered by any permits which would normally be required.
Surface Water/CWA	Massachusetts Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharge 314 CMR 12.00	Applicable	Regulations to ensure proper operation and maintenance of wastewater treatment facilities and sewer systems within the Commonwealth.	Remedial activities will comply with all provisions of this regulation.
Air/CAA	Federal-CAA-National Ambient Air Quality Standards (NAAQA)(40 CFR 50 & 61)	Applicable	NAAQS define levels of primary and secondary levels for six common air contaminants(sulfur dioxide,particulate matter "PM^{10}", carbon monoxide,ozone,nitrogen dioxide and lead).	The levels established for these six air contaminants will be used as target levels which may not be exceeded by air release from on-site activities.

TABLE SC-2 (Cont'd)
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Medium/ Authority	ARAR	Status	Summary of Requirement	Action to be Taken to Attain ARAR
Air Discharge/ CAA	State-Mass. Guidance on Allowable Ambient Levels(AALs), cited in Chemical Health Effects Assessment Methodology and Methodology to Derive Allowable Ambient Levels, DEP, 1989.	To be considered	This guidance evaluates acute and chronic toxicity and sets draft AALs for volatile and semi-volatile chemicals. AALs have been issued by the DEP for 108 chemicals to date. The AALs to be considered,modeled, and monitored for are considered in conjunction with BACT to meet the action specific applicable requirements at 310 CMR 6.0 thru 8.0 in "not causing a condition of air pollution."	The selected remedy will attain AALs during on-site remediation activities if technically feasible.
RCRA-Closure Requirements Federal	TSD Facility Closure and Post Closure Subpart G -40 CFR 264.110 to .120 and 264.228	Applicable	Identifies the requirements for closure of surface impoundments and provides for monitoring requirements.	The selected remedy will comply with all the closure and monitoring requirements for surface impoundments.

APPENDIX - D - STATE CONCURRENCE

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection

William F. Weld
Governor
Daniel S. Greenbaum
Commissioner

March 24, 1993

Mr. Paul Keough
Acting Regional Administrator
U.S. Environmental Protection Agency
Region 1
JFK Federal Building
Boston, MA 02203

Re: Salem Acres Federal
Superfund Site
ROD Concurrence

Dear Mr. Keough:

The Department of Environmental Protection (the "Department") has reviewed the preferred and contingent remedial alternatives recommended by EPA for final cleanup at the Salem Acres Federal Superfund Site, the core provisions of which are summarized below. The Department has worked closely with EPA in developing the preferred alternative and is pleased to concur with EPA's choice of this as the selected remedial action. In addition, the Department concurs with the contingent remedial alternative.

The Department has evaluated the preferred and contingent alternatives for consistency with M.G.L. c. 21E ("21E") and the Massachusetts Contingency Plan (the "MCP"). The alternatives were also evaluated for consistency with proposed revisions to the MCP which are currently under consideration. The preferred alternative addresses the entire site as one operable unit and includes the following components:

1. Refined delineation of soil and sludge areas requiring remedial actions;

2. Stabilization of sludge by addition of fly ash rendering the material non-toxic, non-ignitable and otherwise not hazardous under RCRA;

3. Excavation of contaminated soils, fly ash, and stabilized sludge for disposal in a permitted solid waste landfill; and

4. Additional monitoring of groundwater, surface water and wetland sediments.

The preferred alternative will be implemented provided all of the following criteria are met:

1. Treatability and Pilot Studies must demonstrate that the process used to stabilize the sludge renders the sludge non-ignitable, non-toxic and otherwise not hazardous as defined under RCRA (40 CFR 261.21 and 261.24);

2. All wastes from the site, once stabilized as described above, can be classified as "special waste" under Massachusetts Solid Waste Regulations (310 CMR 19.00);

3. A permitted solid waste landfill operator is willing to issue a letter of commitment to accept the stabilized waste for disposal; and

4. The stabilized waste meets the criteria for disposal at that permitted landfill pursuant to applicable statutes and regulations (e.g., 310 CMR 19.00) and the disposal of such waste is not prohibited under the landfill Site Assignment.

If any one of the preceding four criteria cannot be met, the contingent alternative will be implemented, consisting of the following:

1. Refined delineation of soil and sludge areas requiring remedial actions;

2. Evaluation of the feasibility of consolidating the various waste disposal areas;

3. Construction of an on-site RCRA Subtitle C Cap or Caps for containment of wastes;

4. Additional monitoring of groundwater, surface water and wetland sediments;

5. Implementation of institutional controls;

6. Long-term operation and maintenance of the remedy; and

7. CERCLA 5-year reviews of the remedy effectiveness.

The Department's concurrence with the preferred remedial alternative is based upon the expectation that it will result in a permanent solution as defined in 21E and the MCP. The Department's concurrence with the contingent alternative is based upon the expectation that it will result in a temporary solution as defined in 21E and the MCP. In addition, under the proposed revisions to the MCP (assuming no significant changes prior to adoption), the Department notes that the contingent alternative may constitute a permanent solution.

The Department also notes that, based on the proposed cleanup numbers in the ROD, the preferred and contingent alternatives appear, on their face, to be inconsistent with the Total Site Risk requirements for permanent and temporary remedies contained in the MCP. However, the Department bases its concurrence on the expectation that residual levels of contamination will, in fact, be significantly lower than the ROD cleanup numbers. This is because of the discrete nature of the waste areas to be remediated which, the Department anticipates, would result in the preferred and contingent alternatives *exceeding* the proposed cleanup numbers.

The Department would like to thank EPA, in particular the remedial project manager, Joe DeCola, and the section chief, Paula Fitzsimmons, for their efforts to include the Department in this process. We look forward to continuing work with you in implementing the selected remedial actions. If you have any questions, please contact Jay Naparstek at 292-5697.

Very truly yours,

Daniel S. Greenbaum, Commissioner
Department of Environmental Protection

DSG/BWSC/jn

APPENDIX - E - RESPONSIVENESS SUMMARY

APPENDIX E RESPONSIVENESS SUMMARY

This Responsiveness Summary addresses comments received by EPA during the public comment period of June 25, 1992 to July 25, 1992. Comments were delivered verbally into the record at the July 15, 1992 public hearing by two local residents, a Salem Ward Councillor and a private citizen, both of whom live near the site. EPA received one written comment from a Salem City Councillor.

Written Comment 1: The City Councillor expressed her support for the preferred alternative.

Response: EPA acknowledges and appreciates the support of the City Councillor.

Comment 2: The Ward Councillor and a private citizen asked if similarly contaminated soil has been treated at other sites in the same way as is described in EPA's Proposed Plan. Both expressed some concern about potential releases of contaminants to the air during excavation activities and expressed a preference for the capping option as long as the technology of EPA's preferred alternative remains unproven. The City Councillor expressed concern for the health and safety of the immediate neighborhood and the public in general during remedial activities, and asked EPA to take all necessary precautions.

Response: Immobilization of contaminated soil sludge is a proven technology and has been an effective remedial action at many sites. In addition, a treatability study will be performed utilizing contaminated soils from the Salem Acres site to further evaluate the effectiveness of the immobilization process. Tests will be done on the treated materials to determine toxicity and ignitability according to RCRA. Under the remedy, all materials that leave the Site will have to pass RCRA standards for ignitability and toxicity.

During the implementation of the remedy, EPA will require the remediation contractors to take the necessary precautions to minimize any contaminant releases to the surrounding neighborhoods during the remedial action. A health and safety plan, required for all Superfund site work, will outline the procedures for ambient air monitoring and action levels that will be required to protect site workers and the general public during all remedial activities.

Comment 3: The Ward Councillor asked if EPA has decided what route will be used to transport materials from the Site and to what destination the material will be taken. The City Councillor

asked that EPA maintain contact with the Ward Councillor and the Mayor's office during the planning process in order to adequately address traffic and public safety issues.

Response: The route to be used to transport materials from the site to its destination will be determined as part of the remedial design activities. When making its final selection, EPA will consider public health and safety, traffic, and noise. Discussions with regard to a final disposal site are ongoing and have not been determined at this time. To the maximum extent possible, traffic will be directed on and off the Site to avoid congestion and noise in the adjacent neighborhood.

As part of its community relations efforts, EPA will continue to provide concerned members of the community, including the Ward Councillor and the Mayor, with information regarding site activities. The EPA community relations team will prepare fact sheets and/or hold public meetings as needed to discuss site issues pertinent to the community. During the early stages of the Remedial Action, EPA will revise the site Community Relations Plan at which time current community concerns will be studied.

Comment 4: The Ward Councillor asked for information regarding the length of time the site will be monitored following the removal of the hazardous material, and if the site is capped, how large the buffer zone around the site will be.

Response: Semi-annual groundwater monitoring will be implemented for a minimum of five years after which time a full review of site conditions will be conducted. The need for further testing will be evaluated based on the five-year review. If it is determined that monitoring is still required, a similar review process would occur every five years.

If a RCRA Subtitle C Cap is applied at the site, fencing will be constructed around the entire capped areas to restrict access. The limits of this fencing and the "buffer zone" shall be determined during the remedial design.

Comment 5: The Ward Councillor asked if the South Essex Sewerage District will pay for the cleanup, and if so, would this mean the towns of Salem and Peabody would ultimately bear the cost. The City Councillor commented that EPA should pursue all potentially responsible parties so that the cost of the cleanup will be shared by all who contributed to the contamination.

Response: EPA has identified the South Essex Sewerage District (SESD) as a Potentially Responsible Party. EPA has undertaken thorough efforts to identify all potentially responsible parties connected with the Site.

APPENDIX - F - ADMINISTRATIVE RECORD

Salem Acres

NPL Site Administrative Record

Index

Compiled: March 1, 1989
Updated: June 23, 1992
ROD Signed: March 25, 1993

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

With Assistance from

AMERICAN MANAGEMENT SYSTEMS, INC.
One Bowdoin Square, 7th Floor • Boston, Massachusetts 02114 • (617) 557-2000

Introduction

This document is the Index to the Administrative Record for the Record of Decision for the Salem Acres National Priorities List (NPL) site. Section I of the Index cites site-specific documents, and Section II cites guidance documents used by EPA staff in selecting a response action at the site.

Although not expressly listed in this Index, all documents contained in the October 28, 1987 Removal Administrative Record and the September 11, 1990 Removal Administrative Record are incorporated by reference herein, and are expressly made a part of this Administrative Record.

This Administrative Record is available for public review at EPA Region I's Office in Boston, Massachusetts, and at the Salem Public Library, 370 Essex Street, Salem, Massachusetts 01970. Questions concerning the Administrative Record should be addressed to the EPA Region I site manager.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Section I

Site-Specific Documents

ADMINISTRATIVE RECORD INDEX

for the

Salem Acres NPL Site

ROD Signed: March 25, 1993

1.0 Pre-Remedial

1.2 Preliminary Assessment

1. "Preliminary Studies on Disposal of Grease Grit and Ash," Metcalf & Eddy, Inc. for South Essex Sewerage Board (April 5, 1974).
2. Memorandum from Robert S. Palermo, NUS Corporation to Donald Smith, EPA Region I (March 4, 1983). Concerning initial phase of site investigation with attachments:
   A. "Identification and Preliminary Assessment," EPA Region I (January 26, 1983).
   B. Trip Report on a Visit to Salem Acres Site, John M. Panaro, R.J. DeLuca and Kathryn Parker, NUS Corporation (January 26, 1983).
   C. National Priorities Checklist of Data Requirements.
3. "Preliminary Site Assessment," NUS Corporation (April 21, 1983).

1.3 Site Inspection

1. Memorandum from William Cashins, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Sabin M. Lord Jr., Commonwealth of Massachusetts Department of Environmental Quality Engineering (April 20, 1980). Concerning sludge beds found between Barcelona Avenue and Strong Water Brook.
2. Memorandum from Sabin M. Lord Jr., Commonwealth of Massachusetts Department of Environmental Quality Engineering to Richard F. Slein, Commonwealth of Massachusetts Department of Environmental Quality Engineering (October 28, 1980). Concerning possible hazardous waste from sludge bed off Barcelona Avenue.
3. "Sample Analysis Report," Commonwealth of Massachusetts Department of Environmental Quality Engineering (May 18, 1981).
4. "Water Supply Analysis," Commonwealth of Massachusetts Department of Environmental Quality Engineering (May 17, 1982).
5. "Gas Chromatography-Mass Spectrometry Analysis of Purgeable Organics," Commonwealth of Massachusetts Department of Environmental Quality Engineering (May 25, 1982).
6. "Draft Site Inspection Report," NUS Corporation (May 29, 1984).

1.5 Correspondence Related to CERCLIS

1. Memorandum from Sabin M. Lord Jr., Commonwealth of Massachusetts Department of Environmental Quality Engineering to File (February 12, 1981). Concerning complaints from Salem residents of hydrogen sulfide odors.
2. Letter from Peter R. Beatrice Jr. (Attorney for the DiBiases) to Richard T. Leighton, EPA Region I (December 3, 1982). Concerning preliminary site testing.

1.6 Hazard Ranking System (HRS)

1. "National Priorities List Site" Form, EPA Region I (October 17, 1984). Concerning brief description of the site.

1.18 FIT Technical Direction Documents (TDDs) and Associated Records

The record cited in entry number 1 may be reviewed, by appointment only, at EPA Region I, Boston Massachusetts.

1. Letter Report from John M. Panaro, NUS Corporation to Donald Smith, EPA Region I (October 11, 1985). Concerning sludge, soil and water samples.

2.0 Removal Response

2.1 Correspondence

1. Trip Report on a Visit to Salem Acres Site, Richard Willey and John C. Keane, EPA Region I (April 22, 1987). Concerning observations on site activities.
2. Memorandum from Robert J. Ankstitus, EPA Region I to John C. Keane, EPA Region I (August 27, 1987). Concerning analytical data on samples taken from the site.
3. Memorandum from Edward Reiner, EPA Region I to John C. Keane and Robert J. Ankstitus, EPA Region I (September 10, 1987). Concerning the proposed construction of concrete walls around the sludge pits.
4. Memorandum from Elio Goffi, EPA Region I to Donald Berger, EPA Region I (October 8, 1987). Concerning Clean Harbors, Inc. technical report analysis for total tetra dioxins.
5. Letter from Ronald J. Chernik, Jacobs Engineering Group to John C. Keane, EPA Region I (November 3, 1987) with attached meeting notes. Concerning the October 1, 1987 meeting held with South Essex Sewerage District, Jacobs Engineering Group and EPA Region I.

2.3 Sampling and Analysis Data

1. Memorandum from Joseph Montanaro and Richard Siscana, EPA Region I to Donald Berger, EPA Region I (April 13, 1986). Concerning the attached polychlorinated biphenyl analysis in waste oils.

The maps associated with entry numbers 2 through 8 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

2. Index Sheets to data presented in entry numbers 3 through 8 (April 13, 1987). It should be viewed in conjunction with maps cited in entry number 17.4.3.
3. "Report of Analysis," Clean Harbors, Inc. for O.H. Materials Co. (May 5, 1987).
4. Memorandum from Scott Clifford, EPA Region I to Donald Berger, EPA Region I (May 14, 1987). Concerning the attached results of the purgeable organic analysis on water samples.
5. Memorandum from Scott Clifford, EPA Region I to Donald Berger, EPA Region I (May 24, 1987). Concerning the attached results of the purgeable organic analysis on soil samples.

2.3 Sampling and Analysis Data (cont'd.)

6. Memorandum from Kathleen M. Polgar, Mary Jane Maciejko and Michael E. Dowling, EPA Region I to Robert Ankstitus, EPA Region I (July 8, 1987). Concerning the attached results of water and soil samples.
7. Memorandum from Kathleen M. Polgar, Mary Jane Maciejko and Michael E. Dowling, EPA Region I to Robert Ankstitus, EPA Region I (July 16, 1987). Concerning the attached results of water and soil samples.
8. Memorandum from Moira Lataille, EPA Region I to Donald Berger, EPA Region I (July 24, 1987). Concerning the attached results of the purgeable organic analysis on samples taken from Sewer D.
9. Memorandum from Nathan Raines III, EPA Region I to Robert Ankstitus, EPA Region I (August 5, 1987). Concerning results of analysis to determine the polychlorinated biphenyls in transformer fluid and waste oils.
10. Letter from Tara L. Abbott, Enseco to William Buchan, O.H. Materials Co. (August 31, 1987). Concerning attached results of water and soil samples.
11. Memorandum from Joseph Montanaro, Suresh Srivastava, and Richard Siscana, EPA Region I to Robert Ankstitus, EPA Region I (October 9, 1987). Concerning the attached gas chromatography - mass spectrometry analysis of extractable organics in soils and sediments.
12. "Report of Analysis," Clean Harbors, Inc. for O.H. Materials Co. (November 3, 1987).

Additional Sampling and Analysis Data for the Removal Response may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

2.4 Pollution Reports (POLREPs)

1. POLREP 1, EPA Region I, (April 20,1987).
2. POLREP 2, EPA Region I, (May 18,1987).
3. POLREP 3, EPA Region I, (June 30,1987).
4. POLREP 4, EPA Region I, (August 24,1987).
5. POLREP 5, EPA Region I, (October 14,1987).
6. POLREP 6, EPA Region I, (November 14,1987).
7. POLREP 7, EPA Region I, (December 28,1987).
8. POLREP 8, EPA Region I, (January 15, 1988).
9. POLREP 9, EPA Region I, (February 20,1988).
10. POLREP 10, EPA Region I, (April 15,1988).

2.5 On-Scene Coordinator Reports

1. "Salem Acres, Salem, Massachusetts," Roy F. Weston, Inc. (January 11, 1988).
2. Letter from Timothy Ott, Roy F. Weston, Inc. to Steven R. Novick, EPA Region I (May 9, 1988). Concerning the attached after action report.

2.6 Work Plans and Progress Reports

1. "Sampling Plan - Salem Acres Site - Sludge Pit Characterization," Jacobs Engineering Group (November 12, 1987).
2. "Salem Work Schedule - Emergency Response Action," (October 17, 1987 through December 12, 1987).

2.9 Action Memoranda

1. Memorandum from Robert J. Ankstitus, EPA Region I to Michael R. Deland, EPA Region I (April 15, 1987). Concerning request for immediate removal action at the abandoned lagoons.
2. Memorandum from Robert J. Ankstitus, EPA Region I to Michael R. Deland, EPA Region I (August 10, 1987). Concerning ceiling increase request for removal action at the abandoned lagoons.
3. Memorandum from Robert J. Ankstitus, EPA Region I to Michael R. Deland, EPA Region I (October 28, 1987). Concerning second ceiling increase request for the removal action.

3.0 Remedial Investigation (RI)

3.1 Correspondence

1. Letter from Steven Thayer, Maquire Group to John C. Keane, EPA Region I (November 11, 1987). Concerning sampling and analysis plan.
2. Telephone Notes Between Jeremy Firestone, EPA Region I and John E. Darling, Serafini & Serafini (Attorney for South Essex Sewerage District) (November 12, 1987). Concerning agreement that EPA will conduct sampling activities in the sludge pits.
3. Memorandum from Ronald J. Chernik, Jacobs Engineering Group to File (November 15, 1987). Concerning sludge pit characterization.
4. Letter from Robert E. Blenkhorn, City of Salem Board of Health to Richard Cavagnero, EPA Region I (January 5, 1988). Concerning request to sample private wells.

3.2 Sampling and Analysis Data

1. Letter from Jay S. Naparstek, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Robert E. Blenkhorn, City of Salem Health Department (November 13, 1987). Concerning attached results of water and sediment samplings.
2. Letter from Richard Cavagnero, EPA Region I to John Cresenti (May 23, 1990). Concerning validated results of well water samples.
3. Letter from Richard Cavagnero, EPA Region I to Angelo Pramas (May 23, 1990). Concerning validated results of well water samples.
4. Letter from Richard Cavagnero, EPA Region I to Richard Suiniuch (May 23, 1990). Concerning validated results of well water samples.

The records cited in entry numbers 5 and 6 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

5. "Split Samples Comparison Summary Response Report," Maguire Group, Inc. (January 20, 1991).
6. "Salem Acres Method Evaluation," U.S.E.P.A. Environmental Monitoring Systems Laboratory, Las Vegas, Nevada (September 1991).

Additional Sampling and Analysis Data for the Remedial Investigation may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

3.4 Interim Deliverables

1. "Baseline Health Risk Assessment - Volume I - Draft Final Report," URS Consultants for Maguire Group, Inc. (May 29, 1992).
2. "Baseline Health Risk Assessment - Volume II - Appendices," URS Consultants for Maguire Group, Inc. (May 29, 1992).

3.6 Remedial Investigation (RI) Reports

1. "Remedial Investigation Report - Draft Final," URS Consultants for Maguire Group, Inc. (May 29, 1992).
2. "Remedial Investigation Report - Appendices A Through J (Excluding Appendices C and H)," URS Consultants for Maguire Group, Inc. (May 29, 1992).
3. "Remedial Investigation Report - Appendix C," URS Consultants for Maguire Group, Inc. (May 29, 1992).
4. "Remedial Investigation Report - Appendix H," URS Consultants for Maguire Group, Inc. (May 29, 1992).

3.7 Work Plans and Progress Reports

1. "Final Report - RI/FS Study Project Work Plan," GCA Corporation (September 1986).
2. "Statement of Work - Technical and Enforcement Oversite," EPA Region I (June 12, 1987).
3. Letter from Roger L. Williams, Jacobs Engineering Group to Jack Jojokian, EPA Headquarters (September 22, 1987) with attached work plan.

4.0 Feasibility Study (FS)

4.1 Correspondence

1. Letter from Joseph N. DeCola, EPA Region I to Andrew Sims Jr., South Essex Sewerage District (June 2, 1992). Concerning in-situ vitrification process as an inappropriate alternative.

4.5 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Letter from Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection to Andrew Sims Jr., South Essex Sewerage District (April 21, 1992). Concerning ARARs identified by the Commonwealth of Massachusetts Department of Environmental Protection.

4.6 Feasibility Study (FS) Reports

1. "Feasibility Study Report - Draft Final," URS Consultants (June 4, 1992).

4.9 Proposed Plans for Selected Remedial Action

1. "EPA Proposes Cleanup Plan for the Salem Acres Site," EPA Region I (June 1992).

Comments

Comments on the Feasibility Study and Proposed Plan received by EPA Region I during the formal public comment period are filed and cited in 5.3 Responsiveness Summaries.

5.0 Record of Decision (ROD)

5.3 Responsiveness Summaries

1. Cross-Reference: Responsiveness Summary, EPA Region I (March 25, 1993) [Filed and included as an Appendix to entry number 1 in 5.4 Record of Decision (ROD)].

The following citation indicates written comments received by EPA Region I during the formal comment period:

2. Letter from Jane Stirgwolt, City of Salem to Joseph DeCola, EPA Region I (July 24, 1992). Concerning support for the alternative of sludge fixation/ off-site disposal for cleanup of the site.

5.4 Record of Decision (ROD)

1. Record of Decision for Salem Acres, EPA Region I (March 25, 1993).

9.0 State Coordination

9.1 Correspondence

1. Letter from Richard J. Chalpin, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Elio DiBiase and Ugo DiBiase, Salem Realty Trust (November 21, 1984). Concerning notice of potential liability.
2. Letter from Richard J. Chalpin, Commonwealth of Massachusetts Department of Environmental Quality Engineering to James A. Vitale, South Essex Sewerage District (November 21, 1984). Concerning notice of potential liability.
3. Letter from Richard J. Chalpin, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Real Estate Department, New England Electric Power Company (November 21, 1984). Concerning notice of potential liability.
4. Letter from Richard J. Chalpin, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Elio DiBiase and Ugo DiBiase, DiBiase Salem Realty Trust (December 5, 1984). Concerning results of investigation which began in September 1980.
5. Letter from John R. Serafini, Serafini & Serafini (Attorney for South Essex Sewerage District) to Richard J. Chalpin, Commonwealth of Massachusetts Department of Environmental Quality Engineering (January 9, 1985). Concerning the use of a temporary cover as an alternative to fencing the sludge pits at the site.

9.1 Correspondence (cont'd.)

6. Letter from Richard J. Chalpin, Commonwealth of Massachusetts Department of Environmental Quality Engineering to John R. Serafini, Serafini & Serafini (Attorney for South Essex Sewerage District) (February 4,1985). Concerning fencing the sludge pits at the site.
7. Letter from Peter R. Beatrice Jr. (Attorney for Ugo DiBiase) to John E. Darling, Serafini & Serafini (Attorney for South Essex Sewerage District) (March 15, 1985). Concerning permission granted to South Essex Sewerage District to enter and construct a fence on the site.
8. Letter from Merrill S. Hohman, EPA Region I to Gerald St. Hilaire, Commonwealth of Massachusetts Executive Office of Communities and Development (October 15, 1985). Concerning notice of proposed Superfund Project and subsequent 60-day comment period.
9. Letter from Robert E. Blenkhorn, City of Salem Health Department to Patricia D'Andrea, EPA Region I (December 15, 1986). Concerning request for information about the site.
10. Letter from Robert E. Blenkhorn, City of Salem Health Department to John C. Keane, EPA Region I (January 9, 1987). Concerning request for Mr. Keane's presence at the February 10, 1987 meeting.
11. Letter from Martha Steele, Commonwealth of Massachusetts Department of Public Health to Leonard O'Leary, Salem City Council (July 16, 1987). Concerning the attached "Report on the Potential Health Impact of Salem Acres."
12. Letter from Robert B. Bois, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Richard Cavagnero, EPA Region I (October 8, 1987). Concerning recommended removal actions.
13. Letter from Robert B. Bois, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Richard Cavagnero, EPA Region I (October 14, 1987). Concerning the State's involvement under SARA in the cleanup process at the site.

10.0 Enforcement

10.3 State and Local Enforcement Records

1. Letter from Richard F. Slein, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Salem Acres, Inc. (September 30, 1980). Concerning notice of violation for uncovered sewerage and industrial waste sludge pits.
2. Letter from Susan Madison, City of Salem Conservation Commission to Gerald St. Hilaire, Commonwealth of Massachusetts Department of Environmental Quality Engineering (November 5, 1982). Concerning the attached October 14, 1982 City Council Order for a report on sludge pits at the site.
3. Notice of Federal Lien under SARA, EPA Region I (January 28, 1987).
4. Letter from Robert E. Blenkhorn, City of Salem Health Department to Ugo DiBiase, Salem Realty Trust (February 13, 1987). Concerning the City of Salem's refusal to approve the "Preliminary Sub-division Plan for Ugo DiBiase Country Club Estates."
5. Notice of Partial Release of Federal Lien under SARA, EPA Region I (June 19, 1987).

10.7 EPA Administrative Orders

1. Letter from John E. Darling, Serafini & Serafini (Attorney for South Essex Sewerage District) to Richard G. McAllister, EPA Region I (May 26, 1987). Concerning approval of EPA Region I Order and Final Consent Order by Commonwealth of Massachusetts Department of Environmental Quality Engineering.
2. Consent Order, *In the Matter of South Essex Sewerage District, Salem Massachusetts* (June 11, 1987).
3. Consent Order, *In the Matter of South Essex Sewerage District, Salem Massachusetts* , Docket No. I-87-1095 (June 15, 1987).

11.0 Potentially Responsible Party (PRP)

11.3 Contractor Work Plans and Progress Reports

1. Letter from Joseph M. McGinn, CE Maguire, Inc. to John C. Keane, EPA Region I (March 27, 1987). Concerning the attached "Revised Project Work Plan," CE Maguire, Inc. for South Essex Sewerage District.

11.9 PRP-Specific Correspondence

1. Cross-Reference: Letter from Peter R. Beatrice Jr. (Attorney for the DiBiases) to R. Leighton, EPA Region I (December 3, 1982) [Filed and cited as entry number 2 in 1.5 Correspondence Related to CERCLIS].
2. Letter from Merrill S. Hohman, EPA Region I to James A. Vitale, South Essex Sewerage District (November 5, 1985). Concerning notice of liability and request for information.
3. Letter from Merrill S. Hohman, EPA Region I to Elio DiBiase and Ugo DiBiase, DiBiase Salem Realty Trust (November 5, 1985). Concerning notice of liability and request for information.
4. Letter from Merrill S. Hohman, EPA Region I to Elio DiBiase, Salem Acres, Inc. (December 29, 1986). Concerning notice of potential liability.
5. Letter from Merrill S. Hohman, EPA Region I to Ugo DiBiase, Salem Acres, Inc. (December 29, 1986). Concerning notice of potential liability.
6. Letter from Merrill S. Hohman, EPA Region I to DiBiase Salem Acres, Inc (December 29, 1986). Concerning notice of potential liability.
7. Letter from Merrill S. Hohman, EPA Region I to Elio DiBiase and Ugo DiBiase, DiBiase Salem Realty Trust (December 29, 1986). Concerning EPA offer to PRP to voluntarily perform the Remedial Investigation/Feasibility Study.
8. Telephone Notes Between Jeremy Firestone, EPA Region I and and John R. Serafini, Serafini & Serafini (Attorney for South Essex Sewerage District) (April 9, 1987). Concerning the discovery of an oily substance being discharged from the pits.
9. Telephone Notes Between Jeremy Firestone, EPA Region I and Peter R. Beatrice Jr. (Attorney for the DiBiases) (April 10, 1987). Concerning results of the emergency action and comment on the oil substance discharge.
10. Letter from Merrill S. Hohman, EPA Region I to John E. Darling, Serafini & Serafini (Attorney for South Essex Sewerage District) (April 23, 1987). Concerning notice of potential liability and initiation of an Emergency Response Action.
11. Letter from Merrill S. Hohman, EPA Region I to Michael Last, Gaston, Snow, Ely and Bartlett (Attorney for the DiBiases) (April 23, 1987). Concerning notice of potential liability and initiation of an Emergency Response Action.

11.9 PRP-Specific Correspondence (cont'd.)

12. Letter from Merrill S. Hohman, EPA Region I to Elio DiBiase (September 14, 1987). Concerning notice of potential lability and an invitation to perform response activities at the site.
13. Letter from Stephen T. Kunian, Singer, Stoneman, Kunian and Kurland, P.C. (Attorney for Elio DiBiase) to Merrill S. Hohman, EPA Region I (September 18, 1987). Concerning decline by Elio DiBiase to perform response activities at the site.
14. Telephone Notes Between Jeremy Firestone, EPA Region I and and John E. Darling, Serafini & Serafini (Attorney for South Essex Sewerage District) (October 2, 1987). Concerning the September 29, 1987 meeting at which the Board of South Essex Sewerage District agrees that EPA should perform sampling activities.
15. Cross-Reference: Letter from Steven Thayer, Maquire Group to John C. Keane EPA Region I (November 11, 1987) [Filed and cited as entry number 1 in 3.1 Remedial Investigation Correspondence].
16. Letter from Merrill S. Hohman, EPA Region I to Craig E. R. Jakubowics, New England Power Service Company (January 23, 1991). Concerning a request for information.
17. Letter from Merrill S. Hohman, EPA Region I to Craig E. R. Jakubowics, New England Power Service Company (June 23, 1992). Concerning notice of potential liability and request for participation in cleanup activities.
18. Letter from Merrill S. Hohman, EPA Region I to President, Boston Gas Company (June 23, 1992). Concerning notice of potential liability and request for participation in cleanup activities.
19. Letter from Merrill S. Hohman, EPA Region I to President, Eastern Enterprises (June 23, 1992). Concerning notice of potential liability and request for participation in cleanup activities.

11.14 Title Searches

1. Deed transfer from James V. Grasso to Ugo DiBiase (December 20, 1969).
2. Deed, Nondas Lagonakis, Trustee of Crete Realty Trust (March 24, 1972) with attached survey maps.

13.0 Community Relations

13.1 Correspondence

1. Memorandum from Deborah Alexander, Salem Fund Superfund Action Group to EPA Region I (October 2, 1984). Concerning attached responses by EPA to questions.
2. Letter from Leonard F. O'Leary, City of Salem Council to John C. Keane, EPA Region I (May 19, 1987) with attached City Council Order. Concerning the formation of the "Salem Acres Joint Monitoring Committee" between the City of Salem and the City of Peabody.
3. Letter from Josephine R. Fusco, City of Salem to John C. Keane, EPA Region I (July 2, 1987) with attached City Council Order. Concerning opposition to Salem Acres being used as a possible dump site.
4. Letter from Leonard F. O'Leary, City of Salem to John C. Keane, EPA Region I (December 9, 1987). Concerning invitation to the December 15, 1987 meeting.

13.2 Community Relations Plans

1. "Draft - Community Relations Plan," NUS Corporation (December 1985).
2. Letter from Patricia Poussevin, Jacobs Engineering Group to John C. Keane, EPA Region I (December 24, 1987). Concerning the attached "Community Relations Plan," Jacobs Engineering Group (December 1987).

13.3 News Clippings/Press Releases

News Clippings

1. "Salem Site on Superfund List," Salem Evening News - Salem, MA (September 26, 1984).
2. "Salem Acres Makes EPA Superfund Cleanup List," Daily Evening Item - Lynn, MA (September 26, 1984).
3. "Salem Marsh Cited for Superfund Money," Beverly Times - Beverly, MA (September 26, 1984).
4. "Salem Acres Nominated for Superfund List," Salem Evening News - Salem, MA (October 3, 1984).
5. "Salem Acres Action Asked," Salem Evening News - Salem, MA (November 9, 1984).
6. "Cleanup Priorities Wait, Too," North Shore Sunday - Danvers, MA (November 11, 1984).
7. "Support for Fencing Waste Site Grows," Salem Evening News - Salem, MA (November 27, 1984).
8. "Councilor Fears Hazardous Waste Near Sewage Plant," Salem Evening News - Salem, MA. (December 4, 1984).
9. "State May Sue South Essex Sewerage District Over Old Waste Dump," Beverly Times - Beverly, MA (December 6, 1984).
10. "DEQE Places the Blame for Salem Pollution," Salem Evening News - Salem, MA (December 6, 1984).
11. "South Essex Sewerage District to Fence off Salem Acres Site," Beverly Times - Beverly, MA (December 20, 1984).
12. "Waste Cleanup Delayed," Gloucester Daily Times - Gloucester, MA (December 21, 1984).
13. "Hazardous Waste Dump Sites Marked for Fencing," Salem Evening News - Salem, MA (January 8, 1985).
14. "Quick Cleanup of Salem Acres asked by South Essex Sewerage District," Salem Evening News - Salem, MA (January 17, 1985).
15. "Salem Acres Waste Cleanup at Least 2 Years Away," Salem Evening News - Salem, MA (February 22, 1985).
16. "Notice to Bidders - Furnish and Install Chain Link Fencing for South Essex Sewerage District," Salem Evening News - Salem, MA (March 2, 1985).
17. "City Demands Faster Action at Sludge Pits," Salem Evening News - Salem, MA (March 6, 1985).
18. "EPA Funding May be Delayed," Beverly Times - Beverly, MA (March 6, 1985).
19. "Mavroules Adds His Weight to Cleanup Effort," Salem Evening News - Salem, MA (March 9, 1985).
20. "Leading the Fight at Salem Acres," Beverly Times - Beverly, MA (March 14, 1985).
21. "Fence Going Up on Toxic Dump Site," Beverly Times - Beverly, MA (March 19, 1985).

News Clippings (cont'd.)

22. "Salem Acres Fence Awaits an Agreement," Salem Evening News - Salem, MA (March 22, 1985).
23. "Will You Pay to Clean the Pits?," North Shore Sunday - Danvers, MA (March 24, 1985).
24. "State Threatens Takeover if Salem Acres Fence is Delayed," Beverly Times - Beverly, MA (March 25, 1985).
25. "New Fence Blocks Sludge Pits at Salem Hazardous Waste Site," Salem Evening New - Salem, MA (July 11, 1985).
26. "Firms Submit Bids for Salem Acres Cleanup," Daily News - Newburyport, MA (July 17, 1985).
27. "Salem and Peabody May Bear Costs of Salem Acres Cleanup," Peabody Times - Beverly, MA (July 18, 1985).
28. "South Essex Sewerage District Moves to Study Salem Acres Site," Salem Evening News, Salem, MA (August 21, 1985).
29. "South Essex Sewerage District Hires Firm to Survey Waste Dump Site," Salem Evening News, Salem, MA (October 24, 1985).
30. "Salem Acres Cleanup Stalled 5 Years," Peabody Times - Beverly, MA (November 13, 1985).
31. "James A. Vitale, Served as Mayor of Beverly for Three Terms; at 62," The Boston Globe - Boston, MA (September 12, 1986).
32. "Funds for Salem Acres Cleanup Freed," Salem Evening News - Salem, MA (September 25, 1986).
33. "Salem Acres Toxic Waste Site May Get Needed Federal Bucks," Daily Evening Item - Lynn, MA (September 29, 1986).
34. "EPA Seeks Fund for Salem Acres Waste Site Study," Salem Evening News - Salem, MA (October 27, 1986).
35. "Site of Hugh Subdivision is Polluted with Toxins," Peabody Times - Beverly, MA (December 31, 1986).
36. "Salem Development Project Stalled," Salem Evening News - Salem, MA (January 29, 1987).
37. "Opposition Voiced to DiBiase Project," Salem Evening News - Salem, MA (February 18, 1987).
38. "Buying Woodland Just a Dumb Idea," Salem Evening News - Salem, MA (February 8, 1987 through February 25, 1987).
39. "EPA to Repair Waste Lagoons at Salem Site," The Boston Globe, Boston, MA (March 17, 1987).
40. "EPA Team Hurries to Stem Toxic Ooze," Salem Evening News - Salem, MA (April 11, 1987).
41. "Toxins Spill in Salem," Daily Evening Item - Lynn, MA (April 11, 1987).
42. "EPA Takes Aim at Dumping near Cedar Grove Cemetery," Daily Evening Item - Lynn, MA (April 13, 1987).
43. "A Poor Example for Waste Cleanup," Salem Evening News - Salem, MA (April 15, 1987).
44. "EPA Can Contain Not Move Toxins," Salem Evening News - Salem, MA (April 15, 1987).
45. "Toxic Cleanup Proceeds Cautiously," Salem Evening News - Salem, MA (April 17, 1987).
46. "South Essex Sewerage District, Developer Promise to Work with EPA on Sludge Pit Solutions," Salem Evening News - Salem MA (May 27, 1987).
47. "SESD Dump at Salem," Salem Evening News - Salem, MA (June 30, 1987).

News Clippings (cont'd.)

48. "Tests: Salem Acres No Risk," Salem Evening News - Salem, MA (August 4, 1987).
49. "Feds to Take Steps to Halt Site's Ooze," Salem Evening News - Salem, MA (September 16, 1987).
50. "EPA Says Road Mud Not Toxic," (December 1987).
51. "EPA Cloaks Cost of Salem Acres Work," Salem Evening News - Salem, MA (December 10, 1987).
52. "EPA: Salem Acres Cleanup to End Next Week," Salem Evening News - Salem, MA (December 11, 1987).
53. "Four Years to Track Down Poison?"

Press Releases

54. "Environmental News - Public Meeting on Salem Acres Superfund Site Announced," EPA Region I (February 13, 1985).
55. "Environmental News," EPA Region I (April 17, 1987). Concerning authorization of emergency funds to stabilize lagoons.
56. "Salem Acres Site Removal Activity Community Newsletter," EPA Region I (April 20, 1987). Concerning background of the Emergency Response Action and future plans.
57. "Salem Acres Site Removal Activity Community Newsletter," EPA Region I (May 18, 1987). Concerning removal activities including the containment of PCB contaminated oil.
58. "Environmental News - EPA Announces Consent Order at Salem Acres Site," EPA Region I (June 18, 1987).
59. "Salem Acres Site Removal Activity Community Newsletter," EPA Region I (May 18, 1987). Concerning removal activities following the completion of sampling activities.
60. " Community Newsletter - Salem Acres Hazardous Waste Site," EPA Region I (August 24, 1987). Concerning actions to be taken following the completion of sampling and analysis activities.
61. " Community Newsletter - Salem Acres Hazardous Waste Site," EPA Region I (October 14, 1987). Concerning best alternative action for removal per waste stream and regulatory criteria.
62. " Community Newsletter - Salem Acres Hazardous Waste Site," EPA Region I (November 7, 1987). Concerning construction activities following selection of alternative response action.
63. " Community Newsletter - Salem Acres Hazardous Waste Site," EPA Region I (February 20, 1988). Concerning completion of construction activities and description of site monitoring activities.
64. "Environmental News - EPA Announces Public Meeting to Explain Proposed Cleanup Plan for the Salem Acres Superfund Site," EPA Region I (June 12, 1992).

13.4 Public Meetings

1. Summary of Public Meeting, EPA Region I (March 5, 1985).
2. Meeting Notes, Residents Meeting for the Salem Acres Site with attached Attendance List, EPA Region I (December 15, 1987). Concerning the roles of EPA, PRPs, and assorted contractors.
3. Meeting Notes, Residents Meeting for the Salem Acres Site with attached Attendance List, EPA Region I (December 15, 1987). Concerning activities which took place during the Emergency Action Response.
4. Summary of Public Meeting, EPA Region I (June 24, 1992).
5. Summary of Public Meeting, EPA Region I (July 15, 1992).

13.5 Fact Sheets

1. "Superfund Fact Sheet," EPA Region I (October 1987). Concerning the Emergency Response Action to be initiated.
2. "Superfund Fact Sheet," EPA Region I (December 1987). Concerning the Emergency Response Action that was initiated
3. "Salem Acres Chronology," EPA Region I (December 1987).
4. "Potential Health Hazards at the Salem Acres Site," EPA Region I (December 1987). Concerning descriptions of hazardous substances and their potential health effects as determined from sampling activities.

14.0 Congressional Relations

14.1 Correspondence

1. Letter from Paul Keough for Michael R. Deland, EPA Region I to Nicholas Mavroules, Member of U.S. House of Representatives (April 5, 1985). Concerning current activities at the site.
2. Letter from Michael R. Deland, EPA Region I to Nicholas Mavroules, Member of U.S. House of Representatives (June 15, 1987) with attached chronology. Concerning the status of the site.

16.0 Natural Resource Trustee

16.1 Correspondence

1. Letter from John C. Keane, EPA Region I to Ken Carr, U.S. Department of the Interior Fish and Wildlife Service (February 10, 1987). Concerning transmittal of the RI/FS work plan.
2. Letter from John C. Keane, EPA Region I to William Patterson, U.S. Department of Interior (February 10, 1987). Concerning notification that natural resources may be affected by contamination existing at the site.
3. Letter from Gordon E. Beckett, U.S. Department of the Interior Fish and Wildlife Service to John C. Keane, EPA Region I (March 25, 1987). Concerning review of the draft RI/FS Work Plan as it addresses wetlands interests.
4. Letter from Gordon E. Beckett, U.S. Department of Interior Fish and Wildlife Service to John C. Keane, EPA Region I (April 30, 1987). Concerning recommendations for sampling of water and fish to determine the extent of impact on DOI trustee resources.

16.1 Correspondence (cont'd.)

5. Letter from Lawrence E. Keister, U.S. Department of Commerce National Oceanic and Atmospheric Administration to John C. Keane, EPA Region I (August 7, 1987). Concerning review of the proposed RI/FS Work Plan.
6. Letter from Jonathan P. Deason, U.S. Department of the Interior to Merrill S. Hohman, EPA Region I (January 21, 1991). Concerning results of preliminary survey conducted at the site.

16.4 Trustee Notification Form and Selection Guide

1. Trustee Notification Form (June 12, 1987).

17.0 Site Management Records

17.4 Site Photographs/Maps

The records cited in entry numbers 1, 2, and 3 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. Aerial Photographic Study and Topographic Maps of Land Use and Point Source Inventory, Salem, MA (September 1983).
2. Aerial Photographic Study of Salem Acres Disposal Site, Salem, MA (January 1984).
3. Topographic maps of Salem Acres sampling locations.

Section II

Guidance Documents

GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at EPA Region I, Boston, Massachusetts.

General EPA Guidance Documents

1. "Protection of Wetlands (Executive Order 11990), Appendix D," Federal Register (Vol. 42), 1977.

2. U.S. Environmental Protection Agency. Guidance Manual for Minimizing Pollution from Waste Disposal Sites (EPA/600/2-78/142), August 1978.

3. U.S. Environmental Protection Agency. Office of Water and Waste Management. Evaluating Cover Systems for Solid and Hazardous Waste, 1980.

4. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Costs of Remedial Response Actions at Uncontrolled Hazardous Waste Sites, April 15, 1981.

5. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Lining of Waste Impoundment and Disposal Facilities (SW-870, OSWER Directive 9480.00-4), March 1983.

6. "Final and Proposed Amendments to the National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), September 8, 1983.

7. U.S. Environmental Protection Agency. Office of Research and Development and Office of Emergency and Remedial Response. Review of In-Place Treatment Techniques for Contaminated Surface Soils - Volume 1: Technical Evaluation (EPA/540/2-84/003a), September 1984.

8. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. Development of Statistical Distribution or Ranges Standard Factors Used in Exposure Assessments (EPA OHEA-E-16), March 1985.

9. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #9: Site Safety Plan (OSWER Directive 9285.2-05), April 1, 1985.

10. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Project Summary: Settlement and Cover Subsidence of Hazardous Waste Landfills (EPA/600/S2-85/035), May 1985.

11. U.S. Environmental Protection Agency. Environmental Research Laboratory. EPA Guide for Minimizing the Adverse Environmental Effects of Cleanup of Uncontrolled Hazardous-Waste Sites (EPA/600/8-85/008), June 1985.

12. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Remedial Investigations under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/002), June 1985.

13. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/003), June 1985.

14. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Sediment Sampling Quality Assurance User's Guide (EPA/600/4-85/048), July 1985.

15. U.S. Environmental Protection Agency. Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites (OSWER Directive 9850.3), September 27, 1985.

16. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance Document for Cleanup of Surface Impoundment Sites (OSWER Directive 9380.0-6), June 1986.

17. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. PCB Sediment Decontamination - Technical/Economic Assessment of Selected Alternative Treatment, September 15, 1986.

18. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), December 1988.

19. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Systems to Accelerate in Situ Stabilization of Waste Deposits (EPA 540/2-86/002), September 1986.

20. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Mobile Treatment Technologies for Superfund Wastes (EPA 540/2-86/003 (f)), September 1986.

21. U.S. Environmental Protection Agency. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended October 17, 1986.

22. "Hazardous Waste Management Systems; Land Disposal Restrictions; Final Rule," Federal Register (Vol. 51, No. 216), November 7, 1986.

23. "PCB Spill Cleanup Policy," Federal Register (Vol. 52, No. 63), April 2, 1987.

24. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Environmental Review Requirements for Removal Actions (OSWER Directive 9318.0-05), April 13, 1987.

25. Memorandum from Francis S. Blake, General Counsel, to J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, July 31, 1987 (discussing the scope of the CERCLA petroleum exclusion under sections 101 (14) and 104 (a) (2)).

26. Memorandum from Henry L. Longest, U.S. Environmental Protection Agency Office of Emergency and Remedial Response and Gene Lucero, U.S. Environmental Protection Agency Office of Waste Programs Enforcement to Waste Management Division Directors, Regions I-X and Environmental Services Division Directors, Regions I, VI, and VII, August 11, 1987, (discussing land disposal restrictions).

27. Memorandum from Denise M. Keehner, Chief, U.S. Environmental Protection Agency Chemical Regulation Branch to Bill Hanson, U.S. Environmental Protection Agency Site Policy and Guidance Branch, October 14, 1987 (discussing comments on the PCB contamination -- regulatory and policy background memorandum).

28. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Public Involvement in the Superfund Program (WH/FS-87-004R), Fall 1987.

29. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. The Superfund Remedial Program (WH/FS-87-002R), Fall 1987.

30. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Draft Guidance on CERCLA Compliance with Other Laws Manual (OSWER Directive 9234.1-01), November 25, 1987.

31. "Guidelines for PCB Levels in the Environment," The Hazardous Waste Consultant, January/February 1988.

32. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated GroundWater at Superfund Sites (OSWER Directive 9283.1-2), April 1988.

33. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Exposure Assessment Manual (EPA/540/1-88/001, OSWER Directive 9285.5-1), April 1988.

34. U.S. Environmental Protection Agency. Office of Water. Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants (SCD #17), May 1988.

35. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/540/G-88/002, OSWER Directive 9230.0-3A), June 1988.

36. U.S. Environmental Protection Agency. Risk Reduction Engineering Laboratory. Lining of Waste Containment and Other Impoundment Facilities (EPA/600/2-88/052), September 1988.

37. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Technology Screening Guide for Treatment of CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Soils and Sludges (EPA 540/2-88/004), September 1988.

38. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (Interim Final) (EPA/540/G-89/004, OSWER Directive 9355.3-01), October 1988.

39. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version), Chapter 6 (OSWER Directive 9230.0-3B), November 3, 1988.

40. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Design, Construction, and Evaluation of Clay Liners for Waste Management Facilities (EPA/530/SW-86/007F), November 1988.

41. Interagency Cooperative Publication. Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 1989.

42. Memorandum from Bill Hanson, U.S. Environmental Protection Agency Site Policy and Guidance Branch to Regional Superfund Branch Chiefs, Regions I-X, April 7, 1989 (discussing PCB Contamination at Superfund Sites).

43. U.S. Environmental Protection Agency. Office of Research and Development. Requirements for Hazardous Waste Landfill Design, Construction, and Closure (EPA/625/4-89/022), April 1989.

44. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Land Disposal Restrictions: Summary of Requirements, June 1989.

45. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #3, Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-03FS), July 1989.

46. Memorandum from Henry L. Longest, U.S. Environmental Protection Agency Office of Emergency and Remedial Response and Bruce Diamond, U.S. Environmental Protection Agency Office of Waste Programs Enforcement to Waste Management Division Directors, Regions I, II,IV,V,VII and VIII; Emergency and Remedial Response Division Director, Region II; Hazardous Waste Management Division Directors, Regions III and VI; Toxic Waste Management Division Director, Region IX; and Hazardous Waste Division Director, Region X, (OSWER Directive 9355.4-02) September 7, 1989 (discussing interim guidance on establishing soil lead cleanup levels at Superfund sites).

47. U.S. Environmental Protection Agency. OSWER Directive Initiation Request. Analysis of Treatability Data for Soil and Debris: Evaluation of Land Ban Impact on Use of Superfund Treatment Technologies (OSWER Directive 9380.3-04), November 30, 1989.

48. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Remedial Investigation: Site Characterization and Treatability Studies (OSWER Directive 9355.3-01FS2), November 1989.

49. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #7, Determining When Land Disposal Restrictions (LDRs) are Relevant and Appropriate to CERCLA Response Actions. (OSWER Directive 9347.3-08FS), December 1989.

50. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - CERCLA Compliance with State Requirements (OSWER Directive 9234.2-05/FS), December 1989.

51. U.S. Environmental Protection Agency. Risk Reduction Engineering Laboratory. Handbook on In Situ Treatment of Hazardous Waste-Contaminated Soils (EPA/540/2-90/002), January 1990.

52. "National Oil and Hazardous Substances Pollution Contingency Plan," Federal Register (Vol. 55, No. 46), March 8, 1990, p. 8666.

53. U.S. Environmental Protection Agency. Impact of the RCRA Land Disposal Restrictions of Superfund Response Actions in Superfund.

54. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Application of Low-Temperature Thermal Technology to CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Soils.

55. U.S. Department of Health and Human Services. Agency for Toxic Substances and Disease Registry. ATSDR Fact Sheet.