REGION I

RECORD OF DECISION

NYANZA CHEMICAL WASTE DUMP SUPREME FUND SITE

March 30, 1993
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DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Nyanza Chemical Waste Dump Superfund Site
Operable Unit III
Ashland, Massachusetts

Statement of Purpose

This Decision Document presents the selected remedial action for this Site 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 (SARA), and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300.

The Commonwealth of Massachusetts has concurred with the selected remedy.

Statement of Basis

This decision is based on the Administrative Record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the information repositories located at the public libraries in the Ashland, Framingham, Wayland, Sudbury, Lincoln and Concord, Massachusetts, and at the EPA offices at 90 Canal Street in Boston, Massachusetts. The attached index identifies the items which comprise the Administrative Record upon which the selection of a remedial action is based.

Description of the Selected Remedy

The third operable unit is an additional source control remedy involving the cleanup of mercury-contaminated sediments in a wetland and certain drainageways between the area of former Nyanza, Inc. operations and the Sudbury River. These areas are referred to as the Continuing Source Areas. In summary, the remedy provides for: 1) excavation of sediment with mercury levels above 1 mg/kg from the Continuing Source Areas; 2) dewatering of the contaminated sediment; 3) disposal of dewatered...
sediments under a portion of the cap constructed under the first operable unit remedy; 4) reconstruction of the area of cap removed during disposal; 5) treatment, if necessary, of water from the dewatering operation with discharge to an on-Site surface water body; 6) restoration of impacted wetland areas; 7) institutional controls to limit exposure to contaminants in the Sudbury River; 8) planning and implementation of public awareness activities to increase public knowledge about contamination remaining in the Sudbury River sediments and fish; 9) performing certain pre-design studies to aid in the design of the selected remedy; and 10) creation of a fourth operable unit to conduct additional investigation of the Sudbury River.

The first operable unit ROD, which was signed in September 1985, addressed contaminated sludges and soils at the Site by excavating them from outlying areas, consolidating them with sludges already on Megunko Hill, and burying them under an impermeable cap. This remedy also included an upgradient diversion trench to preclude contact with groundwater and surface water runoff with the buried material. Construction of the first operable unit remedy has been completed.

The second operable unit addressed groundwater contamination at the Site. This ROD, signed in September 1991, selected an interim remedial action that included extraction and treatment of groundwater for a minimum of five years and performance of additional studies before adoption of a final groundwater remedy. This interim remedy is currently being designed.

The third operable unit (OU III) remedy will address risks to human and ecological receptors currently posed by the Continuing Source Areas as well as eliminate these areas as sources of continued contamination to the Sudbury River. The cleanup level of 1 mg/kg of mercury in sediment was selected because it will be protective of aquatic organisms in the Continuing Source Areas and because this level is equivalent to background levels found in the River upstream of the Site. Furthermore, this cleanup level will be protective of human health in the Continuing Source Areas under all exposure scenarios. Because OU III does not include active remediation of contaminants in the Sudbury River, risks to human health and the environment will be controlled through the implementation of institutional controls and public awareness activities as an interim remedy until a final River remedy is selected under operable unit IV.
Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable for this remedial action and is cost-effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. However, because treatment of the principal threats of the Site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Given the relatively low levels of mercury detected in the Continuing Source Areas as compared to levels already beneath the cap, the fact that a cap was selected as the appropriate remedy for mercury-contaminated soils, sediments, and sludges under the first operable unit, and the fact that there is currently no destructive technology for metals, EPA has determined that containment of the contaminated sediments in the Continuing Source Areas is preferable to treatment.

3-30-93
Date

Paul Keough
Acting Regional Administrator, EPA Region I
I. SITE NAME, LOCATION AND DESCRIPTION

The Nyanza Chemical Waste Dump Superfund Site is located in the Town of Ashland, Middlesex County, Massachusetts (see Figure 1). Ashland is located in the Metrowest area of eastern Massachusetts, bordered by Sherborn to the east, Southborough to the west and northwest, Framingham to the north, and Hopkinton and Holliston to the south. Ashland is 25 miles west-southwest of Boston, and 20 miles east-southeast of Worcester.

The term "Site" includes the former Nyanza, Inc. Property (as described below); drainageways between the Property and the Sudbury River; and the Sudbury River downstream to its confluence with the Assabet River in Concord (see Figure 2). Some of these drainageways, referred to as the Continuing Source Areas are the focus of this Record of Decision (ROD). The Continuing Source Areas include the Eastern Wetland, Trolley Brook, Outfall Creek and the lower Raceway (see Figure 3).

The Nyanza, Inc. Property (Property) includes the 35-acre area consisting largely of the area formerly owned and operated by Nyanza, Inc. The Property includes several wetlands, the Megunko Hill area, and the lower industrial area along Megunko Road. The Hill is located in the southern part of the Property and was formerly used as a landfill/disposal area. The lower industrial area was formerly the location of dye manufacturing facilities, the wastewater treatment system and a series of settlingagoons south of Megunko Road. The Property is approximately bounded by an active Conrail railroad line and Chemical Brook to the north, wetland areas and Cherry Street to the east, and undeveloped mixed hardwood forest land to the south, southeast, and west. The Sudbury River is approximately 700 feet north of the Property.

The Town of Ashland occupies approximately 12.9 square miles, of which 18 percent is open water and wetland areas, and more than 40 percent is intensively developed. The bulk of development has occurred in response to the need for single- and multiple-family housing created by rapid economic expansion along the major transportation routes: State Route 128 (I-95), I-495, U.S. Route 9, and I-290. From 1951 to 1980, agriculture and open-land use in the area has decreased from 19 to less than five percent.

A description of the Site can be found in Section 3 of the Remedial Investigation Report.

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1 For purposes of implementing this remedy under CERCLA Section 121(e)(1), the "Site" shall be "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action." National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Section 300.400(e).
II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Response History

From 1917 through 1978, the Property was occupied by several companies involved in the manufacture of various products. Textile dyes and dye intermediates were produced at the Property until 1978 when Nyanza, Inc. apparently ceased operations. Products manufactured on the Property in addition to those previously mentioned included inorganic colloidal solids and acrylic polymers. Nyanza, Inc. was the most recent dye manufacturing company to occupy the Property. The former plant grounds now are occupied by several industrial concerns, the largest of which is Nyacol Products, Inc.

Starting in 1917, several types of chemical wastes were disposed of in various locations on the Property with the majority of these wastes deposited on Megunko Hill, which was used as an unsecured landfill. Wastes included partially-treated process wastewater; chemical sludge from the wastewater treatment process; solid process wastes (e.g., chemical precipitate and filter cakes) in drums; solvent recovery distillation residue in drums; and off-specification products. Process chemicals that could not be recycled or reused (including phenol, nitrobenzene, and mercuric sulfate) were also disposed of on the Property.

Chemical wastes were also disposed of in the wetland areas. The Trolley Brook Wetland received waste effluent discharge from various manufacturing operations in the area. The northwest wetland area at the headwaters of Chemical Brook contained wastewater treatment sludge and possibly received overflow from an underground concrete wastewater vault that discharged into Chemical Brook.

Nyanza, Inc. and its predecessors originally discharged the dye waste stream to a concrete "vault" or settling basin adjacent to the main process building. The vault was used as a central sump for the collection of wastewater from the entire Nyanza, Inc. operation, as well as for other generating tenants housed in the immediate vicinity. This vault was approximately 40 x 80 feet and approximately 10 feet deep. The liquid occasionally overflowed via a pipe into Chemical Brook which flowed into Trolley Brook and through Chemical Brook culvert into Outfall Creek and then into the Raceway that entered the wetlands along the Sudbury River. The vault was taken out of service in the 1960's or 1970's and was subsequently filled with sludge and covered over with fill. However, the vault continued to be a source of groundwater pollution at the Site until its removal in 1988. As part of an ongoing effort to ease river pollution, the Massachusetts Division of Water Pollution Control (DWPC) ordered Nyanza, Inc. to install a pretreatment system for industrial process water and to discharge the treated waste to the Metropolitan District Commission (MDC) sewer collection system. Nyanza, Inc. connected to the MDC system in March 1970.
The first type of contamination linked to the Site was mercury, discovered in the Sudbury River in 1970, as part of an overall investigation of mercury problems in Massachusetts for the DWPC. A follow up study in 1972 focusing on Nyanza, Inc. revealed mercury contamination in the Sudbury River was caused by uncontrolled sludge and wastewater disposal at the Property.

Since 1972, several investigations have been prompted by contamination present at or originating from the Property. From 1972 through 1977, DWPC and the Department of Public Health (DPH) cited Nyanza, Inc. for several contamination problems associated with dumping activities. Following a 1972 DWPC order to implement a plan to stop further groundwater pollution, Camp Dresser and McKee, Inc. (CDM), working for Nyanza, Inc., performed a 1974 investigation aimed at source identification and devised plans to control groundwater contamination from the Property; however, the plans were not implemented. In 1979, Edward J. Camille, an owner of several parcels of the Property, hired Connorstone Engineering, Inc. to complete the CDM groundwater pollution control program. However, the Massachusetts Department of Environmental Quality Engineering (DEQE, successor to DWPC, now known as the Department of Environmental Protection or DEP) halted these plans, pending further investigation. In 1980, DEQE released a Preliminary Site Assessment Report summarizing the Site history and findings of previous investigations at the Site (DEQE, 1980). MCL Development Corporation acquired much of the Property in 1981, and hired Connorstone Engineering, Inc. and Carr Research Laboratory, Inc. to characterize soil composition and locate sludge deposits.

The Nyanza Chemical Waste Dump Superfund Site was included on the original National Priority List (NPL) of Superfund Sites in 1982 and a preliminary Remedial Action Master Plan (RAMP) was prepared. In 1984, the Environmental Protection Agency (EPA) authorized NUS Corporation (NUS) to perform a Remedial Investigation/Feasibility Study (RI/FS).

The September 4, 1985 ROD divided the Agency's remedial response into Operable Units (OUs) for the purpose of addressing distinct problems. The September 1985 ROD was designated Operable Unit I (OU I) and selected soil and wetland excavation at nine localized areas of contamination; solidification of water bearing excavated sludge, sediments, and soil; and placement, capping and consolidation of those materials with material left in place on the "Hill" area in the southern part of the Property. A diversion trench has been constructed on the side of Megunko Hill above and around the capped area to divert surface water flow and lower the groundwater table beneath the cap as part of OU I. Construction of the project began in early 1989 and was completed in 1992.

In 1985, the DEQE undertook an Interim Response Measure at the Site consisting of the following activities: fencing the Trolley Brook Road embankment; placing one foot of clean fill in one of the Site areas to remove the threat of direct contact; and culverting Chemical Brook through neighboring property.
In January 1987, DEQE and the EPA Environmental Services Division (ESD) initiated a sludge removal action of the contents within the vault (see Figure 3). Prior DEQE studies indicated that the vault, and contaminated soil and groundwater in the vicinity of the vault, were a significant source of organic contamination in the groundwater downgradient of the area. Contaminants present included, but were not limited to, trichloroethene (TCE), chlorobenzene, and nitrobenzene, all by-products of aniline dye production. Inorganic contaminants found in the sludge included heavy metals such as antimony, cadmium and chromium. Initially, the vault contamination investigation was planned within the scope of Operable Unit II (OU II). DEQE and the EPA conducted a subsurface investigation in the vault and surrounding area, culminating in a decision to proceed immediately with remediation of the vault area. The removal action was conducted by EPA's Emergency Response Team. From October to December 1987, 665 tons of soil adjacent to the vault were removed; 309 tons were incinerated, and 356 tons were shipped off-Site to an approved landfill. In March and June 1988, 2,512 tons of sludge from the vault was solidified on-Site and disposed of at an off-Site Resource Conservation and Recovery Act (RCRA) landfill facility.

In June 1987, EPA authorized the initiation of RI/FS activities for OU II, addressing contaminated groundwater migrating from the Property. A ROD was signed for this OU on September 23, 1991. The selected remedy was an interim remedy for groundwater cleanup that included extraction and treatment of groundwater for a minimum of five years and additional studies before adoption of a final remedy. This remedy is currently being designed.

A third phase of RI/FS investigations, OU III, focused on contamination in the drainageways between the Property and the Sudbury River and in a 33-mile stretch of the River. During the RI/FS, the scope of OU III was narrowed to focus on the Continuing Source Areas. The scope of this OU is discussed in Section IV, below.

A more detailed description of the Site history can be found in Section 1.2 of the Remedial Investigation Report.

B. Enforcement History

On April 4, 1982, EPA sent 10 general notice letters to 18 entities it believed were responsible parties. On January 22, 1991, based on newly acquired information, EPA notified approximately 21 parties of their potential liability with respect to the Site, some of whom had been previously notified in the 1982 letters. An additional party was notified on June 21, 1991 based on new information supplied by the existing PRPs. On July 22, 1991, eleven parties were removed from the PRP list. On December 28, 1992, EPA notified one additional party of potential liability.
based on new information. EPA, therefore considers eighteen parties potentially liable to perform or pay for the cleanup of the Site. EPA generally conducts negotiations with potentially responsible parties (PRPs) as soon as possible regarding the settlement of their liability at the Site. Some of the PRPs have formed a Steering Committee and substantial discussions between EPA and the Steering Committee have taken place.

The PRPs have been active in the remedy selection process for this OU. Technical comments presented by PRPs during the public comment period are summarized in the responsiveness summary, and the summary and written comments have been included in the Administrative Record.
III. COMMUNITY PARTICIPATION

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

During 1986, EPA released a Community Relations Plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during the planning and execution of remedial activities.

Upon the start of construction of the cap and diversion trench on-Site in 1989, EPA intensified its community relations efforts in response to public concerns about safety issues related to the cleanup. For a several month period, weekly meetings were held with representatives of the police and fire departments, as well as with concerned citizens and representatives of organized labor.

In June, 1992 EPA held three informational meetings in the City of Framingham, MA and the Towns of Sudbury and Concord, MA to discuss the results of the OU III Remedial Investigation. EPA distributed fact sheets at these meetings summarizing the results of the investigation.

On December 31, 1992, EPA made the administrative record for OU III available for public review at EPA's offices in Boston and at the Ashland, Framingham, Wayland, Concord, Lincoln and Sudbury Public Libraries. EPA published a notice and brief analysis of the OU III Proposed Plan in the Middlesex News on December 29, 1992 and made the plan available to the public at the above locations.

On January 6, 1993, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan for OU III. Also during this meeting, the Agency answered questions from the public. From January 7, 1993 to March 10, 1993, the Agency held a 62 day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. On January 27, 1993, the Agency held a Public Hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this hearing and the comments and the Agency's response to comments are included in the attached responsiveness summary, Appendix A.
IV. SCOPE AND ROLE OF OPERABLE UNIT

The OU I ROD was signed on September 4, 1985. This source control remedy called for the excavation of sludges and their consolidation under an impermeable cap constructed on Megunko Hill. The construction of this remedy is now complete.

The OU II ROD was signed on September 23, 1991. The remedy selected in this ROD was an interim remedy for groundwater cleanup that included extraction and treatment of groundwater for a minimum of five years and additional studies before adoption of a final remedy. This remedy is currently being designed.

Operable Unit III (OU III) was initially intended to address contamination of drainageways between the Property and the Sudbury River as well as a 33-mile stretch of the River. The selected OU III remedy addresses contamination in several of these drainageways, referred to as the Continuing Source Areas, and provides for additional investigations to be conducted in the Sudbury River. Alternatives addressing contamination in the River were eliminated from consideration under OU III because of an inability to evaluate their effectiveness using current data, the potential for adverse impacts, and the inordinately high costs associated with these alternatives. Additional investigation of the River is necessary to make a final remedy decision. However, because of the levels of mercury in the Continuing Source Areas which currently pose human health and ecological risks and the potential for these areas to continue to contaminate the Sudbury River, it is appropriate to address these areas now while additional information is being collected to assess the final remediation of the River, which has been designated as the fourth operable unit (OU IV).

In summary, the OU III remedy provides for: 1) excavation of sediment with mercury levels above 1 mg/kg from the Continuing Source Areas; 2) dewatering of the contaminated sediment; 3) disposal of dewatered sediments under a portion of the cap constructed under OU I; 4) reconstruction of the area of cap removed during disposal; 5) treatment, if necessary, of water from the dewatering operation with discharge to an on-site surface water body; 6) restoration of impacted wetland areas; 7) institutional controls to limit exposure to contaminants in the Sudbury River; 8) planning and implementation of public awareness activities to increase public knowledge about the River contamination; 9) performing certain pre-design studies to aid in the design of the selected remedy; and 10) creation of OU IV to conduct additional investigation of the Sudbury River.
V. SUMMARY OF SITE CHARACTERISTICS

A. General

Chapter 2 of the OU III FS contains an overview of the RI. The significant findings of the RI are summarized below. The RI report utilized information developed by previous studies and information developed as part of a two-phased field program to evaluate the OU III Sudbury River Study Area (Study Area). The Study Area includes the drainageways between the Property and the Sudbury River, including the Continuing Source Areas, and a 33-mile stretch of the River from Cedar Swamp in Westborough to the confluence of the Sudbury and Assabet Rivers in Concord. The specific objectives of the OU III field investigation activities are summarized below:

- to assess the nature and distribution of contaminants in surface water, sediments and biota of the Sudbury River and the drainageways between the Property and the River, including the Continuing Source Areas;
- to assess the public health and environmental risk associated with elevated levels of contaminants observed in the sediments, surface water and biota of the Sudbury River and the drainageways between the Property and the River, including the Continuing Source Areas;
- to develop response objectives; and
- to support the evaluation of remedial alternatives.

To achieve the above objectives, the two-phased field program commenced in September, 1989 and continued until July, 1991. The following field activities were conducted as part of these investigative efforts:

- sampling and analysis of sediments from Cedar Swamp Pond in Westborough to the beginning of the Concord River in Concord;
- sampling and analysis of surface water from Cedar Swamp Pond to Heard Pond in Wayland;
- sampling and analysis of fish from Cedar Swamp Pond to Fairhaven Bay in Concord;
- sampling and analysis of surface water and sediment in the Eastern Wetland, Trolley Brook, Chemical Brook culvert, Outfall Creek, and the Raceway;
- assessing wetlands adjacent to the River;
- sampling and analysis of sediment from locations within the bordering wetlands of the River;
- monthly water sampling from several locations to define seasonal fluctuations in water chemistry;
surveying benthic biota (population density count) in the Study Area;
- sampling and analysis of caddis fly larvae in the River;
- surveying bathymetry and sediment thickness in Reservoirs 1 and 2; and
- inspecting the Chemical Brook culvert by remote video camera.

The results of these investigations are presented in detail in the RI report.

B. Physiography

A description of characteristics of the Sudbury River can be found in Section 3 of the RI Report. The drainageways investigated as part of OU III investigations included the following:

- The Eastern Wetland, which receives drainage from the eastern portion of the Property and constitutes the headwaters of a small tributary of the River.

- Chemical and Trolley Brooks, which are the primary surficial drainage routes from the Property and the Eastern Wetland. The brooks merge and discharge through a subsurface culvert (Chemical Brook culvert) which discharges to a small creek called Outfall Creek and then to the lower Raceway, downstream of the Concord Street overpass in Ashland. Chemical Brook and the Trolley Brook Wetland were remediated as part of OU I.

- The Raceway, a man-made canal which channelizes a portion of the river flow from a flow-control gate at Mill Pond into a culvert which passes beneath a large mill building. The Raceway is an open canal downstream of this building before it rejoins the Sudbury River.

All of these drainageways except Chemical Brook culvert comprise the Continuing Source Areas. Chemical Brook culvert is not considered a Continuing Source Area because of the small amounts of sediment in the culvert and the relatively low levels of mercury in that sediment. These drainageways are shown on Figure 3.

C. Contamination of Affected Media

The assessment of Sudbury River and Continuing Source Area contamination was based on the 1989, 1990 and 1991 sampling data. The results of surface water and sediment sampling in the Continuing Source Areas and fish sampling in the Sudbury River are summarized below; additional sampling results can be found in Section 4 of the RI Report.
1. Sediment

- The highest concentrations of mercury in sediments occur in the Eastern Wetland area, which drains the eastern portion of the Site. The average detected level of mercury in this area during the first sampling round was 44.84 ppm with a maximum of 152 ppm. Phase 2 sampling of this area showed that the highest concentrations of inorganic contaminants are in the upper two feet of sediment in this area. Concentrations decrease with depth and approach non-detectable at five to six feet below ground surface.

- As sediments are transported downstream through Chemical Brook culvert to Outfall Creek, mercury concentrations decrease as sediments from other sources are mixed with the contaminated sediment from the Site. However, there is a dramatic rise in mercury concentrations in River sediment where these drainageways (including the Raceway) discharge to the River. Maximum mercury levels in sediment in Trolley Brook and the Outfall Creek/lower Raceway area were 36.5 and 99.2 mg/kg, respectively.

- The maximum mercury concentration found in sediments in Chemical Brook culvert was 7.1 mg/kg.

- Monomethylmercury was found in low levels in two of the Eastern Wetland sediment samples.

- Chromium and aluminum were also found above background levels in the Continuing Source Areas.

- A number of Site-related organic contaminants were detected in the Eastern Wetland sediments in the range of $10^1$ to $10^4$ ppb. These include chlorobenzene, dichlorobenzene, trichloroethene, and dichloroethene. Concentrations decreased within a short distance downstream of the Eastern Wetland.

- Polynuclear Aromatic Hydrocarbons (PAHs) were detected in sediments in the Eastern Wetland, Chemical Brook Culvert, and Outfall Creek. Most of these PAHs are not considered to be Site-related.

- Occasional occurrences of pesticides were found in sediments in the Eastern Wetland. Pesticides are not related to the Site.

2. Surface Water

- Mercury was detected in surface water samples at levels above the chronic and acute Ambient Water Quality Criteria (0.012 ug/l and 2.4 ug/l, respectively) in the Eastern Wetland and at levels above the chronic Ambient Water Quality Criteria in Outfall Creek and Trolley Brook.
- Chromium occurred at low concentrations in several surface water samples from the Eastern Wetland.

- Lead was detected in surface water samples in the Eastern Wetland, Trolley Brook and Outfall Creek. No distribution pattern was apparent.

- Several other inorganic contaminants, including barium, cobalt and zinc were detected in the Continuing Source Areas at levels above the chronic AWQC. These contaminants are not considered to be Site-related.

- Minimal concentrations (less than 13 ug/l maximum concentration) of volatile organic compounds were detected in the surface water in the Continuing Source Areas.

- Methylmercury was not detected in the surface water.

- One phthalate compound, bis(2-ethylhexyl) phthalate, was detected in one surface water sample in Outfall Creek. This compound is not considered to be related to the Site.

3. Biota/Fish

- No biota samples were collected in the Continuing Source Areas.

- Mercury, including methylmercury, was detected in fish samples collected throughout the Sudbury River.

- Pesticides and PCBs were also detected in several fish samples from the River. These contaminants are not considered to be related to the Site.

- Concentrations of mercury and pesticides, both of which bioaccumulate, were generally higher in older, larger fish and in fish that were higher in the food chain.

A complete discussion of Study Area characteristics can be found in Sections 3 and 4 of the Remedial Investigation Report.
VI. SUMMARY OF SITE RISKS

A Risk Assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site. The results of the public health risk assessment for the OU III of the Site are discussed below followed by the results of the environmental risk assessment.

A. Human Health Risk Assessment

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 exposure pathways and characterized the potentially exposed populations; 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 risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks.

1. Contaminants of Concern

Fifty-seven contaminants of concern, listed in Tables 1 and 2 were selected for evaluation in the risk assessment. These contaminants constitute a representative subset of more than seventy-five contaminants identified in the Study Area during the RI. The fifty-seven contaminants of concern were selected to 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 contaminants of concern can be found in Section 6.2 of the RI.

2. Exposure Pathways

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. The following is a brief summary of the exposure pathways evaluated.

Under current and expected future land use conditions, the Human Health Risk Assessment assumed that the Study Area, is used for recreational purposes- swimming, boating, wading and fishing.

Surface water exposure scenarios included exposure through wading and swimming which resulted in accidental ingestion of and dermal contact with the surface water. This scenario was evaluated for adult (50 days/year), teenage (150 days/year) and child (50 days/year) receptors.
Sediment exposure scenarios mirrored the surface water scenarios with accidental ingestion and dermal contact being the primary routes of exposure. However, in addition to the recreational scenario, a residential scenario, which assumed more frequent exposure to contaminated sediment was evaluated in some areas. This scenario assumed an exposure frequency of 270 days/year and was evaluated for the bordering wetland areas. Although the Continuing Source Areas were not evaluated in the Risk Assessment for a residential exposure scenario, EPA believes this scenario is appropriate for these areas, due to their proximity to both residential areas and Ashland High School.

Fish ingestion exposure scenarios for the Sudbury River were evaluated for two different receptors—sports and subsistence fishermen. These scenarios were evaluated for an adult who consumes fish 350 days/year over a 30 year period. The sports and subsistence fishermen were assumed to consume 0.054 kg/day and 0.132 kg/day, respectively.

A more thorough description of exposure pathways can be found in Section 6.4 of the RI Report.

For each pathway evaluated, an average and reasonable maximum exposure estimate was generated, corresponding to the average and maximum concentration of contaminants detected in each medium.

3. Toxicity Assessment
An important component of the risk assessment is the relationship between the dose of a compound and the potential for adverse health effects resulting from exposure to that dose. Dose-response relationships provide a means by which potential public health impacts may be evaluated. The toxicity criteria that were used to characterize the public health risk associated with exposure to Contaminants of Concern are explained in Section 6.3 of the RI Report.

4. Risk Characterization
The Human Health Risk Assessment calculated excess lifetime cancer risks for each exposure pathway by multiplying the exposure level with the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. $1 \times 10^{-6}$ or 1/1,000,000) and indicate (using this example), that an average 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 as defined by the compound at the
stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. For carcinogenic risk, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual between $10^{-6}$ and $10^{-5}$.

The hazard quotient was also calculated for each pathway as EPA’s measure of the potential for non-carcinogenic health effects. The hazard quotient is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects for an individual compound. 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 quotient 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 quotient is only considered additive for compounds that have the same or similar toxic endpoints (for example: the hazard quotient for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage). For non-carcinogenic risk, acceptable exposure levels are generally concentration levels that represent a hazard quotient less than or equal to one.

Table 3 depicts the carcinogenic and non-carcinogenic risk summaries for the contaminants of concern in sediment, surface water and fish evaluated to reflect risks corresponding to the average and the reasonable maximum exposure scenarios for each exposure pathway in each area evaluated.

The following sections summarize the results of the Human Health Risk Assessment as indicated in Table 3.

In addition, Tables 6-9A to 6-47B of the RI Report show the maximum and average concentrations, the exposure factors and the calculated risk for each contaminant of concern, for surface water, sediment, and biota for each River area and for each of the drainageways between the Property and the River, including the Continuing Source Areas.

a. Sediment Exposure Scenarios

1. Carcinogenic Risk

Cancer risk estimates do not exceed $1.3 \times 10^{-4}$ in any case presented for any of the areas evaluated. The principal contaminants contributing to this risk are not related to the Site. Therefore, there is no excess cancer risk for this scenario from Nyanza contaminants.
2. Non-Carcinogenic Risk

The hazard index calculated for chemicals affecting the kidney and/or central nervous system equals one for the Eastern Wetland sediment exposure scenario when the receptor of concern is a child and a recreational exposure scenario is used. The primary contaminant contributing to this risk is mercury. If a residential scenario, which assumes more frequent exposure and which was not evaluated for this area in the Risk Assessment, were considered, the hazard index would be greater than one.

The hazard index for wetlands bordering the River (residential exposure scenario), when calculated on a target organ-specific basis, does not exceed one.

b. Surface Water Exposure Scenarios

1. Carcinogenic Risk

EPA's acceptable risk range for carcinogenic risk is not exceeded for any of the surface water exposure scenarios.

2. Non-Carcinogenic Risk

A hazard index of one is not exceeded for any of the surface water scenarios evaluated with the exception of Reservoir 2 where a maximum detection of 19,300 ug/l of selenium resulted in a hazard index of 3.8. This single detection, however, appears to be an anomaly. Furthermore, selenium is not a Site-related contaminant.

c. Fish Ingestion Exposure Scenarios

1. Carcinogenic Risk

-Cancer risks estimated for the fish ingestion scenarios in the Sudbury River range up to $5.5 \times 10^{-3}$. The principal contaminants of concern contributing to these risks are arsenic, several pesticides and PCBs. For all of the areas where EPA's acceptable risk range is exceeded for this scenario, the risk range is exceeded for non-Site related contaminants. Therefore, there is no excess cancer risk from Nyanza contaminants for this scenario.

2. Non-Carcinogenic Risk

With regard to the fish ingestion scenario, hazard indices exceed one in each of the areas evaluated for at least one of the scenarios. The following is a summary of the locations and scenarios where a hazard index of one is exceeded:

- Sudbury Reservoir (background)
  Subsistence fisherman- maximum and average
- Cedar Swamp Pond (background)
  Subsistence fisherman- maximum and average
  Sport fisherman- maximum
- Southville Pond (background)
  Subsistence fisherman - maximum and average
- Mill Pond
  Subsistence fisherman - maximum and average
  Sport fisherman - maximum
- Reservoir 2
  Subsistence fisherman - maximum and average
  Sport fisherman - maximum and average
- Reservoir 1
  Subsistence fisherman - maximum and average
  Sport fisherman - maximum
- Saxonville Impoundment
  Subsistence fisherman - maximum and average
  Sport fisherman - maximum
- Fairhaven Bay
  Subsistence fisherman - maximum and average
  Sport fisherman - maximum

Mercury, for which the toxic endpoints are the central nervous system and the kidney, is the primary contaminant contributing to the risk in these scenarios. The hazard quotient for mercury and/or methylmercury exceeds one in every case that the hazard index exceeds one.

5. Uncertainties in Estimating Risk

It should be emphasized that the risk estimates in this assessment are based on numerous assumptions, each having uncertainty associated with it. Several types of uncertainties should be considered in any risk evaluation:

- uncertainties associated with identifying contaminants of concern and estimating average exposures;
- uncertainties associated with estimating the frequency, duration and magnitude of exposure;
- uncertainties in the models used to characterize risk;
- uncertainties in estimating carcinogenic potency factors and/or non-carcinogenic measures of toxicity (e.g., RfDs).

A complete discussion of these uncertainties is located in Section 6.7 of the RI Report.
B. Ecological Risk Assessment

The ecological risk assessment was conducted using methodology similar to the human health risk assessment except that, in the ecological assessment, the receptors of concern are plants and animals other than humans. The methodology and results of the Ecological Risk Assessment can be found in more detail in Chapter 7 of the RI Report.

1. Contaminants of Concern

Thirty-six contaminants of concern, listed in Table 4, were selected for evaluation in the ecological risk assessment. These contaminants constitute a subset of more than seventy-five contaminants identified in the Study Area during the RI. The thirty-six contaminants of concern were selected to represent potential Site-related hazards based on concentration, frequency of detection, toxicity, bioconcentration potential, or environmental persistence.

2. Exposure Assessment

The exposure assessment identifies a number of exposure pathways for evaluation in the ecological risk assessment. These pathways are shown in Figure 4. These exposure scenarios evaluate the following:

- effect on plants and animals that live in the surface water;
- effect on animals that live in the sediment;
- effect on animals that feed on fish or river animals.

Indicator species were selected for each of the exposure pathways based on a number of factors including relevance for the Site (i.e. the species is known to occur at the Site) and position in the food chain (as a measure of bioaccumulation).

The second component of the exposure assessment includes the estimation of environmental concentrations (EECs) for Contaminants of Concern for each exposure pathway (surface water, sediment and biota). The development of the EECs is based on measured concentrations of contamination at the Site, and an understanding of chemical fate and transport, which is described in Section 5.0 of the RI Report. Average and maximum EECs were calculated for each Contaminant of Concern for each media.

3. Hazard Assessment

The hazard assessment identifies concentrations of Contaminants of Concern for the appropriate exposure pathway that are known to or are likely to result in adverse effects to biota. Most toxicity data are based on standard test species that are representative of similar, related species that might exist within the Study Area. Little or no data are available in the literature measuring direct toxicity of the Contaminants of Concern to the indicator species selected for this Site.
4. Risk Characterization

Although many inorganic and organic chemicals were detected in various media within the Study Area, only a few chemicals were found at concentrations that would be considered to pose a risk to ecological receptors. The primary media of concern were determined to be sediments and biota. Risks from surface water appear to be minimal in comparison to those from sediments and biota, with the exception of the Eastern Wetland, Trolley Brook and Outfall Creek where risks from surface water are more substantial. However, risks due to bioaccumulation from contaminants at levels in surface waters below the current detection limits will be further investigated as part of the additional studies to be conducted on the River under OU IV.

a. Surface Water Scenarios
Contaminant levels above the Ambient Water Quality Criteria (AWQC) were considered to be of concern in this evaluation. Based on current data, mercury exceeded the chronic AWQC of 0.012 ug/l in the Eastern Wetland, Trolley Brook and Outfall Creek. In addition, the acute AWQC of 2.4 ug/l was exceeded in the Eastern Wetland. Several other compounds, particularly lead, also infrequently exceeded the AWQC.

b. Sediment Scenarios
Mercury constituted a major portion of the estimated risk from contaminated sediments. The concentration of mercury found in the Eastern Wetland, Outfall Creek, and many of the River locations exceeded levels reported by the National Oceanic and Atmospheric Administration at which undesirable effects were frequently observed amongst most types of aquatic sediment dwelling animals (ER-M).

Other Site-related contaminants, particularly chromium and lead, were occasionally found at levels that may be harmful to animals in the sediment. However, these contaminants constitute less of a risk to ecological receptors than mercury primarily because they do not bioaccumulate.

The risk estimates for exposure to aluminum in the sediments, which is not considered to be a Site-related contaminant, were also high throughout the river system.

c. Bioaccumulation of Contaminants through the Food Chain
The predominant contaminant of concern for biota was mercury, followed by PCBs and DDT and its degradation products (DDD and DDE), which are not considered to be Site-related contaminants. The contaminants which resulted in the greatest risk are those
that have the greatest effects on food chains/webs due to their high potential for bioaccumulation. The toxicity hazards associated with these contaminants are minimal compared to the risk associated with exposure through the food chain.

The greatest risk from exposure to contaminants through the food chain from Site contaminants is to upper trophic level predators that ingest contaminated fish and invertebrates from the Sudbury River and the Continuing Source Areas. The harmful effects to animals at all levels of the food chain include death, reproductive failure, central nervous system effects, and behavioral modification.

5. Uncertainties in Estimating Risk

As in the Human Health Risk Assessment, it should be emphasized that the risk estimates in the Ecological Risk Assessment are based on numerous assumptions, each having uncertainty associated with it. These uncertainties are similar to those discussed for the Human Health Risk Assessment above and are summarized in more detail in Section 7.6.6 of the RI Report.

C. Primary Risks from Site-related Contaminants

A number of contaminants, both Site- and non-Site related are found in the Continuing Source Areas and in the Sudbury River. However, clean-up levels were evaluated only for mercury for several reasons. First, it is one of the only contaminants which showed a clear connection to the Site. In addition, mercury is the primary Site-related contaminant contributing to both human health and ecological risk due, in part, to its propensity to biaccumulate.

Mercury concentrations in sediments are significantly higher in the Continuing Source Areas than in the River areas. In addition to the risk resulting from these contaminated sediments, these sediments are expected to continue to migrate to the Sudbury River, providing a continuing source to the River. Based on the human health and ecological risks associated with these areas, the potential for continued migration of contaminated sediments from these areas to the River, and the inability to evaluate the effectiveness of River remediation using current data, EPA has focused this remedy on the Continuing Source Areas. Additional studies under OU IV will address River contamination.
D. Conclusion

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. Risks due to contamination in the sediment and surface water in the Continuing Source Areas are dealt with in this ROD. In addition, through the use of institutional controls, risks due to fish ingestion in the Sudbury River are also temporarily addressed in this ROD.
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 the Comprehensive Environmental Response, Compensation and Liability Act (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:

Human Health Objectives

1. Mitigate mercury contamination in sediment in areas where accidental ingestion and dermal contact with contaminated sediments may result in unacceptable human health risks.

2. Mitigate mercury contamination in sediment in order to reduce mercury levels in fish, which may be consumed by fishermen.

3. Mitigate mercury contamination in sediment in the Continuing Source Areas in order to prevent continued migration of contamination to the Sudbury River.
Ecological Objectives

1. Mitigate mercury contamination in sediment to achieve an increased level of protection to environmental receptors in the Continuing Source Areas; one which is approximately equal to that found in background areas.

2. Mitigate mercury contamination in sediment in Continuing Source Areas in order to prevent continued migration of contamination to the Sudbury River.

3. Restore any wetland habitat disturbed during remediation.

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 was developed for the Study Area.

The first OU addressed the primary source control at the Site through the excavation, consolidation, and capping of on-Site soils, sludges and sediments. The second OU addresses management of migration through an interim remedy to pump and treat contaminated groundwater. The remedy selected in this ROD provides additional source control through remediation of the Continuing Source Areas.

With respect to OU III source control, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances in the Continuing Source Areas is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing 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.

As discussed in Chapters 4 and 5 of the FS, the RI/FS identified, assessed and screened technologies based on implementability, effectiveness, and cost. These technologies were combined into source control alternatives. Chapter 5 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 6 of the FS and in the FS Addendum Report.

In summary, of the 13 source control remedial alternatives screened in Chapter 5, six were retained for detailed analysis. Table 5 identifies the six alternatives that were retained through the screening process, as well as those that were eliminated from further consideration.
VIII. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each alternative evaluated. The alternatives evaluated include a no action alternative (Alternative 1), a limited action alternative (Alternative 2), as well as a series of remediation alternatives for the Continuing Source Areas.

Alternatives that required active remediation of River Areas were eliminated in OU III because of an inability to evaluate their effectiveness using current data, the potential for adverse impacts during remediation, and the inordinately high costs associated with these alternatives. All of the alternatives which consider remediation in the Continuing Source Areas also include institutional controls as an interim remedy for the Sudbury River. These temporary controls will be implemented as part of the selected remedy until a final remedy decision is made for the River under OU IV, which EPA has initiated to further investigate the River.

Source Control Alternatives Analyzed

Alternative 1: No Action with Monitoring

The FS evaluated this alternative to serve as a baseline for comparison with the other remedial alternatives under consideration. No work would be performed to address sediment contamination in the Continuing Source Areas or River Areas. Annual monitoring of sediment, surface water, and fish would be conducted for 30 years or until a final remedy decision is made for the River under OU IV.

Estimated Time for Implementation: Not applicable
Estimated Capital Cost: $0
Estimated Annual O&M Cost: $420,670
Estimated Total Cost (net present worth): $6,893,000

Alternative 2: Limited Action (No Action with Institutional Controls and Monitoring)

This alternative is identical in scope to Alternative 1, except that it adds institutional controls and measures to enhance public awareness.

The FS evaluated this alternative for both the Continuing Source Areas and for the River Areas containing mercury-contaminated sediments. Components common to both areas include posting signs warning against consumption of fish; conducting a public awareness program; and annual sampling of surface water, sediments, and biota to evaluate contaminant levels and
migration. In addition, for the Continuing Source Areas, a fence would be installed around the Eastern Wetland, Trolley Brook and Outfall Creek, extending along the lower Raceway to the confluence with the Sudbury River. For the River Areas, EPA would recommend that the Massachusetts DPH advisory against consuming Sudbury River fish be maintained throughout the River.

Estimated Time for Implementation: 4 months
Estimated Capital Cost: $286,789
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $7,626,000

Alternative 3: Dredging, Treatment by Solvent Extraction/Soil Washing, Redeposition of Sediment, Wetland Restoration and Institutional Controls

This alternative would include dredging sediments from the Continuing Source Areas and treating them on-Site with a solvent extraction/soil washing process; off-Site disposal of the treatment residuals; treating the resulting wastewater, if necessary, and discharging it on-Site; redepositing the treated sediments in the excavated areas; restoring impacted wetland areas; evaluating and implementing institutional controls for the River Areas until a final remedy decision is made in these areas; preparing and implementing a plan for increased public awareness regarding River contamination; and creating a fourth OU to perform additional studies on sediment and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environment in the River Areas. Treatability testing would be necessary under this alternative to determine the optimal treatment methods and the effectiveness of the treatment technology.

Three target cleanup goal concentrations were examined for this alternative, as follows:

Alternative 3A incorporated a target cleanup goal of 1 mg/kg of mercury in sediment, which is the background level in upstream reaches of the River unaffected by releases from Nyanza. This target cleanup goal is protective of human health and the environment and is expected to eliminate future migration of mercury to the Sudbury River. The volume of contaminated sediment to be excavated and treated under this alternative is estimated to be approximately 20,206 cubic yards.
Estimated Time for Implementation: 19 months
Estimated Capital Cost: $17,254,081
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $24,593,000

Alternative 3B incorporated a target cleanup goal of 7 mg/kg of mercury in sediment, a concentration estimated to reduce mercury concentrations in fish in the Sudbury River to levels protective of human health from occasional ingestion of mercury-contaminated fish by sports fishermen. This target cleanup goal would be protective of humans exposed to contaminated sediment through dermal contact or accidental ingestion for a residential exposure scenario, but would not be protective of environmental receptors. The volume of contaminated sediment to be excavated and treated under this alternative is estimated to be approximately 11,186 cubic yards.

Estimated Time for Implementation: 14 months
Estimated Capital Cost: $10,618,228
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $17,957,000

2 The actual annual Operation and Maintenance costs for this alternative will be substantially less than the estimated costs noted here. The majority of these annual costs (approximately $390,000) are for sampling and analysis activities in the Sudbury River which will not be conducted as Operation and Maintenance for this remedy. Instead, sampling and analysis will be conducted during OU IV investigations and a final monitoring plan for the Sudbury River will be included as part of the OU IV remedy decision. In addition, the institutional controls which will be implemented as part of OU III (e.g. sign maintenance and public awareness activities) are an interim remedy only, pending the OU IV remedy decision. Therefore, these activities will be conducted for a much shorter period than the 30 years calculated in the FS. The only Operation and Maintenance costs associated with OU III are the costs associated with ensuring the long-term effectiveness of the wetland restoration program. Thus, the long-term costs of this remedy are expected to be far less than the 30-year cost estimate, closer, in fact, to the capital costs.

3 See footnote 2.
Alternative 3C incorporated a target cleanup goal of 30 mg/kg of mercury in sediment, a concentration that is protective of humans exposed to contaminated sediment by dermal contact or accidental ingestion for a residential exposure scenario, but is not protective of environmental receptors. The volume of contaminated sediment to be excavated and treated under this alternative is estimated to be approximately 3,604 cubic yards.

Estimated Time for Implementation: 6 months
Estimated Capital Cost: $4,745,362
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $12,084,000

Alternative 4: Dredging, Solidification, Off-Site Disposal, Wetlands Restoration and Institutional Controls

This alternative includes dredging sediments from the Continuing Source Areas; stabilizing/solidifying the sediments on-Site and disposing of them off-Site; treating the resulting wastewater, if necessary, and discharging it on-Site; restoring impacted wetland areas; evaluating and implementing institutional controls for the River Areas until a final remedy decision is made in these areas; preparing and implementing a plan for increased public awareness regarding River contamination; and creating a fourth OU to perform additional studies on sediment and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environment for River Areas.

Three target cleanup goal concentrations were examined for this alternative, as follows:

Alternative 4A incorporated a target cleanup goal of 1 mg/kg of mercury in sediment, which is the background level in upstream reaches of the River unaffected by releases from Nyanza. This target cleanup goal is protective of human health and the environment and is expected to eliminate future migration of mercury to the Sudbury River. The volume of contaminated sediment to be excavated, stabilized and disposed off-Site under this alternative is estimated to be approximately 20,206 cubic yards.

Note: See footnote 2.
Estimated Time for Implementation: 19 months
Estimated Capital Cost: $40,460,444
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $47,799,000

**Alternative 4B** incorporated a target cleanup goal of 7 mg/kg of mercury in sediment, a concentration estimated to reduce mercury concentrations in fish in the Sudbury River to levels protective of human health from occasional ingestion of mercury-contaminated fish by sports fishermen. This target cleanup goal would be protective of humans exposed to contaminated sediment through dermal contact or accidental ingestion for a residential exposure scenario but would not be protective of environmental receptors. The volume of contaminated sediment to be excavated, stabilized and disposed off-Site under this alternative is estimated to be approximately 11,186 cubic yards.

Estimated Time for Implementation: 14 months
Estimated Capital Cost: $23,327,516
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $30,667,000

**Alternative 4C** incorporated a target cleanup goal of 30 mg/kg of mercury in sediment, a concentration that is protective of humans exposed to contaminated sediment by dermal contact or accidental ingestion for a residential exposure scenario, but is not protective of environmental receptors. The volume of contaminated sediment to be excavated, stabilized and disposed off-Site under this alternative is estimated to be approximately 3,604 cubic yards.

Estimated Time for Implementation: 6 months
Estimated Capital Cost: $8,500,246
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $15,839,000

**Alternative 11: Dredging, Disposal in OU I Cell, Wetlands Restoration, and Institutional Controls**

This alternative includes dredging and dewatering of contaminated sediments from the Continuing Source Areas; placing dredged sediments under a portion of the cap constructed in OU I of the

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5 See footnote 2.
6 See. footnote 2.
7 See footnote 2.
Site; treating, if necessary, water from the dewatering process and discharging it to an on-Site surface water body; restoring impacted wetland areas; evaluating and implementing institutional controls for River Areas until a final remedy decision is made in these areas; preparing and implementing a plan for increased public awareness regarding River contamination until a final remedy decision is made; and creating a fourth OU to perform additional studies on sediments and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environment for River Areas.

As in Alternatives 3 and 4, EPA evaluated three target cleanup goal concentrations for this alternative, as follows:

**Alternative 11A** is the selected alternative and is discussed in Section X of this ROD.

**Alternative 11B** incorporated a target cleanup goal of 7 mg/kg of mercury in sediment, a concentration estimated to reduce mercury concentrations in fish in the Sudbury River to levels protective of human health from occasional ingestion of mercury-contaminated fish by sports fishermen. This target cleanup goal would be protective of humans exposed to contaminated sediment through dermal contact or accidental ingestion for a residential exposure scenario but would not be protective of environmental receptors. The volume of contaminated sediment to be excavated and disposed of under the OU I cap for this alternative is estimated to be approximately 11,186 cubic yards.

Estimated Time for Implementation: 14 months
Estimated Capital Cost: $8,161,994
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $15,501,000

**Alternative 11C** incorporated a target cleanup goal of 30 mg/kg of mercury in sediment, a concentration that is protective of humans exposed to contaminated sediment by dermal contact or accidental ingestion for a residential exposure scenario, but is not protective of environmental receptors. The volume of contaminated sediment to be excavated and disposed of under the OU I cap for this alternative is estimated to be approximately 3,604 cubic yards.

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8 See footnote 2.
Estimated Time for Implementation: 7 months
Estimated Capital Cost: $4,038,798
Estimated Annual O&M Cost: $449,770
Estimated Total Cost (net present worth): $11,378,000

Alternative 13: Diverting Flow from the Eastern Wetland to a Constructed Sedimentation Basin, and Institutional Controls

This alternative, which is evaluated in the FS Addendum, would include redirecting discharge from the Eastern Wetland to a concrete sedimentation basin, located in the Trolley Brook Wetland; evaluating and implementing institutional controls for the River Areas and the Continuing Source Areas; preparing and implementing a plan for increased public awareness regarding contamination; and creating a Fourth OU to perform additional studies on sediment and fish in the Sudbury River and some of the Continuing Source Areas (Trolley Brook, Outfall Creek and the Raceway) to determine a sediment cleanup level that would lower risks to human health and the environment for these areas.

Maintenance of the sedimentation basin would include quarterly removal, treatment and disposal of accumulated sediments.

Target cleanup goals are not applicable to this alternative. This alternative would result in decreased migration of contaminated sediments from the Eastern Wetland to the Sudbury River. However, due to space constraints, a basin equipped to handle storm flows cannot be constructed in this area. Therefore, storm flows would need to bypass the sedimentation basin, resulting in migration of sediment during storm events.

In addition, this alternative is expected to have only minimal benefit in protecting human health and the environment. Through the accumulation and eventual removal of sediments from the basin, there will be, over the long term, a decrease in exposure to the contaminants. In the meantime, however, this alternative does not prevent human or ecological exposure to the contaminated sediments.

Estimated Time for Implementation: 3 months
Estimated Capital Cost: $756,749
Estimated Annual O&M Cost: $521,620
Estimated Total Cost (net present worth): $9,200,000

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9 See footnote 2.
10 See footnote 2.
IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Introduction

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

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a remedy for this OU. 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 cleanup goals are achieved.

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

7. **Cost** includes estimated capital and Operation and 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 analysis of each alternative compared to the nine criteria can be found in Section 6 of the FS Report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis is summarized in the Table 6-15 of the FS and in Sections A.1.1.1 to A.1.1.7 in the FS Addendum.
B. Threshold Criteria

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives 1 and 2 provide no significant reduction in risk to humans or the environment. Alternative 1 (No Action with Monitoring) would not eliminate, reduce or control any of the risks posed by the contaminants in the Continuing Source Areas or in the River. Alternative 2, which adds Institutional Controls, may control some of the risks to human health, although it should be noted that EPA has little experience in implementing institutional controls over long periods of time. Furthermore, institutional controls would not eliminate, reduce or control any risks to environmental receptors.

While the current and future risks from dermal contact or ingestion in the Continuing Source Areas are acceptable for a recreational exposure scenario (i.e., 50 days/year), the risks are unacceptable under a residential exposure scenario (i.e., 270 days/year). Due to the proximity of both residential areas and Ashland High School to the Continuing Source Areas, EPA believes the more conservative residential exposure scenario is appropriate for these areas.

In addition, the risks to both human and ecological receptors in the River areas are likely to increase over time due to the continued migration of contaminants from the Continuing Source Areas to the River. Thus, Alternatives 1 and 2 would not be protective of either human health or the environment.

The selected alternative, 11A, as well as other alternatives with a cleanup level of 1 mg/kg of mercury (3A and 4A), would be protective of humans exposed to Continuing Source Area sediments through direct contact or ingestion for both residential and recreational exposure scenarios. These ‘A’ alternatives would also provide protection to environmental receptors in the Continuing Source Areas based on data in the National Oceanic and Atmospheric Administration’s "The Potential for Biological Effects of Sediment Sorbed Contaminants Tested in the National Status and Trends Program" (NOS OMA 52). These data show that the ER-M, the contaminant level above which adverse effects to ecological receptors are expected, is 1.3 ppm for mercury in sediment.

The 'B' and 'C' alternatives (3B, 4B, 11B, 3C, 4C, and 11C), with cleanup levels of 7 mg/kg and 30 mg/kg of mercury, respectively, would be protective of humans exposed to Continuing Source Area sediments through direct contact or
ingestion for both residential and recreational exposure scenarios. However, these alternatives would not be protective of ecological receptors because mercury levels remaining in sediments would exceed the 1.3 ppm ER-M.

Alternative 13 provides only a minimal reduction of the risk to human health from the sediment exposure scenarios through the removal of small amounts of contaminated sediment during maintenance of the sedimentation basin. Throughout implementation of this alternative, both human and ecological receptors would continue to be exposed to contaminated sediments and surface water.

With regard to risks in River Areas, the 'A' alternatives (with a cleanup goal of 1 mg/kg of mercury in the Continuing Source Areas), including the preferred alternative, would result in the greatest decrease in the migration of contaminated sediments to the Sudbury River and, thereby, prevent risks from increasing. The 'B' alternatives (with a cleanup goal of 7 mg/kg of mercury in the Continuing Source Areas) would be expected to have a lesser effect in preventing an increase in risk in the River. Alternatives 3C, 4C, and 11C (with a cleanup goal of 30 mg/kg of mercury in the Continuing Source Areas) and Alternative 13 would provide the smallest decrease in migration of contaminated sediments to the River and therefore would have the least impact in preventing River contamination from increasing.

The control of risk to humans in River Areas under all alternatives (except Alternative 1) would rely on institutional controls and public awareness activities until such time as a final remedy is selected under OU IV. Human exposure to highly contaminated sediments in the River areas is unlikely due to the fact that highly contaminated sediments in the River are generally under 8-10 feet of water. Risks to human health through consumption of fish from the River will be controlled through maintenance of warning signs and other measures to increase public awareness. While institutional controls and public awareness activities will not provide any reduction in risk to environmental receptors in the River Areas, these disadvantages are mitigated by the fact that the controls will only be in place until a final remedy for the River is implemented under OU IV.
2. **COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)**

Neither Alternative 1 nor 2 would meet all ARARs. The Ambient Water Quality Criteria (AWQC) for mercury are currently exceeded in the Eastern Wetland, Trolley Brook and Outfall Creek. Under the No Action alternative and the limited action alternative, these criteria would continue to be exceeded in these areas since there would be no decrease in the amount of mercury released from contaminated sediments into the surface water.

The selected alternative, 11A, and Alternatives 3A and 4A, which call for the excavation of sediments exceeding 1 mg/kg mercury, are expected to result in surface water mercury levels below the AWQC. The regression analysis conducted in the FS calculated that a value of 4.5 mg/kg mercury in sediment may result in surface water levels below the AWQC. Although this value is based on a low correlation coefficient, EPA expects that the cleanup level of 1 mg/kg of mercury in sediments, which is considerably below this value, will result in surface water in the Continuing Source Areas that meets AWQC. Furthermore, in implementing these alternatives, all chemical-, location-, and action-specific ARARs for the Continuing Source Areas can be met.

Alternatives 3B, 3C, 4B, 4C, 11B and 11C are not expected to meet the AWQC since higher levels of contamination remaining in the sediment after remediation will allow more partitioning of contaminants into the surface water.

Alternative 13 is not expected to have any significant effect on the levels of mercury in the surface water since contaminated sediments will not be excavated. The diversion of surface water outflow from the Eastern Wetland to a sedimentation basin will not prevent the continued partitioning of mercury from sediments to surface water and, therefore, this alternative is not expected to meet the AWQC. In addition, implementation of Alternative 13 would fail to comply with wetlands ARARs. This alternative includes the construction of a sedimentation basin into which surface water outflow from the Eastern Wetland will be diverted. Because of Site limitations, the only land available for construction of a sedimentation basin is a wetland area. Since the sedimentation basin would be in place for many years, this alternative would result in long term destruction of wetlands in violation of federal (Clean
Water Act § 404 and associated regulations; Executive Order 11990 and State (Massachusetts Wetland Protection Act and associated regulations) requirements which mandate minimization of loss or degradation of wetlands.

In summary, only alternatives 3A, 4A and 11A satisfy both threshold criteria of Overall Protection and Compliance with ARARs. These alternatives are compared below using the balancing and modifying criteria. All other alternatives have been eliminated from further consideration since they failed to satisfy one or both of the threshold criteria.

C. Balancing Criteria

1. Long-Term Effectiveness and Permanence

Alternative 11A (the selected alternative) and Alternatives 3A and 4A, are equally effective over the long-term in that they would leave no contaminated sediment above background levels in the Continuing Source Areas. The magnitude of residual risk from untreated wastes in these areas is equal for all three alternatives.

All of the 'A' Alternatives require land disposal of contaminated materials and vary only in the volume and toxicity of these materials. The selected alternative provides for land disposal of untreated sediments under the impermeable cap constructed under OU I. This cap will provide a barrier against exposure to contaminated sediments to both human and ecological receptors. Periodic Site visits and maintenance will be performed to ensure the integrity of the cap and its effectiveness in preventing exposure to contaminated sediments. Alternative 3A would treat contaminated sediments through a solvent extraction/soil washing technology which would result in a smaller volume of more highly contaminated material that would be shipped off-Site for land disposal. Alternative 4A would use solidification/stabilization to treat contaminated sediment. This treatment would likely result in a larger volume of less concentrated material which would be shipped off-Site for disposal. Therefore, upon comparison, these alternatives are equivalent in the long-term effectiveness and permanence they afford.

All of the A alternatives rely on institutional controls and public awareness activities to control risk to humans in the River Areas until a final remedy is implemented for OU IV. These controls do not provide any increase in protection to environmental receptors in the River and, because EPA has
little experience in implementing institutional controls over long periods of time, it is not known whether these controls are reliable over the long term. This disadvantage, however, is mitigated by the fact that the controls would only be in place until a final remedy is implemented under OU IV. Because all of the 'A' alternatives would involve institutional controls and public awareness activities, the effects of these measures on long-term effectiveness are equal for all these alternatives.

2. REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative 3A would permanently reduce the volume of contaminated sediments through treatment of these sediments. However, because there is currently no destructive treatment for metals, this treatment alternative would result in a smaller volume of more toxic material (treatment residuals) which would need to be disposed of off-Site.

Alternative 4A would permanently reduce the mobility and toxicity of the sediments through treatment but is likely to result in an increase in volume due to the solidification/stabilization treatment which may be necessary prior to off-Site disposal.

Alternative 11A, the selected alternative, does not include any treatment.

3. SHORT-TERM EFFECTIVENESS

For the selected alternative, 11A, and Alternatives 3A and 4A, short-term effects are similar: construction and traffic congestion, including possible construction of a water treatment facility to treat water from the dewatering process; exposure of on-Site workers to contaminants in excavated sediments; and temporary disturbance of wetlands, wildlife habitat and the aquatic community. These impacts would be mitigated by (1) minimizing, to the extent possible, off-Site construction activities and off-Site movement of construction vehicles; (2) implementation of on-Site worker protection measures, as needed; (3) protection of the aquatic community through the use of silt curtains and/or sedimentation basins; and (4) restoration or wetlands, wildlife habitat and the aquatic community at the conclusion of remedial activities. Furthermore, alternatives 3A and 4A would have all of the short term impacts stated above, but would have additional potential impacts due to the construction of a sediment treatment
plant on or near the Property and transportation of contaminated materials off-Site to an appropriate disposal facility. Alternative 4A would require the greatest amount of contaminated materials to be transported off-Site to a disposal facility.

4. IMPLEMENTABILITY

The selected alternative, 11A, is the most easily implemented. It is technically feasible, requires limited land area for implementation, and requires little specialized equipment or materials. Furthermore, because the location for disposing the excavated sediment is the cell constructed in the OU I cap, no off-Site landfill capacity need be obtained. Alternatives 3A and 4A are technically feasible but require specialized equipment and operators, and may not be administratively feasible if significant land acquisition and permitting are necessary. Land availability in the vicinity of the Nyanza Property is limited because most of the Property is either wetland area or is already being utilized for active industrial uses. In addition, Alternatives 3A and 4A will require off-Site landfill capacity for disposal of sediment treatment residuals; the capacity needed for Alternative 4A is greater.

5. COST

The capital, operation and maintenance, and total cost for each 'A' alternative is provided as part of the Description of Alternatives in Sections VIII and X of this ROD. It should be noted, however, that the Operation and Maintenance costs for these alternatives assume 30 years of Operation and Maintenance estimated at approximately 6.8 to 7.3 million dollars (net present worth). These Operation and Maintenance costs were calculated in the FS to include activities such as annual monitoring and institutional controls for the Sudbury River. However, because investigations under OU IV will be performed concurrently with the implementation of the OU III remedy, monitoring of the River will be conducted as part of these OU IV investigations. In addition, institutional controls are an interim remedy only, pending the OU IV remedy decision. Therefore, these costs are expected to be far less than the 30-year cost estimate.
Of the 'A' alternatives, the selected alternative, 11A, is the least expensive at $20,419,000 and is the most cost-effective since it achieves a protective clean-up level at the smallest cost. Alternative 3A is the next most expensive at $24,593,000, while 4A is the most costly alternative at $47,799,000.

Table 6 summarizes the total cost and operation and maintenance costs for each alternative as estimated in the FS. In addition, this table shows the cost of the remedy excluding operation and maintenance costs because the actual total costs (net present worth) are expected to be closer to the estimated capital costs for the reasons explained above.

D. Modifying Criteria

1. STATE ACCEPTANCE

Based on its review of the RI/FS and Proposed Plan, the Commonwealth of Massachusetts concurs with the selected remedy. A copy of the declaration of concurrence is attached as Appendix B.

2. COMMUNITY ACCEPTANCE

Comments received from the Ashland community indicated a concern about the capacity under the OU I cap and the risks associated with opening the cap. Comments also indicated a preference for the No Action or the Solvent Extraction/Soil Washing Alternative (3A or 3B) for the Continuing Source Areas. Those recommending No Action felt there wasn't enough information to determine the presence of a human health or ecological risk from these areas. Comments received from the downstream communities indicated support for remediation of the Continuing Source Areas in combination with additional studies on the Sudbury River. Responses to community comments are located in Appendix A.
X. THE SELECTED REMEDY

EPA has chosen Alternative 11A as the selected alternative. Alternative 11A is a source control remedy which addresses the threat to human health and the environment posed by exposure to contaminated sediments in the Continuing Source Areas. This remedy will also reduce the continued migration of contaminants to the Sudbury River. In addition, EPA will perform additional studies of the Sudbury River under OU IV, after which a final remedy for the River will be selected. Finally, institutional controls, which will be implemented as part of this remedy, are an interim remedy only, pending the final OU IV remedy decision.

A. Cleanup Levels

A number of contaminants, both Site- and non-Site related, are found in the Continuing Source Areas and in the Sudbury River. However, clean-up levels were evaluated only for mercury for several reasons. First, it is the only contaminant which showed a clear connection to the Site. In addition, mercury is the primary Site-related contaminant contributing to both human health and ecological risk.

The mercury cleanup level of 1 mg/kg was selected for the Continuing Source Areas in order to be protective of human health and the environment for a variety of exposure scenarios. This cleanup level is approximately equal to concentrations of mercury found at locations upgradient of the Site. In addition, this cleanup level reduces mercury levels approximately to the median biological effects level (ER-M) reported by NOAA in "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (NOS OMA 52). This ER-M, the contaminant level above which adverse effects to ecological receptors are expected, is 1.3 ppm for mercury in sediment. A level of 1 mg/kg of mercury is also protective for human health through exposure via accidental ingestion and dermal contact for all exposure scenarios. Remediation to this clean-up level is expected to result in a hazard index of less than one for these exposure scenarios. This cleanup level is also expected to prevent the risks in the River from increasing by decreasing the levels of mercury migrating to the Sudbury River.

This cleanup level will be met at the completion of the remedial action throughout the Continuing Source Areas. This cleanup level attains EPA's risk management goal for remedial actions and has been determined by EPA to be protective.
B. Costs of Selected Alternative:

The costs of this remedial alternative are:

Estimated Capital Cost: $13,080,276
Estimated Annual Operation and Maintenance Cost (net present worth): $449,770\textsuperscript{11}
Estimated Total Cost (net present worth) $20,419,000\textsuperscript{12}

C. Description of Remedial Components

Major components of the selected remedy are described below.

1. Site Preparation

Site preparation activities would be initiated with the construction of access roads necessary for the mobilization and use of excavation, transportation and disposal equipment. Roadway construction would be performed to minimize wetland impacts. Exact locations of the access roads shall be determined in Remedial Design.

The Site preparation includes the establishment of security and controlled access to the Site, the connection of light and power utilities and the furnishing of sanitary facilities. A chain link fence will be constructed around the perimeter of the areas to be remediated. To the maximum extent feasible, existing fences will be utilized. Warning signs will be posted at 100 foot intervals along the fences and at the entrance gates.

Site preparation work will also include provisions for controlling Site drainage. In general, diversion ditches will be used to ensure proper drainage of stormwater away from contaminated areas. Erosion control in the form of silt fencing will be used to prevent uncontrolled movement of contaminated sediments. Stormwater management and erosion control measures to be used during excavation activities are also considered part of the Site preparation work.

Because these activities may include sediment movement, an air monitoring program will be implemented during the performance of the Site preparation work to determine risks to on-Site workers and nearby residents. In addition, subsequent to Site preparation

\textsuperscript{11} See footnote 2.
\textsuperscript{12} See footnote 2.
work but prior to sediment excavation activities, sediment monitoring will be performed to further define contaminant levels in any area impacted by Site preparation work.

If necessary, this component of the remedy will utilize measures to limit potential air emissions from excavation activities, including the following methods: enclosure of the work areas; emission suppression techniques (e.g. foam, water spray); and containment of excavated sediments.

Following the installation of erosion control structures, clearing and grubbing will be performed on the densely vegetated areas needed for implementation and construction of the selected remedy. If possible, cleared debris such as trees, shrubs, and stumps will be disposed of under the OU I cap. If there is not sufficient space under the cap for disposal of these materials, they will be disposed of off-Site. Although it is not expected that these materials will constitute RCRA hazardous waste, if it is determined that they do, they will be disposed of off-Site in accordance with RCRA requirements. After areas have been cleared, grading will be performed to provide a level surface for the operational areas.

Adverse impacts to wetlands and wildlife will be minimized during all Site preparation activities. To the extent practicable, consideration will be given to seasonal constraints to minimize impacts to wildlife during these activities.

2. Removal of Section of OU I Cap

A portion of the existing cap constructed under OU I will be removed (see Plate 1). This will be done by excavating the material above the liner in the area to be removed. This material will be stockpiled and to the extent practicable, used to rebuild the cap when remediation is complete. The liner will then be cut out. Next, the bentonite layer will be broken out, excavated or saw cut. The practicability of reusing cap materials will be determined during remedial design. If it is determined during design that this material will be re-used, it will be stockpiled until it is used in reconstruction.
3. Excavation of Clean Fill from under OUI Cap

Clean soils will be excavated from the area where the cap was removed. Survey information from construction of OUI indicates the vertical and lateral limits of this clean soil. A buffer of clean soil will be left between the contaminated materials under the cap and the limits of excavation. If suitable, the clean material excavated will be used to create a temporary water control berm around the exposed area. This excavated material will be tested to determine its suitability for use to backfill the wetland areas to be excavated. If it is found to be suitable, this clean fill will be used for the reconstruction of the wetlands; if it is not suitable, it will be disposed of in an appropriate off-Site location. Criteria to determine the suitable use of this material will be developed as part of the wetland restoration program during remedial design.

4. Excavation of Contaminated Sediment

Four areas, referred to as the Continuing Source Areas, shall be excavated. These areas include the Eastern Wetland, Trolley Brook, Outfall Creek and the lower Raceway (see Figure 3). The approximate surface areas of these areas are approximately 295,110 square feet. These areas shall be excavated by conventional mechanical means to a depth of up to approximately 4 feet in the Eastern Wetland and Trolley Brook and approximately 1 foot in Outfall Creek and the lower Raceway. This excavation will remove sediments with mercury in excess of the 1 mg/kg cleanup level. A total of approximately 20,206 cubic yards of contaminated sediments shall be excavated. These depths and volumes will be further refined through predesign sampling.

A combination of conventional mechanical means shall be used including the following: clamshell dredge, dragline dredge, backhoe, suction dredge, cutterhead dredge, dustpan dredge and portable hydraulic dredges.

To implement this component, a processing area will be set up prior to sediment excavation. The processing area will be constructed so as to prevent, to the extent possible, any migration of the excavated soils and any adverse impacts to wetlands.
Characteristics between the four Continuing Source Areas to be excavated vary somewhat and different techniques for staging, dredging and transport may be appropriate. The most appropriate technique for conducting the excavation for each area will be determined during remedial design. Excavated sediments from the Outfall Creek and lower Raceway areas will need to be transported for a short distance on public roads to the Property. The volume of this material was estimated to be only 121 cubic yards of the estimated 20,206 cubic yards to be excavated under the selected remedy.

As described in the Site Preparation component of the selected remedy above, measures will be implemented to limit potential air emissions from excavation activities. An air monitoring program shall be implemented during the performance of on-Site sediment excavation components of the remedy to determine risks to on-Site workers and nearby residents. Air sampling stations will be located at representative points throughout the remediation area and at the perimeter of the work zone.

This portion of the selected remedy shall be implemented in a manner that mitigates any contaminant migration downstream. The method of isolating contaminated sediments will be determined during design of the selected remedy, considering also the need to mitigate wetland impacts.

Confirmatory sampling will be conducted following excavation to determine that clean-up levels have been attained.

Because the areas to be excavated are wetlands, excavation and associated activities will be performed to minimize adverse impacts to wetland areas. EPA has determined that, for this OU, there are no practicable alternatives to the Site preparation and sediment excavation components of the selected remedy, that would achieve Site goals but would have less, short-term adverse impacts on the ecosystem. Therefore, measures will be performed to mitigate these impacts. Sedimentation basins and/or silt curtains will be installed downstream to capture any particles that may become suspended during excavation activities. During excavation and dewatering of mercury contaminated sediments, downstream monitoring of surface water will
be conducted to ensure that transport of contaminants is not occurring as a result of the excavation. Excavated areas shall be isolated by means of erosion control devices (e.g. sandbags, haybales or earthen dikes) and sedimentation control devices (e.g. sedimentation basins), and diversion structures. To the extent practicable, consideration will be given to seasonal constraints to minimize impacts to wildlife during these activities.

In addition to these minimization components, steps will be taken to restore impacted wetland areas as described in component 7 of the selected remedy below.

5. Dewatering and Disposal

Because the excavated sediments will contain liquids when excavated, a dewatering process (e.g. filter presses) shall be used following excavation. Dewatering will reduce the moisture content of the excavated materials and facilitate their handling and transport. The dewatering system shall consist of mechanical (e.g. belt filter presses, recessed chamber filter presses, centrifuges) and/or chemical processes (e.g. flyash addition) and would be designed based on results of bench-scale and chemical tests. Following the dewatering process, sediments will be tested to determine that they pass the paint filter test prior to disposal under the cap. If they fail to pass this test, additional dewatering measures will be taken.

Water extracted from the excavated materials shall be adequately stored and treated as necessary to remove residual contaminants to protective levels. Treated effluent shall be discharged to an on-Site surface water body. Treatment residuals will be disposed of off-Site. If it is determined that treatment residuals constitute RCRA hazardous waste, they will be disposed of off-Site in accordance with RCRA requirements. Predesign studies will be conducted to determine the need to treat water from the dewatering process.

Following dewatering, the excavated materials would be transported to the OU I cap area and disposed of under the cap. The estimated capacity of the OU I cell to be used is 25,000 to 30,000 cubic yards. The current estimate of sediment to be excavated under the selected remedy is approximately 20,000 cubic yards. Therefore, EPA expects that the OU I cell will have sufficient capacity for disposal of all contaminated sediments.
from OU III. The areal extent and vertical profile of the existing cap will not be increased under this remedy. In addition, if it is determined that previously undisturbed materials from the cell need to be excavated during Remedial Action, this material will be characterized during remedial design. Predesign sampling will be conducted in the Continuing Source Areas to further delineate mercury depth profiles, to refine the volume estimates of mercury-contaminated sediment requiring excavation, and to delineate initial vertical and lateral boundaries for sediment excavation. During remedial design a detailed evaluation will be made of existing cap capacity and the refined volume of material requiring disposal. The purpose of this evaluation will be to determine if, based on best engineering practices, there is sufficient storage capacity in the cell for OU III materials. If it is determined that the contaminated sediments to be excavated and disposed are likely to exceed cell capacity, or if this is found to be the case during construction, EPA will proceed in accordance with Section 300.435(c)(2) of the NCP.

Contaminated materials deposited in the OU I cell will be at least 4 feet above the probable high groundwater level in the area of the cell. During remediation, any rain water that may come in contact with excavated material deposited in the cell will be controlled through engineering and construction techniques.

Activities relating to the disposal and transportation of these sediments will be performed so as to minimize potential destruction or loss of wetlands or adverse impacts to organisms.

6. Rebuild the Removed Portion of OU I Cap

The cap, as designed for OU I, will be reconstructed in the area where it was removed. To the extent possible, materials removed during the cap removal will be used to rebuild the cap. The reconstructed cap shall meet the performance standards required under OU I including the following: (1) it shall have a permeability less than or equal to $1 \times 10^{-7}$ cm/sec; (2) it shall function with minimum maintenance; (3) it shall promote drainage and minimize erosion or abrasion of the cover; and (4) it shall accommodate settling and subsidence so that the cover's integrity is maintained. Both lab and field tests (including undisturbed core sampling) shall be performed to check compliance with the permeability
requirement. During the design analysis it will be determined if it is feasible to re-batch the existing bentonite. If this is not possible, a new mixed batch of bentonite will be used. As stated in component 2, to the extent practicable, the material over the existing liner will be stockpiled and used for reconstruction of the cap. In replacing the liner, the liner rolls will be overlapped and the seams will be heat welded in accordance with current construction methods used under OU I.

7. Wetlands Restoration

EPA has determined that, for this Site, there are no practicable alternatives to the selected remedy that would achieve Site goals with less, short-term adverse impacts on the ecosystem. Unless sediments with contaminant levels greater than the target levels are excavated, the contaminants in the sediments would continue to pose an unacceptable ecological risk. Thus, excavation of the contaminated sediments is necessary.

This excavation of contaminated sediments and ancillary activities will result in unavoidable temporary impacts and disturbance to wetland resource areas. Such impacts may include the destruction of vegetation and the loss of certain plants and aquatic organisms. Impacts to the fauna and flora will be mitigated in accordance with the minimization methods discussed under component 4, above, and the restoration/enhancement requirements discussed below. Wetland enhancement will only be performed if it is determined that a portion of the existing wetland cannot be restored.

This wetland restoration/enhancement program will be implemented upon completion of the remedial activities in wetland areas adversely impacted by remedial action and ancillary activities. All excavated areas will be backfilled with suitable material, graded, stabilized and planted. The area will be restored to appropriate elevation contours and similar vegetation will be planted. Organic fill material will be distributed throughout the excavated areas to create grading, elevation and drainage approaching original patterns and to serve as substrate for replacement of vegetation.
The restoration program will be developed during design of the selected remedy to replace wetland functions and habitat areas. Pre-remediation conditions in wetlands likely to be impacted by remedial activities shall be assessed prior to disturbance. This pre-remediation assessment shall be the baseline by which compliance with wetland restoration performance standards shall be measured. This baseline assessment shall characterize the existing wetlands with regard to hydrology, soil characteristics, depth of organic soils, vegetation, diversity, and other appropriate criteria and shall include a thorough analysis of the existing and potential values and functions of the wetland. This assessment shall also include a field investigation to determine the presence of and map the occurrence of any Federal Endangered or Threatened Species and Massachusetts Rare Species within areas likely to be impacted by remedial activities. Based on the pre-remediation assessment, the wetlands restoration plan will identify the factors which are key to a successful restoration and/or enhancement of the altered wetlands. Factors will include, but not necessarily be limited to, replacing and regrading hydric soils, provisions for hydraulic control and provisions for vegetative reestablishment, including transplanting, seeding, or some combination thereof. For restored areas, wetland plant species shall be of sufficient diversity to provide habitat for a variety of indigenous animal species equivalent to conditions existing prior to remedial activities. Habitat value will be evaluated using three endemic species (2 plant/1 animal) to monitor for successful restoration. Quality assurance measures shall include: (1) detailed topographic and vegetative surveys to ensure replication of proper surface elevations and vegetation; (2) engagement of a wetland replication specialist; (3) establishment of work area limits for equipment to prevent inadvertent placement of fill; (4) production of a reproducible base map and a detailed planting scheme; (5) photographic documentation: and (6) description of pre-remediation conditions.

EPA, in consultation with DEP, shall determine when specific restoration activities shall be performed. Consideration shall be given to breeding seasons, climatic conditions, and the time frame between excavation activities and restoration activities.
The restoration program will include monitoring requirements to determine the success of the restoration. Periodic maintenance (e.g. planting) may also be necessary to ensure final restoration of the designated wetland areas.

8. Long-Term Environmental Monitoring

At the completion of remedial action, no contamination above background levels will remain in the Continuing Source Areas. Therefore, a five year review will not be necessary in these areas.

Long-term monitoring of these areas, however, shall be conducted to ensure the long-term effectiveness of the wetland restoration program.

As required by law, EPA will review the remedy, including the cap, at least once every five years after initiation of remedial action to assure that the remedial action continues to be protective of human health and the environment. This review will be conducted under the OU I remedy.

9. Institutional Controls/Additional Studies

A fourth OU to further investigate contamination in the Sudbury River will be implemented to select a final remediation plan for the River. Until such time as this final remedy is selected, institutional controls (e.g. sign maintenance and public awareness activities) shall be implemented along the Sudbury River as an interim remedy to deter consumption of fish by fishermen along the River. Warning signs alerting anglers to the risks from ingestion of contaminated fish will be maintained along the River until a final remedy is implemented for these areas.

EPA will also implement a public awareness campaign in conjunction with DEP and the towns along the River until a final remedy decision is made under OU IV. The purpose of the public awareness campaign is to increase the awareness of the public about the risks from consumption of contaminated fish. EPA, in coordination with DEP, will work with officials from affected towns, representatives from existing River groups (e.g. Framingham Advocates for the Sudbury River, Sudbury Valley Trustees, Wild and Scenic Rivers Study
Committee) and other interested community groups to evaluate and implement public awareness activities. These activities may include identification of groups likely to be eating contaminated fish, identification of methods to educate the impacted groups on an ongoing basis, identification of measures to evaluate the effectiveness of the public awareness program and establishing a timeframe for implementing the plan.

In addition, institutional controls will be implemented in the vicinity of the cap to prevent activities that would compromise the integrity of the cap.

10. Restoration of Trolley Brook Wetland (Area G)

Following remediation of the Eastern Wetland the culvert between the Eastern Wetland and Trolley Brook Wetland (Area G) will be reopened and Area G will be restored. As explained in the September 21, 1992 Explanation of Significant Differences, this culvert was not reopened at the completion of OU I activities because of the risk of recontaminating Area G.

Restoration of Area G will be completed based on a wetland restoration plan to be developed during design. This plan will include planting and other activities to restore the wetland to its preconstruction state and will be based on historical information (e.g. aerial photography) regarding the wetland.
XI. STATUTORY DETERMINATIONS

The remedial action selected for OU III is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy does not, however, satisfy the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element, based on the reasons discussed in Section XI.E. below. Additionally, the selected remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

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

The selected remedy will permanently reduce the risks posed to human health and the environment from the Continuing Source Areas by eliminating, reducing or controlling exposures to human and environmental receptors through containment and engineering controls. Excavation of sediments with mercury exceeding the cleanup goal, as required by the selected remedy, will permanently and significantly reduce the risks to human health and the environment associated with exposure to contaminated sediments in the Continuing Source Areas. In addition, the selected remedy will temporarily control risks to human health from River Areas through institutional controls.

As discussed above in Section IX, the selected remedy will be protective of ecological receptors within the Continuing Source Areas. This cleanup level reduces mercury levels approximately to concentrations of mercury found at locations upgradient of the Site. The selected clean-up level is also below the median biological effects level (ER-M) reported by NOAA in "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (NOS OMA 52). This ER-M, the contaminant level above which adverse effects to ecological receptors are expected, is 1.3 ppm for mercury in sediment.

In addition, as discussed in Section IX, the cleanup goal of 1 ppm is protective of human health for all accidental ingestion and dermal contact exposure scenarios. This cleanup level is expected to result in a hazard index of less than one for these scenarios in the Continuing Source Areas. Moreover, by reducing migration of contaminated sediments to the Sudbury River, the selected remedy is expected to prevent risks in the River Areas from increasing.
Under the selected remedy, disposal of excavated materials under the impermeable cap will provide a barrier against exposure to contaminated sediments to both human and ecological receptors. Periodic Site visits and maintenance will be performed to ensure the integrity of the cap, and its effectiveness in preventing exposure to contaminated sediments. In addition, institutional controls will be implemented to prevent activities that will compromise the integrity of the cap.

Finally, implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts. Most of the Site work will be conducted in non-residential areas. Implementation of this remedy may result in a slight increase in exposure to mercury and other contaminants for workers during remedial activities. However, any short-term risks will be mitigated by requiring workers to wear protective clothing. In addition, the breathing zone will be monitored and protection provided if necessary. Dust is not expected to be a problem during excavation or transport of sediment; however, control measures such as water sprays will be kept available in case roadways or other areas become too dry. For all remedial activities that include sediment movement, an air monitoring program will be implemented during the performance of the activities to determine risks to on-Site workers. Measures will be utilized to limit potential air emissions from Site preparation, excavation and disposal activities including the following methods: enclosure of work areas; emission suppression techniques (e.g. foam, water spray); and containment of excavated sediments.

Short-term risks would also be present for wildlife in and around the wetlands during the limited time that Site remediation and restoration would be required. However, engineering controls would be chosen and implemented to minimize downstream impacts resulting from excavation and other impacts on the wetlands, including the use of sandbags, earthen dikes, silt curtains and sedimentation basins.

The mitigative measures, described above, would also serve to prevent unacceptable cross-media impacts during implementation of the selected remedy. In addition, containment of the sediments, as required by the selected remedy, would not result in cross-media impacts because disposal under an impermeable cap would prevent the transport of contaminants from sediments to air and surface waters.
B. The Selected Remedy Attains ARARs

This remedy will attain all applicable or relevant and appropriate federal and state requirements. Federal environmental laws from which ARARs for the selected remedial action are derived include, but are not limited to:

- Clean Water Act (CWA)
- Executive Order 11988 (Floodplain Management)
- Executive Order 11990 (Protection of Wetlands)
- Fish and Wildlife Coordination Act
- Clean Air Act (CAA)
- National Historical Preservation Act
- Protection of Archaeological Resources
- Endangered Species Act
- Wild and Scenic Rivers Act
- Federal Noise Control Act

State environmental laws and regulations from which ARARs for the selected remedial action are derived include, but are not limited to:

- Hazardous Waste Regulations
- Surface Water Quality Standards
- Air Pollution Control Regulations
- State Implementation Plans for Particulate Matter and Volatile Organic Compounds
- Wetlands Protection Act
- Endangered and Threatened Species Regulations

Tables 7, 8, and 9 provide a synopsis of all ARARs and to be considered requirements for the selected remedy. A brief narrative summary of the major ARARs follows:

A. Sediments

Hazardous Waste Management Requirements under RCRA

EPA has determined that the hazardous waste management regulations, set forth in Subtitle C of RCRA, including land disposal restrictions (set forth in 40 CFR Part 268), are not applicable to the selected remedy. In order for RCRA requirements to be applicable to a CERCLA remedy, there must be a finding that (i) the remedy involves a waste which is a listed or characteristic waste under RCRA; and (ii) the waste was treated, stored, or disposed after the effective date of the RCRA requirements at issue or the remedy will involve treatment, storage or disposal as defined under 40 CFR §260.10.
The sediments in the Continuing Source Areas are not listed wastes under RCRA but may be characteristic wastes. Samples of sediments in the Continuing Source Areas were analyzed using the Toxicity Characteristic Leaching Procedures during OU III investigations. Several contaminants exceeded maximum concentration for the Toxicity Characteristic. However, these wastes were not disposed of in the Continuing Source Areas after the 1980 effective date of RCRA. In addition, under the selected remedy, excavated sediments will not be treated or stored before burial in a cell of the impermeable cap constructed under OU I. Furthermore, EPA has determined that excavation and burial under the OU I cap constitutes consolidation of contaminants within a single area of contamination and therefore is not land disposal under RCRA. Because the selected remedy will not involve treatment, storage or disposal as defined by 40 CFR §260.10, the corresponding RCRA requirements are not applicable to the selected remedy.

EPA has similarly determined that RCRA generator requirements are not applicable. A hazardous waste generator, under 40 CFR §260.10, is one, by site, who produces a hazardous waste or first causes the waste to be regulated as hazardous. The excavation of contaminated sediments from the Continuing Source Areas will not "produce" a hazardous waste nor will it subject the waste to hazardous waste regulation since, as discussed above, the selected remedy will not involve treatment, storage or disposal as defined by RCRA.

However, because certain RCRA regulations address activities sufficiently similar to those contemplated by the selected remedy, EPA has determined that those RCRA requirements are relevant and appropriate. The Commonwealth of Massachusetts has been authorized by EPA to administer and enforce RCRA programs in lieu of the federal authority. Compliance with Massachusetts Hazardous Waste Regulations is discussed below.

**Massachusetts Hazardous Waste Regulations**

Based on the discussion of Federal RCRA requirements above, EPA has determined that Massachusetts Hazardous Waste Regulations are not applicable to the selected remedy. However, because the regulations address activities sufficiently similar to those contemplated by the selected remedy, EPA has designated certain provisions of the regulations as relevant and appropriate and will comply with
the substantive requirements during implementation of the selected remedy. These requirements include, among others, requirements for generators and transporters of hazardous wastes and management and technical standards for hazardous waste facilities and landfills. These requirements are set forth in various sections of 30 CMR 30.000 et seq and are listed in Table 9.

B. Floodplains and Wetlands

The regulations under Section 404 of the Clean Water Act (CWA) are applicable to the selected remedy, because construction of access roads will involve discharge of dredged or fill material into a water of the United States. In addition, wetlands restoration will involve backfilling to the extent necessary to create grading, elevation and drainage approaching original patterns and to serve as substrate for replacement of vegetation.

Regulations promulgated under the CWA require that, before a project which involves a discharge of dredge or fill material into a wetland is undertaken, there must be an analysis of the impact of such a project on the aquatic environment, and a comparison to other practicable alternatives (40 CFR Section 230.10(a)). In this case, EPA compared the selected remedy to other alternatives which did not involve discharge of fill material to wetland areas. EPA compared excavation (as called for in the selected remedy) to: (1) a "no-action" remedy; (2) a "limited action" remedy (no action with institutional controls); (3) capping contaminated sediments in the Eastern Wetland; and (4) diverting surface water from the Eastern Wetland to a constructed sedimentation basin.

EPA determined that none of the alternatives to excavation would be able to achieve the overall purpose of the project, which is to attain clean-up levels protective of human and environmental receptors in the Continuing Source Areas, without causing other significant adverse impacts to the environment. Specifically, the "no-action" and "limited action" remedies would leave mercury in place and human and environmental receptors would be at risk due to exposure to this contaminant. Thus, although the habitat would remain intact, adverse environmental effects due to the presence of mercury would continue. Capping of the contaminated sediments in the Eastern Wetland was found to be ineffective due to the probability that a cap in a wetland area would erode and the contaminants would be re-exposed. In addition, capping in place would result in permanent loss of wetland habitat and loss of flood storage capacity, thereby
having an even greater adverse impact to wetlands and floodplains than the selected remedy. Finally, diversion of surface water from the Eastern Wetland to a constructed sedimentation basin, although it would reduce somewhat the migration of mercury to the Sudbury River, would only minimally reduce risk to human health and the environment because exposure to the contaminated sediments and surface water above protective levels would continue to occur. In addition, because of site restrictions, the only available location to construct a sedimentation basin is in a wetland area. Therefore, this alternative would result in long-term loss of wetland habitat, thereby having an even greater adverse impact to wetlands than the selected remedy.

Based on the foregoing analysis, EPA has concluded that excavation of sediments contaminated with mercury above the 1mg/kg cleanup level followed by wetland restoration is the only alternative that will be protective of human and environmental receptors while minimizing adverse effects on wetlands habitat. Accordingly, EPA has determined that there are no other practicable alternatives which would have less adverse impact on the aquatic ecosystem than the impacts of the selected remedy.

The selected remedy also satisfies the substantive requirements of 40 CFR 230.10(b). Mitigation techniques such as silt curtains will be used so that the action will not cause or contribute to the violation of a state water quality standard; the action will not violate toxic effluent standards under the Clean Water Act; and the action will not jeopardize the continued existence or critical habitat of species listed in the Endangered Species Act. In addition, consistent with 40 CFR Section 230.10(c), the selected remedy will not cause or contribute to significant degradation of the waters of the United States. Specifically, any discharges of wastewater will be monitored and treated, if necessary, to ensure that they will not have a significant, long-term adverse effect on (i) human health or welfare, (ii) aquatic life and other wildlife, (iii) ecosystem diversity, productivity and stability and (iv) recreational, aesthetic and economic values. Finally, the selected remedy will minimize adverse impacts to the aquatic ecosystem in accordance with 40 CFR Section 230.10(d), by creating sedimentation basins and by restoring the wetlands, to the extent feasible.

In addition, the policies expressed in Executive Orders regarding wetlands and floodplains were taken into account in the selected remedy. As described above, the remedy will include steps to minimize the destruction, loss, or
degradation of wetlands in accordance with Executive Order 11990. In addition, the remedy will include steps to reduce the risk of floodplain loss, including the distribution of fill material in the Eastern Wetland to create grading, elevation and drainage consistent with original patterns, in accordance with Executive Order 11988.

Finally, the substantive requirements of Massachusetts Wetlands Protection Regulations concerning dredging, filling, altering or polling inland wetlands are applicable to the dredging of the Continuing Source Areas. These standards set performance standards for banks, vegetated wetlands, lands under water, and land subject to flooding. During remedial design, EPA will determine which of these resource areas will be impacted during remedial action. The selected remedy will comply with the performance standards for each such resource area and will among other things, involve a one-for-one replication of any hydraulic capacity which is lost as the result of this part of the remedial actions.

It is anticipated that the selected remedy will require a variance from selected requirements contained in the Massachusetts Wetland Protection Regulations because, at a minimum, it will result in the temporary loss of more than 5000 square feet of bordering vegetated wetlands. The selected remedy satisfies the substantive requirements for a variance (310 CMR 10.58). As a condition for satisfying the substantive requirements for this variance, three sensitive endemic species shall be used to monitor for successful restoration.

Because the Continuing Source Areas are within the areal extent of contamination, they are considered part of the Site, and EPA is not required to obtain permits for wetland activities.

C. Surface Water

Certain regulations under the CWA are applicable to the discharge of treated waters to any of the surface waters on-Site. In implementing the selected remedy, any wastewater discharges will be monitored and will comply with water quality standards in accordance with the National Pollution Discharge Elimination System (NPDES), 40 CFR 122, 125. However, under Section 121(e) of CERCLA, no permit is required under the NPDES program for these discharges,
because the effluent from the treatment facilities (e.g. dewatering) will be discharged directly into a surface water of the United States at a point considered part of the CERCLA Site.

AWQC are developed under the CWA as guidelines from which States develop water quality standards. Massachusetts Surface Water Quality Standards have been developed using the federal criteria and are applicable to discharges to all surface water bodies. These State standards categorize surface waters of the Commonwealth according to their uses and set water quality criteria necessary to sustain such designated uses. The Sudbury River has been designated a Class B river for protection and propagation of fish, other aquatic life and wildlife, as well as for other recreational purposes. In implementing the selected remedy, discharge limits will be calculated by using these water quality standards. In addition, whole effluent toxicity limits will be used to set discharge limits which are protective for cumulative effects from multiple contaminants and for those contaminants for which there are no criteria. Because the effluent from dewatering activities will be discharged to an on-site surface water body, no permit is required.

Moreover, the water quality standards for mercury are currently exceeded in the Eastern Wetland and Outfall Creek. Implementation of the selected remedy, which calls for the excavation of sediments exceeding 1 mg/kg mercury, is expected to result in a decrease in surface water mercury levels below the levels established under the water quality standards as necessary to sustain a Class B river.

D. Air

National Ambient Air Quality Standards for particulate matter and volatile organic compounds under the Clean Air Act are ARARs and will be attained during construction phases. The Massachusetts State Implementation Plans (SIPs) contain the specific requirements designed to ensure that these standards are met.

The SIP for Particulate Matter requires that any construction shall not be allowed to cause "excessive emissions" of particulate matter and specifies measures which can be taken to control such emissions. Dispersal of dust will be controlled under the selected remedy by spraying of roads and excavated sediments and soils. In addition, at the completion of Site remediation, disturbed areas will be revegetated.
The SIP for Emissions of Volatile Organic Compounds (VOCs) is relevant and appropriate to the selected remedy since some VOCs have been detected in the sediments to be excavated. The SIP requires that all sources emitting 100 tons or more of VOCs must install Reasonably Available Control Technology. VOCs contribute to ozone production. Because the site is located in an ozone non-attainment area, the Region has determined that it is appropriate to control VOC emissions, even if they do not exceed the threshold amount set forth in the SIP, in accordance with Regional policy. Therefore, air emissions will be monitored and, if necessary, measures will be taken to control emissions in accordance with Reasonably Available Control Technology.

E. Other Laws

The selected remedy will comply with certain other laws and regulations, although strictly speaking, they are not ARARs because they are not environmental laws or relate to off-site activities. These laws include, but are not limited to: the Occupational Health and Safety Act, 29 USC 651 et seq.; Department of Transportation Hazardous Material Transportation Act regulations, 49 CFR 171-179, 387; Massachusetts Requirements for Transporters of Hazardous Waste, 30 CMR 30.400; and Massachusetts Right to Know Requirements, 105 CMR 670.00, 310 CMR 33.00, and 454 CMR 21.00.

C. The Selected Remedial Action is Cost-Effective

The selected remedy is effective. It provides for excavation of mercury-contaminated sediments exceeding 1 mg/kg in the Continuing Source Areas, a level that is protective of both human and ecological receptors in these areas. The excavated sediments will be disposed of under the impermeable cap constructed under OU I. Periodic Site visits and maintenance will be performed to ensure the integrity of the cap and its effectiveness in preventing exposure to contaminated sediments. As discussed in Section IX.C.1, above, the long-term effectiveness and permanence afforded by the selected remedy is equivalent to that afforded by the other 'A' alternatives.

In comparison to the other 'A' alternatives, the selected remedy is the least costly, with a present worth cost of $20,419,000. In contrast, present worth costs of other action alternatives range from $24,593,000 to $47,799,000. As stated in Section IX.C.5, it should be noted that the Operation and Maintenance costs for these alternatives assume 30 years of Operation and Maintenance estimated at approximately 6.8 to 7.3 million dollars (net present worth). These Operation and Maintenance costs
include activities such as annual monitoring and institutional controls for the Sudbury River. However, because investigation under OU IV will be performed concurrently with the implementation of the OU III remedy, monitoring of the River will be conducted as part of these OU IV investigations. In addition, institutional controls are an interim remedy only, pending the OU IV remedy decision. Therefore, the cost of the selected remedy will be significantly less than $20,419,000. Based on the discussion above, the selected remedy is cost-effective.

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

The selected remedy provides the best balance of trade-offs among the alternatives. The selected remedy will be protective of human health and the environment in the Continuing Source Areas by reducing contaminant levels to meet cleanup levels and will meet ARARs. Excavation, dewatering and disposal of sediments under the existing cap will provide effective long-term protection in the Continuing Source Areas without unacceptable short-term impacts and at less cost than Alternatives 3A and 4A. Furthermore, of all the 'A' alternatives, the selected remedy will be the most easily implemented as it would not require use of specialized units and would not require additional land or availability of substantial off-Site disposal capacity.

The placement of excavated sediment under the cap will not decrease the mobility, toxicity or volume of contaminated materials through treatment, but will nevertheless significantly reduce the mobility of hazardous substances through engineering controls by containing the contamination under an impermeable cap. Although Alternative 3A would permanently reduce the volume of contaminated sediments through treatment, this treatment would result in a smaller volume of more highly toxic material requiring off-Site transport and disposal due to the inability to destroy metals through treatment. Similarly, Alternative 4A, while reducing mobility and toxicity of the contaminated sediments, would result in greater volume of material requiring off-Site transport and disposal. Therefore, the treatment alternatives do not provide any significant benefit over the containment remedy.
E. The Selected Remedy is Primarily a Containment Remedy, and Does Not Use Treatment as a Principal Element to Permanently and Significantly Reduce the Toxicity, Mobility or Volume of the Hazardous Substances

The principal threats of the Nyanza Site were addressed through the first and second OUs, which included source control components for on-Site soils, sediments and sludges and management of migration components for groundwater contamination, and through the vault removal action, in which a major source of groundwater contamination was excavated and permanently destroyed using incineration technology. Implementation of the OU III remedy is necessary to address threats to human and ecological receptors at the Continuing Source Areas, to eliminate remaining sources of mercury contamination to the Sudbury River and to ensure a Site-wide remedy that is protective of human health and the environment.

The selected remedy is primarily a containment remedy and does not satisfy the preference for treatment as a principal element. However, given the relatively low levels of mercury detected in the Continuing Source Areas as compared to levels already beneath the cap, the fact that a cap was selected as the appropriate remedy for mercury-contaminated soils, sediments and sludges under the first OU, and the fact that there is currently no destructive technology for metals, EPA has determined that containment of the contaminated sediments in the Continuing Source Areas is preferable to treatment. Moreover, the overall response at the Site is consistent with the NCP preference for treating principal threats and containing low-threat material set forth in Section 300.430(a)(1)(iii) of the NCP.

XII. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA presented a Proposed Plan (preferred alternative) for remediation of the Site on December 31, 1992. In summary, the preferred alternative, as described in the Proposed Plan, consisted of excavation of contaminated sediments from the Continuing Source Areas to a cleanup level of 1 mg/kg of mercury; dewatering of the excavated sediment; disposal of the excavated material under the OU I cap; restoration of impacted wetland areas; institutional controls and annual monitoring for River areas; and creation of OU IV to conduct additional studies of the Sudbury River.

The selected remedy is the same as the preferred alternative with the exception of the annual monitoring of the Sudbury River. EPA determined that monitoring of the River would be conducted under the OU IV investigations concurrently with implementation of the
OU III remedy. Therefore, it is not a part of the selected remedy for OU III. In addition, EPA determined that the implementation of institutional controls (e.g. sign maintenance and public awareness activities) do not constitute Operation and Maintenance for this remedy but, rather, are an interim remedy for the River that will be conducted until such time as a final remedy is selected for the River.

XIII. STATE ROLE

The DEP 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 Commonwealth of Massachusettsconcurs with the selected remedy for OU III at the Nyanza Chemical Waste Dump Superfund Site. A copy of the declaration of concurrence is attached as Appendix B.
Figure 2
Nyanza Chemical Waste Dump Site
Nyanza Chemical Waste Dump Site
Principal Features and Continuing Source Areas

LEGEND:
- River
- Wetland
- Culvert
- Site Boundary

NOT TO SCALE
Figure 4. Exposure Pathways
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<tr>
<th>Sediment</th>
<th>Surface Water</th>
<th>Fish</th>
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<td>Vinyl chloride</td>
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### TABLE 2: SUMMARY OF CONTAMINANTS OF CONCERN INORGANICS

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### Table 3
**SUMMARY OF RISK RESULTS**
**NYANZA OPERABLE UNIT 3**

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Table 3
SUMMARY OF RISK RESULTS
NYANZA OPERABLE UNIT 3

PAGE 3
Table 3

SUMMARY OF RISK RESULTS
NYANZA OPERABLE UNIT 3

PAGE 4

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**Table 3**

**SUMMARY OF RISK RESULTS**

**NYANZA OPERABLE UNIT 3**

**PAGE 6**
Table 3
•UUUAfflT OF MSK RESULTS
HYAHZA OrERABLE UNIT *
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PHENOL*
AH8ENC*
AN1IMONV
CADMIUM* '
CtlFDUHM*
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B6N2>|A|ANTH
CHRY8ENE
BENJO|B|FLUOIt
BEN20|K)FLUOn
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INIiai-CqPYRENE
DIBENZ|AH|ANTH
BENJDIOIItFEHn.
•AHUM
BEFNUHJU
COPPEW
UANOANEU

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BILVEA
•ELENUM
THAUUM
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IOE-04

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t.OE-M

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iaE-oi aiE-oa ooEtoo ooEtoo

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tac-oa

iiE-oa ooEtoo ooctoo

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<td>(LIFETIME)</td>
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Table 3
SUMMARY OF RISK RESULTS
NYANZA OPERABLE UNIT 3

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<td>MAX</td>
<td>AVG</td>
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### Table 3
**SUMMARY OF RISK RESULTS**
**NYANZA OPERABLE UNIT 3**

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*Values represent the risk quotients for the respective elements in each reach.*
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**CONTAMINANTS OF CONCERN**
**INORGANICS AND ORGANICS**
**ECOLOGICAL RISK ASSESSMENT**

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<td>Chromium</td>
<td>4,4′-DDE</td>
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<td>Cadmium</td>
<td>Copper</td>
<td>4,4′-DDT</td>
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<td>Lead</td>
<td>Aroclor 1254</td>
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<tr>
<td>Copper</td>
<td>Mercury</td>
<td>Aroclor 1260</td>
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<td>Silver</td>
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<td>Mercury</td>
<td>Zinc</td>
<td>Dieldrin</td>
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<td>Nickel</td>
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<td>Methylmercury</td>
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<td>Selenium</td>
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### Table 5
Summary of Remedial Alternatives
Nyanza Operable Unit 3

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<th>REMEDIAL COMPONENTS</th>
<th>SUMMARY OF COMPONENTS</th>
<th>IMPLEMENTABILITY</th>
<th>COST</th>
<th>FINAL DEPOSITION</th>
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<td>1 RIVER</td>
<td>No action</td>
<td>Does not achieve remedial action objective. Relies on previously installed institutional controls, maintenance of controls, and compliance of the general public. Does not reduce risk, useful for documenting conditions</td>
<td>Not applicable</td>
<td>None</td>
<td>Retained</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
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<td>Easily implementable</td>
<td>Low capital Low O &amp; M</td>
<td>Retained</td>
</tr>
<tr>
<td>CONTINUING SOURCE AREAS</td>
<td>No action</td>
<td>Does not achieve remedial action objective. Relies on previously installed institutional controls, maintenance of controls, and compliance of the general public. Does not reduce risk, useful for documenting conditions</td>
<td>Not applicable</td>
<td>None</td>
<td>Retained</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td></td>
<td>Easily implementable</td>
<td>Low capital Low O &amp; M</td>
<td>Retained</td>
</tr>
<tr>
<td>2 RIVER</td>
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<td>Does not achieve remedial action objective. Relies on previously installed institutional controls, maintenance of controls, and compliance of the general public. Does not reduce risk, useful for documenting conditions</td>
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<td>None</td>
<td>Retained</td>
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<tr>
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<td>Monitoring</td>
<td></td>
<td>Easily implementable</td>
<td>Low capital Low O &amp; M</td>
<td>Retained</td>
</tr>
<tr>
<td></td>
<td>Institutional controls (signs and public awareness)</td>
<td>No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td>Fencing is not implementable for entire River, Signs and Public Awareness Program easily implementable</td>
<td>Relatively low</td>
<td>Retained</td>
</tr>
<tr>
<td>CONTINUING SOURCE AREAS</td>
<td>No action</td>
<td>Does not achieve remedial action objective. Relies on previously installed institutional controls, maintenance of controls, and compliance of the general public. Does not reduce risk, useful for documenting conditions</td>
<td>Not applicable</td>
<td>None</td>
<td>Retained</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td></td>
<td>Easily implementable</td>
<td>Low capital Low O &amp; M</td>
<td>Retained</td>
</tr>
<tr>
<td></td>
<td>Institutional controls (fencing, signs and public awareness)</td>
<td>No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td>Fencing, signs and Public Awareness Program easily implementable</td>
<td>Relatively low</td>
<td>Retained</td>
</tr>
<tr>
<td>ALTERNATIVE</td>
<td>REMEDIAL COMPONENTS</td>
<td>EFFECTIVENESS</td>
<td>IMPLEMENTABILITY</td>
<td>COST</td>
<td>FINAL DEPOSITION</td>
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<tr>
<td>5</td>
<td>RIVER</td>
<td>- Sediment cover</td>
<td>Long-term effectiveness questionable due to erosion and bioturbation. River velocities conductive for cover only in Oxbow Lake.</td>
<td>Technically implementable</td>
<td>Capital low O &amp; M High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Institutional controls</td>
<td>No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td></td>
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<tr>
<td></td>
<td>CONTINUING SOURCE AREAS</td>
<td>- No action</td>
<td>Long-term effectiveness questionable due to erosion and bioturbation. River velocities only conductive in Eastern Wetland. Increase potential for flooding.</td>
<td>Technically implementable</td>
<td>Capital low O &amp; M High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Monitoring</td>
<td>No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td>Fencing is not implementable for entire River. Signs and Public Awareness Program easily implementable</td>
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### Table 5
Summary of Remedial Alternatives
Nyanza Operable Unit 3

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>REMEDIAL COMPONENTS</th>
<th>SUMMARY OF COMPONENTS</th>
<th>FINAL DEPOSITION</th>
</tr>
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<tbody>
<tr>
<td><strong>RIVER</strong></td>
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<tr>
<td>3</td>
<td>- Excavate sediment</td>
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<tr>
<td></td>
<td>- Treatment with soil washing/solvent extraction</td>
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<td></td>
<td>- Redeposition of treated sediment</td>
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<td></td>
<td>- Institutional controls</td>
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<tr>
<td></td>
<td><strong>REMEDIAL COMPONENTS</strong></td>
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<td></td>
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<tr>
<td></td>
<td>- Effective and reliable</td>
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<td>- Effective and reliable</td>
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<td>- Effective</td>
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<td>- Redeposition of treated sediment</td>
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<td>- Institutional controls</td>
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<td><strong>CONTINUING SOURCE AREAS</strong></td>
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<td>- Effective</td>
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<td>- No protection to wildlife, changes in public policy may reduce effectiveness</td>
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<tr>
<td>4</td>
<td>- Excavate sediment</td>
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<td></td>
<td>- Treatment with stabilization/solidification</td>
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<td>- Dispose treated sediment off-site</td>
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<td></td>
<td>- Backfill excavated</td>
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<td>- Institutional controls</td>
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<td><strong>REMEDIAL COMPONENTS</strong></td>
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<td>- Effective and reliable</td>
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<td>- Effective</td>
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<td></td>
<td>- Redeposition may be more effectively contained</td>
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<td>- No protection to wildlife, changes in public policy may reduce effectiveness</td>
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<td><strong>CONTINUING SOURCE AREAS</strong></td>
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<td>- Effective</td>
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<td>- Redeposition could impact environment downstream</td>
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<td>- No protection to wildlife, changes in public policy may reduce effectiveness</td>
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<td><strong>CONTINUING SOURCE AREAS</strong></td>
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<td>- No protection to wildlife, changes in public policy may reduce effectiveness</td>
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<td><strong>SUMMARY OF COMPONENTS</strong></td>
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<td></td>
<td>- Effectiveness</td>
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<td>- Requires significant land acquisition</td>
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<td>- Fencing is not implementable for entire River, Signs and Public Awareness Program easily implementable</td>
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<td><strong>COST</strong></td>
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<td>- Relatively low</td>
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<td><strong>FINAL DEPOSITION</strong></td>
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<td>ALTERNATIVE</td>
<td>REMEDIAL COMPONENTS</td>
<td>SUMMARY OF COMPONENTS</td>
<td>EFFECTIVENESS</td>
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<tr>
<td>6</td>
<td>Excavate - Trolley Brook, Ouitall Creek and Lower Raceway&lt;br&gt;Deposit untreated sediment in Eastern Wetland&lt;br&gt;Construct sediment cover over Eastern Wetland&lt;br&gt;Backfill excavated area</td>
<td>SUMMARY OF COMPONENTS</td>
<td>Effective and reliable&lt;br&gt;Does not reduce contamination&lt;br&gt;Long-term effectiveness questionable due to erosion and bioturbation. Increases potential for flooding&lt;br&gt;Promotes reestablishment of environment</td>
</tr>
<tr>
<td>7</td>
<td>Excavate - Trolley Brook, Ouitall Creek and Lower Raceway&lt;br&gt;Treat sediment with solvent extraction/washing&lt;br&gt;Sediment cover in Eastern Wetland using treated sediment and clean fill&lt;br&gt;Backfill excavated area</td>
<td>Effective and reliable&lt;br&gt;Effective and reliable&lt;br&gt;Long-term effectiveness questionable due to erosion and bioturbation. Increases potential for flooding&lt;br&gt;Promotes reestablishment of environment</td>
<td>Readily Implementable&lt;br&gt;Requires significant land acquisition technically implementable&lt;br&gt;Technically Implementable&lt;br&gt;Readily Implementable</td>
</tr>
<tr>
<td>8</td>
<td>Excavate - Trolley Brook, Ouitall Creek, Lower Raceway and Eastern Wetland&lt;br&gt;Construct CDF ponded area of Eastern Wetland&lt;br&gt;Place untreated sediment in CDF&lt;br&gt;Institutional Controls&lt;br&gt;Backfill excavated areas with clean fill</td>
<td>Effective and reliable&lt;br&gt;Long-term containment and integrity questionable due to erosion, bioturbation and vertical gradients&lt;br&gt;Does not reduce volume or inherit level of toxicity&lt;br&gt;No protection to wildlife, changes in public policy may reduce effectiveness,&lt;br&gt;Promotes reestablishment of environment</td>
<td>Readily Implementable&lt;br&gt;Requires permanent extensive monitoring&lt;br&gt;Not acceptable to local/public government&lt;br&gt;Fencing is not implementable for entire River. Signs and Public Awareness Program easily implementable&lt;br&gt;Readily Implementable</td>
</tr>
<tr>
<td>9</td>
<td>Excavate - Trolley Brook, Ouitall Creek and Lower Raceway&lt;br&gt;Treat sediment with stabilization/solidification&lt;br&gt;Dispose solidified sediment in off-site RCRA facility&lt;br&gt;Construct sediment cover over ponded water areas of Eastern Wetland&lt;br&gt;Backfill excavated areas with clean fill</td>
<td>Effective and reliable&lt;br&gt;Effective and reliable. Requires transportation&lt;br&gt;Long-term effectiveness questionable due to erosion and bioturbation. Increases potential flooding&lt;br&gt;Promotes reestablishment of environment</td>
<td>Readily Implementable&lt;br&gt;Significant land acquisition technically implementable&lt;br&gt;Nearest RCRA facility 500 miles&lt;br&gt;Technically Implementable&lt;br&gt;Readily Implementable</td>
</tr>
<tr>
<td>ALTERNATIVE</td>
<td>REMEDIAL COMPONENTS</td>
<td>SUMMARY OF COMPONENTS</td>
<td>COST</td>
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</tr>
<tr>
<td>10</td>
<td>• Excavate • Trolley Brook, Oultall Creek and Lower Raceway • Dispose untreated sediment in Operable Unit 1 cell • Construct sediment cover over ponded water areas of Eastern Wetland • Backfill excavated areas with clean fill</td>
<td>• Effective and reliable • Effective and reliable. Requires transportation • Long-term effectiveness questionable due to erosion and bioturbation. Increases potential flooding • Promotes reestablishment of environment</td>
<td>• Moderate</td>
</tr>
<tr>
<td>11</td>
<td>• Excavate • Trolley Brook, Oultall Creek and Lower Raceway • Disposal in Operable Unit 1 cell • Institutional controls</td>
<td>• Effective and reliable • Effective and reliable. Requires transportation • No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td>• Moderate</td>
</tr>
<tr>
<td>12</td>
<td>• Excavate • Trolley Brook, Oultall Creek and Lower Raceway • Sediment disposal in Eastern Wetland • Sediment cover in Eastern Wetland • Redirect flow of Eastern Wetland • Institutional controls</td>
<td>• Effective and reliable •Does not reduce volume or toxicity, increase potential flooding • Effective and reliable. Requires transportation • Reduce erosion and scouring, but requires additional storage capacity • No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td>• Moderate</td>
</tr>
<tr>
<td>13</td>
<td>• Divert flow from Eastern Wetland • Institutional controls</td>
<td>• Does not meet remedial action objectives potentially contaminates remediate areas • No protection to wildlife, changes in public policy may reduce effectiveness</td>
<td>• Low</td>
</tr>
</tbody>
</table>
### Table 6
Comparison of Costs

<table>
<thead>
<tr>
<th>Alternative Number</th>
<th>Total Cost (millions of dollars)</th>
<th>30 year O&amp;M Costs (millions of dollars)</th>
<th>Cost Excluding O&amp;M Costs (millions of dollars)</th>
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<tr>
<td>3A</td>
<td>24.6</td>
<td>7.3</td>
<td>17.3</td>
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<tr>
<td>4A</td>
<td>47.8</td>
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<td>11A</td>
<td>20.4</td>
<td>7.3</td>
<td>13.1</td>
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### TABLE 7

**Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls**

**Chemical Specific ARARs and TBCs**

**NYANZA OU III**

<table>
<thead>
<tr>
<th>Status</th>
<th>Requirements</th>
<th>Requirement Synopsis</th>
<th>Action to be Taken to Attain Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEDERAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevant and Appropriate</td>
<td>CWA - Ambient Water Quality Criteria (AWQC) - Protection of Freshwater Aquatic Life, Human Health - Fish Consumption</td>
<td>AWQC are developed under the Clean Water Act (CWA) as guidelines from which states develop water quality standards. Criteria are established for (1) protection of human health from (a) drinking the water and consuming the fish and (b) consuming the fish only; and (2) protection of aquatic life. The Sudbury River has been designated a Class B River for protection and propagation of fish, other aquatic life and wildlife, as well as for recreational uses (fishing, swimming).</td>
<td>The cleanup level of 1 ppm mercury in sediment is expected to result in surface water in the Eastern Wetland which meets the AWQC for both protection of human health from fish consumption and protection of aquatic life.</td>
</tr>
<tr>
<td>Status</td>
<td>Requirements</td>
<td>Requirement Synopsis</td>
<td>Action to be Taken to Attain Requirements</td>
</tr>
<tr>
<td>------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>STATE</td>
<td>Relevant and Appropriate</td>
<td>The regulations designate the most sensitive uses for which the surface waters of the Commonwealth shall be enhanced, maintained and protected, and prescribe the minimum water quality criteria required to sustain the designated use. The Sudbury River has been designated a Class B river for protection and propagation of fish, other aquatic life and wildlife, as well as for recreational uses.</td>
<td>Water from the dewatering process will be discharged directly to on-Site surface water. If this water does not meet State standards, it will be treated before discharge.</td>
</tr>
</tbody>
</table>
### Table 7

**Table 7**

Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls

**Chemical Specific ARARs and TBCs**

**NYANZA OU III**

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<tr>
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<tbody>
<tr>
<td><strong>FEDERAL</strong></td>
<td></td>
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<tr>
<td>TBC</td>
<td>National Oceanic and Atmospheric Administration (NOAA) Technical Memorandum NOS OMA 52</td>
<td>This memorandum reported the levels of contaminants in sediment at which undesirable effects were observed among most types of aquatic sediment-dwelling organisms.</td>
<td>This memorandum was used to set target cleanup goals for sediments based on exposure scenarios for ecological receptors.</td>
</tr>
<tr>
<td>TBC</td>
<td>EPA Risk Reference Doses (RfDs).</td>
<td>EPA RfDs are dose levels established to characterize risks due to exposure to contaminants in surface water, sediment, as well as in other media in terms of noncarcinogenic effects.</td>
<td>EPA RfDs were used to characterize risks due to exposure to contaminants in surface water and sediment, as well as other media.</td>
</tr>
<tr>
<td>TBC</td>
<td>EPA Carcinogen Assessment Group Potency Factors.</td>
<td>These factors are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.</td>
<td>These factors were used to assess health risks from carcinogens present at the Site.</td>
</tr>
<tr>
<td>TBC</td>
<td>EPA Health Advisories and Acceptable Intake Health Assessment Documents</td>
<td>These materials are intended for use in qualitative public health evaluation of remedial alternatives.</td>
<td>These documents were used in assessing health risks from ingesting surface water and sediment in the Study Area.</td>
</tr>
<tr>
<td>Status</td>
<td>Requirements</td>
<td>Requirement Synopsis</td>
<td>Action to be Taken to Attain Requirements</td>
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</tr>
<tr>
<td>FEDERAL (cont’d)</td>
<td>Risk Assessment Guidance for Superfund and Directive Amendments</td>
<td>The guidance provides parameters for determination of exposure via ingestion of fish, water, and sediment. The document provides guidance for determining risk, which can be used to calculate target cleanup goals.</td>
<td>The guidance was used to calculate target cleanup goals for sediment based on exposure scenarios for subsistence and sports fishermen and residential exposure routes.</td>
</tr>
<tr>
<td>STATE</td>
<td>MA Allowable Ambient Limits - annual (AAL) and 24 hour (TEL)</td>
<td>These DEP guidelines establish limits for air pollutants.</td>
<td>The guidelines will be considered for any actions that impact air quality.</td>
</tr>
</tbody>
</table>

ARARs - Applicable or relevant and appropriate requirements
TBCs - Requirements "To Be Considered"
FS - Feasibility Study
CFR - Code for Federal Regulations
CWA - Clean Water Act
AWQC - Ambient Water Quality Criteria
DEP - MA Department of Environmental Protection
CMR - Commonwealth of MA Regulations
EPA - Environmental Protection Agency
RfDs - References doses
Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls
Action Specific ARARs and TBCs
NYANZA OU III

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</thead>
<tbody>
<tr>
<td>FEDERAL</td>
<td>CAA - National Ambient Air Quality Standards (NAAQS) for Particulate Matter and Ozone (40 CFR Parts 50.6, 50.9).</td>
<td>The regulations specify maximum primary and secondary 24-hour concentrations for particulate matter and ozone in the ambient air, and not from particular sources. The MA State Implementation Plans (SIP) contain the specific requirements for certain sources designed to ensure attainment and maintenance of the NAAQS standards.</td>
<td>The actions to be taken meet the requirements of the SIP designed to maintain the NAAQS standards are discussed below under the SIP requirements.</td>
</tr>
<tr>
<td>Applicable</td>
<td>CWA - National Pollutant Discharge Elimination System (NPDES) (40 CFR 122, 125)</td>
<td>Any point-source discharge to waters of the United States must meet NPDES substantive requirements, which include compliance with corresponding water quality standards and establishment of discharge monitoring systems.</td>
<td>Wastewater from the dewatering process will be monitored for the required pollutants and standards will be met.</td>
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</tbody>
</table>
## Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls
### Action Specific ARARs and TBCs
#### NYANZA OU III

<table>
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<tbody>
<tr>
<td><strong>FEDERAL (cont’d)</strong></td>
<td>Federal Noise Control Act (40 CFR 204, 205, 211)</td>
<td>These provisions regulate construction and transportation equipment noise, process equipment noise levels, and noise levels at property boundaries of the project.</td>
<td>Site noise levels will be in accordance with federal requirements.</td>
</tr>
</tbody>
</table>
## Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls
### Action Specific ARARs and TBCs
#### NYANZA OU III

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<td><strong>STATE</strong></td>
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<tr>
<td>Applicable</td>
<td>MA Air Pollution Control Regulations (310 CMR 7.00)</td>
<td>The purpose of these regulations is to prevent the occurrence of conditions of air pollution and to facilitate the abatement of such conditions.</td>
<td>During construction activities, air emissions will be monitored and control equipment will be used, as necessary. The need for controls and the type of technology to be used will be assessed during remedial design.</td>
</tr>
<tr>
<td>Applicable</td>
<td>MA SIP for Particulate Matter (310 CMR 7.09 (3))</td>
<td>This regulation requires that any construction or demolition shall not be allowed to cause &quot;excessive emissions&quot; of particulate matter by failure to seed, pave, cover, wet or otherwise treat the area.</td>
<td>Disturbed areas will be vegetated at the completion of site construction. Dust suppression will be conducted during construction to control particulate emissions.</td>
</tr>
<tr>
<td>Relevant and Appropriate</td>
<td>MA SIP for Emissions of Volatile Organic Compounds (VOCs) (310 CMR 7.18).</td>
<td>This regulation seeks to control ozone pollution in the air by regulating emissions of VOCs. All sources of VOCs over a certain threshold amount must install Reasonably Available Control Technology (RACT).</td>
<td>Air emissions will be monitored during remediation. If VOC emissions are detected, the remedial activity will employ control equipment adequate to achieve RACT.</td>
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### STATE (cont’d)

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<tr>
<td>Relevant and Appropriate</td>
<td>MA Hazardous Waste Regulations (310 CMR 30.100-160, 30.300-394, 30.400-416, 30.500-586, 30.602, 30.605, 30.622 (5)-(11), 30.624(1), 30.626, 30.627, 30.629, 30.631(1), 30.631(3)-(6), 30.633(1), 30.633(2B)(a), 30.633(2B)(e)-(h), 30.680-689, 30.690-699)</td>
<td>These regulations provide for identification and listing of hazardous waste; include requirements for generators and transporters of hazardous wastes; provide management and technical standards for hazardous waste facilities and landfills; and regulate the use and management of containers and storage and treatment in tanks.</td>
<td>Activities performed in connection with excavation, transportation and burial of contaminated sediments under the cap will comply with all substantive requirements of these regulations.</td>
</tr>
<tr>
<td>Applicable</td>
<td>MA Surface Water Discharge Permit Program (314 CMR 3.00)</td>
<td>The regulations regulate the discharge of pollutants to surface waters of the Commonwealth and any treatment works associated with these discharges.</td>
<td>Wastewater from the dewatering process will be monitored for the required pollutants and substantive requirements will be met.</td>
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<td><strong>STATE (cont'd)</strong></td>
<td><strong>Applicable</strong></td>
<td>MA Certification for Dredging, Dredged Materials Disposal and Filling in Waters (314 CMR 9.00)</td>
<td>The regulations establish criteria and standards for the uniform and coordinated administration of water quality certification of dredging, dredged material disposal and filling projects in the waters of the Commonwealth. These regulations contain some requirements that are more stringent than Federal wetlands ARARs. Excavation, filling and disposal operations will meet criteria and standards established under these regulations, including the requirement to minimize impacts to the environment under 314 CMR 9.04.</td>
</tr>
<tr>
<td><strong>Applicable</strong></td>
<td>MA Operation and Maintenance and Pretreatment Standards for Waste water, Treatment Works and Indirect Discharges (314 CMR 12.00)</td>
<td>These regulations establish requirements that insure the proper operation and maintenance of waste water facilities within the Commonwealth.</td>
<td>Any waste water treatment facility will be operated and maintained in accordance with these requirements.</td>
</tr>
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</table>
### Alternative II: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls

**Action Specific ARARs and TBCs**

**NYANZA OU III**

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<tr>
<td>FEDERAL</td>
<td>RCRA - Corrective Action Management Units and Temporary Units, Final Rule (58 Fed. Reg. 8658 (Feb. 16, 1993)).</td>
<td>This rule, which will not become effective until April 19, 1993, contains the regulations governing corrective action management units (CAMUs), which are used in implementing corrective action remedies at RCRA facilities. The preamble to the rule states that a CAMU need not be a &quot;contiguous area of contamination&quot; but rather is defined in terms of the area where the remediation wastes are to be managed.</td>
<td>This rule was used as additional support in determining that the excavation and burial of sediments from the Continuing Source Areas under the OUI Cap was not &quot;land disposal&quot; requiring compliance with RCRA Land Disposal Restrictions.</td>
</tr>
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### Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls

**Location Specific ARARs and TBCs**

**NYANZA OU III**

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<td><strong>FEDERAL</strong></td>
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<tr>
<td>Applicable</td>
<td>Clean Water Act (CWA) 404, (33 USC 1344, 40 CFR 230; 33 CFR 320-330)</td>
<td>This law and the accompanying regulations apply to discharge of dredged or fill materials. Under these requirements, no activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available.</td>
<td>The selected remedy will involve excavation of wetland sediments followed by the placement of fill materials into the Eastern Wetland as part of the restoration component of the remedy. EPA has determined that there is no practicable alternative and will conduct this activity so as to have the least adverse impact on the aquatic ecosystem and the environment.</td>
</tr>
<tr>
<td>Applicable</td>
<td>Fish and Wildlife Coordination Act (16 USC 661 et seg.; 40 CFR 6.302(g))</td>
<td>This law requires that any Federal agency that proposes to modify a water body must consult with the U.S. Fish and Wildlife Service.</td>
<td>EPA will consult the U.S. Fish and Wildlife Service before implementing the selected remedy.</td>
</tr>
<tr>
<td>Applicable</td>
<td>National Historical Preservation Act (16 USC Section 469; 36 CFR 65)</td>
<td>This regulation requires action to recover and preserve artifacts which may have significant scientific, prehistoric, or archaeological value from terrain that is planned for alteration.</td>
<td>Should scientific, prehistoric, or archaeological artifacts be found at the Site, measures required by the Act will be taken. No such artifacts have been identified to date.</td>
</tr>
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</table>
### Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls
#### Location Specific ARARs and TBCs
#### NYANZA OU III

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<td>Applicable</td>
<td>Protection of Archaeological Resources (32 CFR Part 229, 229.4; 43 CFR Parts 7, 7.4)</td>
<td>These regulations develop procedures for the protection of archaeological resources.</td>
<td>If archaeological resources are encountered during soil excavation or construction, they will be reviewed by Federal and State archaeologists.</td>
</tr>
<tr>
<td>Applicable</td>
<td>Endangered Species Act of 1973 (16 USC 1531 et seq.; 36 CFR 800)</td>
<td>This regulation requires action to protect endangered species or threatened species, including consultation with the Department of the Interior.</td>
<td>Measures will be taken to avoid disturbance of endangered species. Habitats of any listed species will be identified prior to remediation and modifications to operations will be taken to minimize impacts after consultation with the Department of the Interior.</td>
</tr>
<tr>
<td>Applicable</td>
<td>Wild and Scenic Rivers Act (16 USC 1271 et seq., Section 7(a); 40 CFR 6.302(e); 36 CFR Part 297)</td>
<td>This act establishes requirements applicable to water resource projects having a direct and adverse impact on the free-flowing, scenic and natural values of rivers designated as well as proposed for inclusion in the National Wild and Scenic River System. The Sudbury River has been proposed for inclusion in the National System.</td>
<td>If activities constituting a water resource project will have a direct impact on the River, (e.g. a discharge to the River) they will be conducted in a manner that will minimize adverse impacts, in consultation with the Dept. of the Interior and the Dept. of Agriculture.</td>
</tr>
<tr>
<td>Applicable</td>
<td>Floodplains Executive Order (40 CFR Part 6, Appendix A)</td>
<td>Federal agencies are required to reduce the risk of flood loss, minimize impact of floods, and restore and preserve the natural and beneficial value of floodplains.</td>
<td>Any remedial action that will involve construction in a floodplain will be analyzed to determine if there is a practicable alternative. If there is none, measures will be taken to ensure that the risk of flood hazards are reduced, including restoration and preservation of natural undeveloped floodplains.</td>
</tr>
</tbody>
</table>
### Alternative 11: Dredging, Disposal in Operable Unit I Cell, and Institutional Controls

**Location Specific ARARs and TBCs**

**NYANZA OU III**

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<tr>
<td>Applicable</td>
<td>Wetlands Executive order</td>
<td>Under the EO, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance natural and beneficial values of wetlands.</td>
<td>The selected remedy requires excavation of wetland sediments for which there is no practicable alternative. However, measures will be taken to minimize loss, destruction or degradation of wetlands including the restoration of all disturbed wetlands following excavation.</td>
</tr>
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*Executive order (40 CFR Part 6, Appendix A)*
### State Requirements

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<tr>
<td>Applicable</td>
<td>Wetlands Protection Act M.G.L.c. 131, 40; Wetlands Protection Regulations (310 CMR 10.00)</td>
<td>This Act and the associated regulations are applicable requirements which regulate all work which will remove, dredge, fill, or alter any of the following four resource areas: banks, bordering vegetated wetlands, land under water bodies, and land subject to flooding. In addition, the regulations require that if wildlife habitat is altered beyond specified thresholds, wildlife habitat restoration and replication must be achieved. Disturbance of rare species habitat is prohibited.</td>
<td>During Remedial Design, further delineation of wetlands will be performed and all applicable performance standards will be met. Wildlife habitat evaluations will also be performed and replication of altered habitat will be achieved as necessary.</td>
</tr>
<tr>
<td>Applicable</td>
<td>MA Endangered and Threatened Species Regulations (321 CMR 8.00)</td>
<td>This regulation identifies the Commonwealth's list of endangered and threatened species.</td>
<td>During Remedial Design, steps will be taken to identify whether listed endangered or threatened species may be impacted by the remedial activities.</td>
</tr>
<tr>
<td>TBC</td>
<td>Wetland Protection Program Policy 90-2: Standards and Procedures for determining Adverse Impacts to Rare Species Habitat</td>
<td>This policy clarifies the rules regarding rare species habitat contained at 310 CMR 10.59.</td>
<td>Any action taken at the Site which may impact a rare species habitat will consider this policy.</td>
</tr>
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APPENDIX A
RESPONSIVENESS SUMMARY
NYANZA OPERABLE UNIT III
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**RESPONSIVENESS SUMMARY**  
**NYANZA OPERABLE UNIT III**  

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ATTACHMENTS

A COMMUNITY RELATIONS CONDUCTED FOR THE NYANZA III SUDBURY
   RIVER STUDY

B TRANSCRIPT OF THE JANUARY 27, 1993 PUBLIC HEARING
The U. S. Environmental Protection Agency (EPA) held a 62-day public comment period, from January 7, 1993, to March 10, 1993, to provide an opportunity for interested parties to comment on the Feasibility Study and Proposed Plan prepared for the Sudbury River Study. The Feasibility Study examined and evaluated various options, called remedial alternatives, for addressing contamination in the Continuing Source Areas, drainageways between the Nyanza Property and the Sudbury River. EPA identified its Preferred Alternative in the Proposed Plan, issued in December 1992, and then requested comments during the public comment period. On January 27, 1993, EPA conducted an informal public hearing at which four commenters spoke. A total of 36 commenters responded during the public comment period, 2 of which responded both in writing and through testimony at the public hearing.

The purpose of this Responsiveness Summary is to document EPA responses to the comments and questions raised during the public comment period. EPA has considered all of the comments summarized in this document in selecting the final remedy for the OU III.

The Responsiveness Summary is divided into the following sections:

Section I. - Overview.

This section discusses the Site history, outlines the objectives of the RI/FS, identifies the remedial alternatives evaluated in the FS and identifies and summarizes general reaction to EPA’s Proposed Plan.

Section II. - Background on Community Involvement and Concerns.

This section contains a summary of the history of community interest and concerns about OU III.

Section III. - Summary of Major Comments Received During the Public Comment Period and EPA’s Responses to those Comments.

Section IV. - Remaining Concerns.

Attachment A - This attachment provides a list of the Community Relations activities EPA has conducted for the OU III.

Attachment B - This attachment is the transcript of the January 27, 1993 informal public hearing held at the Ashland High School.

Capitalized terms appearing herein are defined in the ROD.
I. OVERVIEW

OU III investigated drainageways between the Property and the Sudbury River (including the Continuing Source Areas) and a 33-mile stretch of the Sudbury River, from Cedar Swamp in Westborough to the confluence of the Sudbury and Assabet Rivers in Concord. The Continuing Source Areas include the Eastern Wetland, Trolley Brook, Outfall Creek, and the lower Raceway and are the focus of the OU III selected remedy. The Sudbury River will be further investigated under OU IV.

Historic information determined that contaminants emanating from the Nyanza Chemical Waste Dump Site in Ashland had migrated through adjacent wetland areas and drainageways to the Sudbury River. Nyanza OU III investigations sought to identify the nature and extent of that migration, documented in the May 1992 Remedial Investigation (RI). The RI revealed that surface water in the Eastern Wetland, Trolley Brook, and Outfall Creek and sediments from these locations and the lower Raceway, contained mercury at levels that caused a risk to both human and ecological receptors. Mercury levels in River sediment generally decreased with distance from the Property. In addition, fish tissue taken from a number of locations in the River showed elevated levels of mercury. Although other Site-related contaminants were found during the RI, only one target cleanup goal was set, for mercury in sediment, because the risk assessment indicated that more than 90 percent of the total health risk to both humans and the environment from Site-related contaminants stemmed from this contaminant.

Based on the Risk Assessment, EPA developed Remedial Action Objectives. These objectives, generally stated, are to protect human and ecological receptors in the Continuing Source Areas by reducing contact with contaminated sediments, to minimize contaminant migration from the Continuing Source Areas to the River and to thereby reduce mercury contamination in fish.

From these objectives, EPA developed and evaluated remedial alternatives in the FS. This report describes the alternatives considered for addressing the remedial objectives and the criteria EPA used to identify the remedial alternatives that were evaluated in detail. These alternatives are described briefly below.

A. Remedial Alternatives

Alternatives 1: No Action with Monitoring

This alternative was evaluated to serve as a baseline for comparison with the other remedial alternatives under consideration. No work would be performed to address sediment contamination in the Continuing Source Areas or River Areas. Annual monitoring of sediment, surface water, and fish would be conducted for 30 years.
Alternative 2: Limited Action (No Action with Institutional Controls and Monitoring)

This alternative is identical in scope to Alternative 1, except that it adds institutional controls and measures to enhance public awareness.

The FS evaluated this alternative for both the Continuing Source Areas and for River Areas containing mercury-contaminated sediments. Components common to both areas include posting signs warning against consumption of fish; conducting a public awareness program; and annual sampling of surface water, sediments, and biota to evaluate contaminant levels and migration. In addition, for the Continuing Source Areas, a fence would be installed around the Eastern Wetland, Trolley Brook, and Outfall Creek, extending along the lower Raceway to the confluence with the Sudbury River. For the River Areas, EPA would recommend that the Massachusetts Department of Public Health advisory against consuming Sudbury River fish be maintained throughout the River.

Alternative 3: Dredging, Treatment by Solvent Extraction/Soil Washing, Redeposition of Sediment, Wetlands Restoration and Institutional Controls

This alternative would include dredging sediments from the Continuing Source Areas and treating them on-Site with a solvent extraction/soil washing process; off-Site disposal of the treatment residuals; treating the resulting wastewater, if necessary, and discharging it on-Site; redepositing the treated sediments in the excavated areas; restoring impacted wetland areas; evaluating and implementing institutional controls for the River Areas until a final remedy decision is made in these areas; preparing and implementing a plan for increased public awareness regarding River contamination; and creating a Fourth OU to perform additional studies on sediment and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environment for River Areas.

Three target cleanup goal concentrations were examined for this alternative, as follows:

Alternative 3A incorporated a target cleanup goal of 1 mg/kg of mercury in sediment, which is the background level in upstream reaches of the River unaffected by releases from Nyanza. This target cleanup goal is protective of human health and the environment and is expected to eliminate future migration of mercury to the Sudbury River. The volume of contaminated sediment to be excavated and treated under this alternative is estimated to be approximately 20,206 cubic yards.
Alternative 3B incorporated a target cleanup goal of 7 mg/kg of mercury in sediment, a concentration estimated to reduce mercury concentrations in fish to levels protective of human health from occasional ingestion of mercury-contaminated fish by sports fishermen. This target cleanup goal would be protective of humans exposed to contaminated sediment through dermal contact or accidental ingestion, but would not be protective of environmental receptors. The volume of contaminated sediment to be excavated and treated under this alternative is estimated to be approximately 11,186 cubic yards.

Alternative 3C incorporated a target cleanup goal of 30 mg/kg of mercury in sediment, a concentration that is protective of humans exposed to contaminated sediment by dermal contact or accidental ingestion for a residential exposure scenario, but is not protective of environmental receptors. The volume of contaminated sediment to be excavated and treated under this alternative is estimated to be approximately 3,604 cubic yards.

Alternative 4: Dredging, Solidification, Off-Site Disposal, Wetlands Restoration and Institutional Controls

This alternative includes dredging sediments from the Continuing Source Areas; stabilizing/solidifying the sediments on-Site and disposing them off-Site; treating the resulting wastewater, if necessary, and discharging it on-Site; restoring impacted wetland areas; evaluating and implementing institutional controls for the River Areas until a final remedy decision is made in these areas; preparing and implementing a plan for increased public awareness regarding River contamination; and creating a Fourth OU to perform additional studies on sediment and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environmental for River Areas.

Three target cleanup goal concentrations were examined for this alternative, as follows.

Alternative 4A incorporated a target cleanup goal of 1 mg/kg of mercury in sediment, which is the background level in upstream reaches of the River unaffected by releases from Nyanza. This target cleanup goal is protective of human health and the environment and is expected to eliminate future migration of mercury to the Sudbury River. The volume of contaminated sediment to be excavated, stabilized and disposed off-Site under this alternative is estimated to be approximately 20,206 cubic yards.
Alternative 4B incorporated a target cleanup goal of 7 mg/kg of mercury in sediment, a concentration estimated to reduce mercury concentrations in fish to levels protective of human health from occasional ingestion of mercury-contaminated fish by sports fishermen. This target cleanup goal would be protective of humans exposed to contaminated sediment through dermal contact or accidental ingestion, but would not be protective of environmental receptors. The volume of contaminated sediment to be excavated, stabilized and disposed off-Site under this alternative is estimated to be approximately 11,186 cubic yards.

Alternative 4C incorporated a target cleanup goal of 30 mg/kg of mercury in sediment, a concentration that is protective of humans exposed to contaminated sediment by dermal contact or accidental ingestion for a residential exposure scenario, but is not protective of environmental receptors. The volume of contaminated sediment to be excavated, stabilized and disposed off-Site under this alternative is estimated to be approximately 3,604 cubic yards.

Alternative 11: Dredging, Disposal in OU I Cell, Wetlands Restoration, and Institutional Controls

This alternative includes dredging and dewatering and of contaminated sediments from the Continuing Source Areas; placing dredged sediments under a portion of the cap constructed in OU I of the Site; treating, if necessary, water from the dewatering process and discharging to an on-Site surface water body; restoring impacted wetland areas; evaluating and implementing institutional controls for the River Areas until a final remedy decision is made in these areas; preparing and implementing a plan for increased public awareness regarding River contamination; and creating a Fourth OU to perform additional studies on sediment and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environment for River Areas.

As in Alternative 3 and 4, three target cleanup goal concentrations were examined for this alternative, as follows:

Alternative 11A is the Selected Remedy. This alternative incorporated a target cleanup goal of 1 mg/kg of mercury in sediment, which is the background level in upstream reaches of the River unaffected by releases from Nyanza. This target cleanup goal is protective of human health and the environment and is expected to eliminate future migration of mercury to the Sudbury River. The volume of contaminated sediment to be excavated and disposed of under this alternative is estimated to be approximately 20,206 cubic yards.
Alternative 11B incorporated a target cleanup goal of 7 mg/kg of mercury in sediment, a concentration estimated to reduce mercury concentrations in fish to levels protective of human health from occasional ingestion of mercury-contaminated fish by sports fishermen. This target cleanup goal would be protective of humans exposed to contaminated sediment through dermal contact or accidental ingestion, but would not be protective of environmental receptors. The volume of contaminated sediment to be excavated and disposed of under this alternative is estimated to be approximately 11,186 cubic yards.

Alternative 11C incorporated a target cleanup goal of 30 mg/kg of mercury in sediment, a concentration that is protective of humans exposed to contaminated sediment by dermal contact or accidental ingestion for a residential exposure scenario, but is not protective of environmental receptors. The volume of contaminated sediment to be excavated and disposed of under this alternative is estimated to be approximately 3,604 cubic yards.

Alternative 13: Diverting Flow from the Eastern Wetland to a Constructed Sedimentation Basin, and Institutional Controls

This alternative, which was evaluated in the FS Addendum, would include redirecting discharge from the Eastern Wetland to a concrete sedimentation basin, located in the Trolley Brook Wetland; evaluating and implementing institutional controls for the River Areas and the Continuing Source Areas; preparing and implementing a plan for increased public awareness regarding contamination; and creating a Fourth OU to perform additional studies on sediment and fish in the Sudbury River and some of the Continuing Source Areas (Trolley Brook, Outfall Creek, and the lower Raceway) to determine a sediment cleanup level that would lower risks to human health and the environmental for these areas. Maintenance of the sedimentation basin would include quarterly removal, treatment and disposal of accumulated sediments.

Target cleanup goals are not applicable to this alternative. This alternative would result in decreased migration of contaminated sediments from the Eastern Wetland to the Sudbury River. However, due to space constraints, a basin equipped to handle storm flows cannot be constructed in this area. Therefore, stormflows would need to bypass the sedimentation basin, resulting in migration of sediment during storm events.

In addition, this alternative is expected to have only minimal benefit in protecting human health and the environment. Through the accumulation and eventual removal of sediments from the basin, there will be, over the long term, a decrease in exposure to the contaminants. In the meantime, however, this alternative does not prevent human or ecological exposure to the contaminated sediments.
B. General Reaction to the Preferred Alternative

During EPA’s public information meeting on January 6, 1993, to discuss the Proposed Plan and the Preferred Alternative, the general public reaction was that not enough information had been provided to determine whether the Preferred Alternative (depositing dewatered sediment in the OU I cell) was either feasible or safe. Following the informal public hearing, when a representative from the Army Corps of Engineers discussed the cell’s characteristics and re-construction options, this issue subsided somewhat. A continuing theme, however, is skepticism on the part of Ashland residents about whether EPA intends to use the OU I facility as a hazardous waste landfill for other Superfund Sites. Some also questioned whether EPA has enough information about contaminant migration to justify proceeding with the Preferred Alternative.

The DEP and the Technical Assistance Grant group requested that EPA re-evaluate a permanent remedy; concerns were expressed about whether the OU I cell has sufficient capacity to accommodate the volume of excavated sediments estimated for the Selected Remedy.

Representatives of the PRPs argue that data gathered during the RI process has been manipulated to inflate the extent and severity of the Site-related contamination in the Study Area. The PRP representatives also contend that there are no identifiable risks to human health or the environment and therefore the Selected Remedy’s cleanup level is technically and legally unsupportable.

A number of comments addressed perceived technical inadequacies of the RI with regard to the River. Although EPA has responded to each of these comments below, they will be further considered in the scoping of OU IV investigations.

Citizens concerned about this project who live in communities other than Ashland generally are concerned that EPA has not proposed as part of this OU any remediation of the River itself. Although the Selected Remedy includes establishing OU IV, many area residents are concerned that the Sudbury River will never be adequately remediated.
II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Community interest in OU III can be divided into two distinct groups: Residents of Ashland, and citizens of the other downstream communities.

Ashland residents have been aware of the impact of the Site since the early 1970s when EPA first identified mercury contamination in the Sudbury River emanating from the Property. Media attention increased after 1981, when the Site was proposed for listing on EPA's National Priorities List. In 1982, a social committee at a local church sponsored a "Nyanza Night". Out of this discussion, emerged Ashland Associates for a Clean Environment, the sponsor of monthly meetings and additional "Nyanza Nights". In 1985, the Nyanza Citizens Advisory Committee was formed, later merging into the Local Emergency Planning Committee. Once the OU I cap was constructed, public interest began to wane. EPA's Selected Remedy for OU III, however, has reawakened interest on the part of the Ashland community.

Citizens of the five downstream communities appear to be more focused on the impact of the contamination on the recreational potential and ecological health of the Sudbury River. In Framingham, the Framingham Advocates for the Sudbury River have been awarded an EPA Technical Assistance Grant. Other active downstream groups include the Sudbury Valley Trustees, Trout Unlimited, the Wild and Scenic Study Committee (working with the National Park Service to evaluate the potential for area riverways to be designated Wild and Scenic Rivers), and citizens working with the US Fish and Wildlife Service to expand the Great Meadows Wildlife Refuge.
III. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

A. Overview

Comment 1: Two commenters requested a 15 day extension of the public comment period, while others requested an extension for an additional 60 days, through April 8.

Response: After considering these requests, EPA granted a 30 day extension, through March 10, 1993, in accordance with 40 CFR Section 300.430(f)(3)(i)(C).

Comment 2: One commenter requested that EPA delay action on Operable Unit III until it conducts further public meetings.

Response: EPA has conducted a public meeting and hearing on OU III and believes the public has had ample opportunity to comment on the remedy.

Comment 3: One commenter stated that EPA must include remediation of the Eastern Wetland (a Continuing Source Area) as part of its Operable Unit III cleanup strategy.

Response: Remediation of the Eastern Wetland will be performed as part of the selected remedy.

Comment 4: One commenter stated that the RI Report does not fully evaluate the data it contains.

Response: An extensive database was generated during the two year field effort for the RI/FS. Data can be manipulated through numerous comparative, statistical, and predictive models. The data was evaluated primarily to determine the risks to human and ecological receptors from the Study Area. Additional evaluation of this data was not considered necessary to evaluate these risks.

Comment 5: One commenter stated that the RI Report contains internal contradictions.

Response: Specific contradictions cited in comments received by EPA are addressed in responses to specific comments.

Comment 6: One commenter stated that the RI Report does not integrate information among its sections.

Response: The RI Report integrated information among its sections where appropriate. The large database presented in Section 4.0 is used throughout the report. Although further integration among the sections may have been possible, segregation of information was effective in focusing the evaluations.
B. Study Area Investigation

B-1 General Comments

Comment 7: One commenter stated that the RI Report fails to adequately indicate specific sampling locations and climatic conditions during the sampling event.

Response: Sampling locations were not optically surveyed during the field investigation, however, locations were identified relative to prominent landmarks at the time of sample collection. Samples were collected during varying seasonal and weather conditions. Weather conditions were recorded as part of the field documentation and this information is available in the field logs maintained by the Field Team Leaders. These logs are a part of the EPA Site File.

Comment 8: One commenter stated that the RI Report fails to indicate whether the number of sampling locations for each medium sampled are statistically representative for each reach.

Response: Sediments are typically not uniformly distributed throughout a river system; nor are contaminants typically uniformly distributed throughout a medium subject to erosional and depositional processes. The value of a statistical analysis of the distribution of sample points is not significant at this time and was not done.

Comment 9: One commenter stressed that EPA has biased the presentation of data in the RI, making the mercury contamination appear more severe than it is.

Response: Specific examples are addressed in responses to Comments 44, 63-66, 69, 70, and 113.

B-2 Specific Sampling Programs

Comment 10: One commenter stated that fish sampling should be conducted in the area located behind the Massachusetts Turnpike Rest Area.

Response: Fish samples were collected from locations perceived to be within the continuous flow path of Site-related contaminants, or from locations which were considered to be applicable background locations. Fish sample locations were also restricted to areas which could provide adequate numbers of each target species which would provide an adequate database. For these reasons, the area behind the Massachusetts Turnpike was not sampled. This area will be considered during the scoping of OU IV investigations.
Comment 11: One commenter stated that the series of ponds, including Farm Pond behind Framingham High School, should be sampled for mercury in fish and sediments since they were overrun by the River during the 1955 flood.

Response: These water bodies are not within the continuous flow path of Site-related contaminants and, therefore, were not sampled in OU III (see Response to Comment 10). This area will be considered during the scoping of OU IV investigations.

Comment 12: Two commenters stated that the RI Report does not indicate whether any sampling was conducted near the intersection of Fountain Street and Route 135 in Ashland, probably a high depositional area.

Response: Sample numbers SD3-116, 117, and 158 (See Figure 2-C of the RI Report) are located in depositional areas in proximity to this location.

Comment 13: One commenter stated that the RI Report does not indicate that any sampling has been conducted in a series of ponds in the former Sudbury River channel behind Saxonville. This is an area which should be investigated, as it is a major fishing area.

Response: The water bodies identified by the commenter are not within the perceived continuous flow path of Site-related contaminants and therefore, were not sampled during OU III. (See Response to Comment 10). This area will be considered during the scoping of OU IV investigations.

Comment 14: One commenter stated that the RI Report does not specify the type or depth of water sampling conducted. The highest contaminant concentrations would probably be found at the sediment-water interface.

Response: The RI Report references appropriate documents for sampling and analytical protocols. Surface water grab samples were collected from the area which was most likely influenced by the existing current. Therefore, the samples were collected from a depth of 0.6 times the total depth of the waterbody.

Comment 15: One commenter stated that the RI Report indicated that in the first round of fish sampling, pesticides, which are non-Site-related contaminants, were given a higher priority during analyses than methylmercury, a Site-related contaminant.
Response: The analysis for total mercury and methylmercury requires two different procedures with independent tissue samples. The decision to prioritize total mercury analysis over methylmercury analysis during the first round of fish sampling was based on the more efficient use of the limited sample material available, and was not intended to prioritize other contaminants (including pesticides) over methylmercury. During the second round, extensive methylmercury analysis of fish samples was conducted.

Comment 16: One commenter stated that the RI discussed the analysis of the benthic macroinvertebrate sampling results from the first sampling round such that it appears that it focused on the qualitative rather than the quantitative aspects. As a result, the analysis is insufficient to determine the extent of the impact on the community from Site-related contaminants.

Response: The data produced during the Phase 1 benthic macroinvertebrate sampling program was evaluated to identify possible areas of environmental stress, based on diversity and abundance of species. This survey was not intended to identify the total impact on the benthic community from Site-related contaminants.

Comment 17: One commenter stated that the RI Report contains no description of the substrate type or habitat in its discussion of the biota sample and analysis.

Response: Descriptions of sediments and bathymetry throughout the Study Area are presented in Section 3.6.2 of the RI Report.

Comment 18: One commenter stated that the sampling technique employed in the first round of benthics sampling and analysis discussed in the RI Report is biased for sediment-dwelling organisms.

Response: The purpose of this sampling round was to determine the qualitative health and biological diversity of the sediment-dwelling community.

Comment 19: One commenter stated that during the second round of biota sampling, EPA should have monitored a detrital feeder to assess the level of transfer of contaminants from sediments to biota. This information would have assisted in developing target cleanup goals based on a relationship between contaminated sediment, biota, and fish.
Response: The second round of biota sampling scoped the use of caddisfly larvae to represent aquatic insects' role in transfer of contaminants from suspended solids to other trophic levels of biota. Caddisfly larvae were selected based on the availability of adequate numbers to provide adequate sample mass. An adequate quantity of detrital browsers could not be collected effectively from the Study Area for analysis based on the volume requirements needed by the laboratories for analysis.

Comment 20: One commenter stated that during the caddisfly sampling and analysis discussed in the RI Report, the analytical holding times were exceeded.

Response: This was reported in the RI and the data was used in a qualitative manner.

Comment 21: One commenter stated that the RI Report should have presented more information on fish data relative to age, weight, and length.

Response: This data was collected in conjunction with the second round of fish sampling and is used and discussed throughout the ecological risk assessment. The data is presented in the risk assessment and in Appendix C.

Comment 22: One commenter stated that EPA did not perform any benthic, terrestrial, vegetative, or aquatic studies in the Eastern Wetland to determine whether it was a source of mercury in fish tissue.

Response: The ecological risk assessment evaluated exposure routes for various trophic levels with respect to mercury and other contaminants in the Study Area. Indicator species for each pathway were selected based on, among other things, relevance to the Site and position in the food chain. This risk assessment demonstrated a risk to ecological receptors from mercury contamination in the Study Area, including the Eastern Wetland.

Comment 23: One commenter references the RI Report indicating that NUS' fish sampling team "often did not have an abundant catch", and statement that the River is "unsuitable for trout and most other sportfish...due to low dissolved oxygen levels....", thereby undermining that Proposed Plan's statement referencing the River's (fishing) bounty.

Response: Fish sampling conducted by NUS during early December and the lack of abundant fish was attributable to the weather conditions, not a lack of fish in the River. An abundant catch was not a problem during the second round of sampling which took place during summer months. The dissolved oxygen levels in the River are generally not high enough to support trout and other sportfish, but are sufficient to support a thriving largemouth bass population.
Comment 24: One commenter stated that EPA's use of the term "oxbow" to refer to the area located behind the Massachusetts Turnpike Rest Area should cease. There is a recognized "Oxbow" on the Framingham-Wayland town line.

Response: This area can be renamed in the future.

Comment 25: One commenter stated that the RI fails to discuss how the contamination in the Sudbury River impacts the ecology of the Great Meadows Wildlife Refuge.

Response: Section 7.0 of the RI Report describes the potential risks that Site contaminants pose to the ecological community of the Sudbury River system. The Great Meadows Wildlife Refuge is a physical part of the ecological community located in the lower reaches of the River system. Because there are no ecological barriers between the Wildlife Refuge and the other portions of these lower reaches, the risks and potential impacts from contaminants are the same.

Comment 26: One commenter stated that the RI Report fails to provide quantitative information to document the level of use the Sudbury River provides in the Study Area.

Response: Section 3.2.1 of the RI Report provides a general qualitative description of the uses in the Study Area of surface water resources associated with the Sudbury River. Quantitative determinations of the uses of surface water resources in the Study Area were beyond the scope of the RI.

Comment 27: One commenter stated that the RI Report only provides general hydrologic information within each reach to assess such important information as the upland extent of Site-related contamination. Reach-specific hydrologic information should be provided.

Response: The hydrologic and bathymetric information presented in Section 3.6 of the RI are sufficient for the purposes of establishing the nature and extent of contamination in the Study Area. Collection of reach-specific hydrologic data will be considered during the scoping of OU IV investigations.

Comment 28: One commenter stated that actual mean current velocities by reach are not presented in order to document the potential extent of contaminant migration within the River system. Only critical mean current velocities are provided.
Response: An analysis of current velocities must include an extensive data collection effort through storm and spring runoff events. These events represent the periods of the highest sediment loading potential, and most sediment transport occurs during these events. Reservoirs, riffle/run, and meandering River reaches all must be studied and instrumented simultaneously to measure current velocities and sediment loading potential during the same runoff events to obtain data that is comparable between reaches. Given the information available at the time of the RI, the value of such an extensive study was questionable.

Comment 29: One commenter asked "If the Sudbury River has been contaminated with mercury since 1980, why is there such a move to clean it up now?"

Response: The Site was listed on EPA's National Priorities List in 1982. In 1985, after the first RI for the Site, EPA separated the Site into Operable Units. OU I, for which the remedy has been completed addressed contaminated sediments, soils and sludges at and near the Nyanza Property. After these major sources of contamination were remediated, EPA's focus shifted to include other risks associated with the Site including the groundwater (OU II), Continuing Source Areas (OU III) and River (OU IV) contamination. A more complete history of investigations and Remedial Actions is presented in Section 1.2.3 of the RI Report.

B-4 Future Use of the River

Comment 30: One commenter stated that the RI Report fails to document and consider the Sudbury River's highest future use which should be used to determine target cleanup goals.

Response: The Agency determined that the present use as a Class B waterway is the highest likely potential (future) use for the River. Current use of the River, other than for the consumption of fish, is not restricted due to contamination in the River. Therefore, EPA determined that the future use was equivalent to the current use. This present-use scenario has been evaluated in the RI Report.

Comment 31: One commenter stated that the future use of the Study Area has not been characterized sufficiently to determine its use as a source of drinking water or as an environmental resource. Because this scenario has not been adequately evaluated, the impact on human health and the environmental cannot clearly be assessed. This commenter also stated that Reservoirs 1 and 2, which are designated as backup drinking water supplies should have been evaluated for this exposure route analysis.
Response: Because there are no plans to use the River in the near future as a drinking water supply and because the River is designated as a Class B waterway, which is drinkable only with treatment, EPA did not consider the evaluation of the River as a drinking water supply to be appropriate.

Comment 32: One commenter asked what effect EPA's failure to propose to remediate the Sudbury River would have on Reservoirs 1 and 2 as backup drinking water sources. Has EPA conducted a comparison of surface water with MCLs for these sources?

Response: See Response to Comment 31. Water samples collected from the Reservoirs did not contain Site-related contamination above MCLs.

Comment 33: One commenter stated that the FS did not provide sufficient information on the possible restrictions of recreational activities along the River. Since the RI did not indicate risks from recreational activities such as boating and swimming, it is not clear what the basis would be for any restriction of activities.

Response: EPA does not contemplate recreational restrictions for River Areas under OU III other than the advisory against consumption of fish. EPA will, however, work with River groups and the towns along the River to increase public awareness about River contamination.

C. Nature and Extent of Contamination

C-1 Potential Sources of Contamination

Comment 34: One commenter stated that the RI Report does not adequately characterize background regarding specific Site conditions and Site-related contaminants such as heavy metals.

Response: Background conditions were established to the extent possible. Limitations involved the lack of similar water systems upstream of the Site and within the drainage basin. Many water bodies in the area were dissimilar or may have been influenced with other sources of contamination. Water chemistry in many areas was found to be different from that of the Sudbury River, which disqualified these areas as representative background locations. Further attempts to classify background will be considered in the scoping of OU IV investigations.

Comment 35: One commenter stated that insufficient data was presented to support the statement that mercury can be used as an indicator of Site-related contamination.
Response: Mercury was selected as an indicator of Site-related contamination because of its documented use at the Property and the fact that the highest concentrations of this contaminant in sediments were found immediately downstream of the Property and these concentrations diminished with increasing distance downstream. In addition, of the Site-related contaminants, mercury was a major factor contributing to both human health and ecological risk.

Comment 36: One commenter stated that the RI Report’s list of Site-related contaminants should include contaminants that can be linked to products or by-products of dye manufacturing at the Property.

Response: Compounds were included on the list if usage was documented at the Property and/or the compound was detected under Ous I or II.

Comment 37: One commenter stated that Section 4.2.3 of the RI Report does not discuss the relative contaminant contribution to the River system of the various non-Site-related sources.

Response: Investigation of these sources was beyond the scope of the RI.

Comment 38: One commenter stated that page 4-57 of the RI Report indicates that non-point source runoff contributes Site-related heavy metals, including selenium. This is the first instance in the RI Report in which the contaminant selenium is identified as a Site-related contaminant.

Response: Selenium is not a Site-related contaminant and the reference in the RI is an error.

Comment 39: One commenter stated that the RI Report uses mercury as the indicator of Site-related contamination. That mercury and other Site-related contaminants have similar fate and transport mechanisms is not supported by information included in the RI Report.

Response: The use of mercury as the indicator of Site-related contamination is unrelated to fate and transport characteristics. The use as an indicator of Site-related contamination is based on documented use at the Property and/or the detection under OUs I or II.

Comment 40: One commenter stated that the RI Report dismisses lead, PAHs, and volatile organics as indicators of Site-related contamination. These contaminants, as well as mercury, should be thoroughly addressed in the risk assessment.
Response: These contaminants were addressed in both the Human Health and Ecological Risk Assessments. The discussion in the RI, however, focused on Site-related contaminants. Criteria was established for the identification of Site-related contaminants and was uniformly applied. Many PAHs and volatile organics detected in the River were not documented under OU I or II; while other contaminants were identified during these OUs, many off-Site sources of these contaminants are also present throughout the Study Area.

Comment 41: One commenter stated that the determination of "background" levels of Site-related chemicals such as lead, chromium, and arsenic to support statements made that the presence of these contaminants throughout the Study Area are similar to "background" has not been fully supported in the text of the RI Report.

Response: Several areas outside of the area of Site influence were sampled, including upgradient reaches of the River and the Sudbury Reservoir. A sufficient number of samples were collected to adequately characterize these areas.

Comment 42: One commenter stated that the PAH compounds can be associated with the Site.

Response: The presence of extensive PAH contamination at the Site is limited to naphthalene and chlorobenzenes (which were designated as Site-related contaminants), while the occurrence of PAHs in the River is ubiquitous, and the number of compounds is extensive.

Comment 43: One commenter questioned whether the diversion trench constructed during OU I changed area hydrology such that the Eastern Wetland has become a source of contamination.

Response: The diversion trench was constructed to divert surface and groundwater around the capped areas of the Property. Although hydrology of the Property has not been investigated since completion of OU I, it is not expected that this trench would change the hydrology in the area of the Eastern Wetland.

Comment 44: One commenter pointed out that in one location of the RI, EPA indicated that "only mercury...is considered unique to the Nyanza Site discharges" yet later stated that mercury was measured in background sediment samples.
Response: The above statement referenced the fact that most other Site-related contaminants, when evaluated in the River, did not show a clear link to the Property. Mercury is a documented Site-related contaminant. The highest levels of mercury in the Study Area are immediately downstream of the Property, with levels decreasing further downstream. Although low levels of mercury were found in background areas, EPA believes that the Property is the primary source of mercury in the River.

C-2 Contaminant Distribution

Comment 45: One commenter stated that insufficient samples were taken to support the statement that chromium is predominantly present in the trivalent form.

Response: Six sediment samples were analyzed for hexavalent chromium, including the areas of highest total chromium concentrations in the Study Area. None of the samples contained detectable concentrations of hexavalent chromium.

Comment 46: One commenter stated that in Section 4.2.1 of the RI Report, the list of Site-related contaminants is incomplete, setting the stage for the elimination of parameters from analysis or discussion because of low detection levels or multiple sources.

Response: See Response to Comment 36 for an explanation of how Site-related contaminants were identified.

Comment 47: One commenter stated that Section 4.2.2 of the RI Report states that "other heavy metals [except mercury] are not commonly detected in groundwater or surface water immediately off-site". It is unclear whether this conclusion stems from Operable Unit II or Operable Unit III investigations.

Response: This is a conclusion of Operable Unit II, the groundwater investigation. Groundwater was not investigated as part of Operable Unit III.

Comment 48: One commenter stated that the RI Report indicates that sampling stations in Reach 1 were selected because they were removed from cultural influence. It is unclear why and whether this is pertinent.

Response: Although it is understood that cultural features impact the River, sample locations were chosen to provide data which was representative of the general conditions in the River. Background samples were collected in areas removed from the immediate impact of such features as stormwater runoff discharges to obtain samples more representative of background conditions in the River.
Comment 49: One commenter stated that the RI Report should have included additional sampling in areas that may have been subject to periodic flooding of the River.

Response: Six wetland areas within the seasonal floodplain of the Sudbury River were investigated as part of the RI. Mercury was detected in concentrations over 1 mg/kg in only one of these areas, a wetland in proximity to the Property located at the discharge of Outfall Creek.

Comment 50: One commenter stated that the RI Report indicates that organic analyses were not conducted in Reaches 8 through 10. Why were they not conducted?

Response: The occurrence of organic contaminants is erratic in Reaches 5 through 7. Site-related organic contaminants were not persistent in these reaches. Sampling and analyses focused on Site-related metals contamination in Reaches 8 through 10 because these contaminants persisted to these areas.

Comment 51: One commenter stated that the RI Report does not include the results of fish sampling in the Oxbow, the location of the highest concentration of mercury below Reservoir 2. Since this is an important fishing location, fish sampling should be conducted and the Oxbow should be considered for remediation.

Response: Fish were not collected from the Oxbow (see Response to Comment 10). This location will be considered during scoping of OU IV investigations.

Comment 52: One commenter stated that the RI Report indicates that sediment samples within Reaches 2 through 4 were collected within the potential seasonal flood zone. How was the seasonal flood zone defined? What is the estimated frequency and duration of inundation at each of the sample locations? Why were organic analyses omitted from the sampling regime of the bordering wetlands?

Response: Samples were collected within the seasonal flood zone, which was identified by professional judgement of the field biologist. These areas are defined by the Massachusetts DEP as "Bordering Land Subject to Flooding" and can be identified by the types of vegetation and presence of hydric soils. It is expected that these areas are flooded during times of high precipitation (during heavy rains and spring snowmelt). No specific data exists regarding frequency and duration of inundation of these areas. Analysis of these soils for organic compounds was not deemed necessary, since these samples were scoped primarily to determine bank deposition of metals.
Comment 53: One commenter stated that on page 4-69 of the RI Report, it is unclear at which of the three locations in Reach 2 samples were collected that included concentrations of mercury and chromium at levels comparable to background and below Reach 2 averages.

Response: Sample number SD3-159 is located in a wetland where mercury and chromium concentrations were present below concentrations found in background areas. Samples SD3-113 and SD3-114 are located in a wetland where mercury and chromium exceeded concentrations found in background areas.

Comment 54: One commenter stated that the RI Report indicates that four vertical sediment profile samples were collected from Mill Pond. What other analyses were performed and what were the analytical results? Did other Site-related contaminants increase or decrease with sediment depth? EPA assumes that metals besides mercury will be remediated by establishing a target cleanup goal for mercury.

Response: Table 1-1 presents a summary of analyses conducted on each sample collected during the investigation. Sample results did not indicate that concentrations of the Site-related inorganic contaminants increased with depth at Mill Pond. Data from organics analysis in this area was rejected during the data validation process. In addition, EPA will not be remediating Mill Pond as part of OU III.

Comment 55: One commenter stated that Section 4.4 of the RI Report appears to minimize the importance of biomagnification of mercury in higher trophic levels.

Response: The information in Section 4.4 merely summarizes the analytical results from fish samples. This section is not intended to present a comprehensive discussion on bioconcentration, bioaccumulation, and biomagnification. However, Section 4.4.2 acknowledges the existence of such processes when pointing out the probable causes for higher concentrations of mercury in largemouth bass in comparison with yellow perch. The RI Report presents an extensive discussion on bioconcentration, bioaccumulation, and biomagnification in the Fate and Transport and Ecological Risk Assessment sections.

Comment 56: One commenter stated that Section 4.4 of the RI Report does not contain data that supports the assumption that in any given fish, methymercury concentrations will be approximately 50 percent of total mercury concentrations.
Response: Section 4.4.3 of the RI Report indicates the data "... show that ADCs [the Average Detected Concentrations] for methylmercury in fish fillet are generally 50 percent of the ADCs for total mercury." This statement is only a description of a general trend observed in the analytical results and, as indicated in the statements that follow in Section 4.4.3: "Exceptions to this observation do exist, ...", is not intended to be an assumption applicable to "any given fish" as pointed out in the comment.

Comment 57: One commenter asked if the RI Report considered that fish of the same age class may not have had equal exposure to contamination?

Response: This was considered in the evaluation and in many cases resulted in conclusions which were of a qualitative nature.

Comment 58: One commenter stated that in Section 4.5 of the RI Report, data from the benthic survey from different locations are compared without sufficient recognition of the sediment structure and other characteristics of the River at the sample locations which could affect the population diversity.

Response: Sediment structure and River features are discussed in Section 3.6.2 of the RI Report. The other aspects of the comment really fall beyond the scope of the qualitative nature of the benthic survey.

Comment 59: One commenter stated that in Section 4.5.1 of the RI Report, the discussion of the relationship between the benthic community and grain size appears to be contradictory.

Response: This comment may stem from a misinterpretation of the text of Section 4.5.1. This section indicates that the diversity in the benthic samples was higher in the areas with coarser grained sediments, regardless of the concentrations of contaminants at these locations.

Comment 60: One commenter stated that in Section 4.8 of the RI Report, no pH levels were included in interstitial water or at the sediment-water interface to support the statement that methylation is more likely to occur at locations where the pH is lower than 5.0.
Response: The statement that methylation of mercury is more likely to occur at low pH is based on the literature. Reportedly, the methylation of mercury in ecosystems depends on mercury loadings, microbial activity, nutrient content, pH and redox condition, and other variables. The less volatile monomethylmercury is usually formed under acidic conditions; the highly volatile dimethyl form is favored under neutral and alkaline pH (Smith 1980; U.S. FWS 1987).


Comment 61: One commenter stated that mercury concentrations found in the wetlands near the Property in 1991 were low. Where is the contamination source?

Response: Mercury concentrations in surficial sediments (surface to 12 inches deep) contain mercury concentrations up to 152 mg/kg in sample SD3-108. These samples were collected at discreet 6 inch intervals. The objective of the sampling and analyses conducted in 1991 was to characterize the horizontal and vertical extent of contamination. To accomplish this objective, samples were collected to a depth of six feet below the sediment-water interface. Samples were composited for analysis from the surface to two feet deep and from two to four feet deep. The result of the composite samples is to mix higher mercury concentrations at the surface with lower concentrations beneath the surface. This dilution was considered in the evaluation of the data. The source of this contamination is the drainage and disposal activities from the Property.

Comment 62: One commenter asked "How high will the contamination reach, if nothing is done?"

Response: No further increase in Site-related contaminant concentrations is expected in the Eastern Wetland, since disposal of industrial wastewaters at the Property have stopped and the contamination on-Site has been remediated. If no remediation were conducted, downstream concentrations could continue to increase as contamination migrated from the Eastern Wetland and other Continuing Source Areas to the Sudbury River.

Comment 63: One commenter stated that the RI indicates that the "detected average" value of mercury in fish sampled was 2.02 ppm; no source of this value was cited.
Response: This average was stated only as a point of reference. Reach and species specific databases were created from the master database for data evaluation purposes. These means are presented in various tables throughout the RI Report.

Comment 64: One commenter pointed out that Table 4.4 of the RI indicates the "detected average" of mercury in fish is 1.52 ppm. If the results for background areas are excluded, the "average" rises to 1.56 ppm.

Response: Fish caught in River reaches in proximity to the Property contain mercury in concentrations much higher than those cited here, and fish caught in areas of the River removed from the Property contain lower concentrations of mercury. Figure 7-6 shows the relationship of average mercury concentration in fish tissue to average mercury concentrations in sediment Reach by Reach. The intent of the RI was to evaluate conditions in the River resulting from Site impacts. Figure 7-6 shows average concentration of mercury of 2.8 ppm in fish caught immediately downstream from the Property in Reach 3. This average decreases downstream. A River-wide averaging of data biases the data toward un-impacted or areas less impacted by the Property.

Comment 65: One commenter stated that the "detected averages" for mercury in fish in the RI "does not take into account the fish in which no mercury contamination was detected".

Response: Reported averages and detected averages were both discussed in the RI Report. Average reported values reflect an average of all the laboratory data presented for a particular reach. A value reported by data validation process followed by "u" is the detection limit for analysis. The actual concentration of the contaminant is expected to be less than the detection limit and also below lab quality control limits. According to EPA Region I policy, one half of the u-qualified value is calculated into the reported average concentration for use in risk assessment calculations. When this process is performed, the calculated average concentrations for some parameters are higher than the maximum concentrations reported by the laboratory. These occurrences indicate a high detection limit in some samples, and a trace of the compound positively detected in others. As a result, the average value is skewed by the high detection limits attained by the laboratory. To compensate for this, averages of samples with positive (above detection limits) detected contaminant concentration are also considered. With regard to fish species, only small percentage of largemouth bass caught in the River contained non-detectable concentrations of mercury. Largemouth bass are the primary species caught by sport and subsistence fishermen; this species was used for the evaluation of human mercury uptake through fish consumption.
Comment 66: One commenter pointed out that if the entire population of fish sampled is included in the database, the true averages become 1.006 ppm for the entire Study Area and 1.07 ppm for Reaches 2-9, levels only just above the Food and Drug Administration action level of 1.0 ppm.

Response: It is misleading to review or to form conclusions regarding the extent of contamination/risk based on the fish tissue concentrations for the Study Area or Reaches 2 through 9 as a whole. As demonstrated in Chapter 4 of the RI Report, there are distinct differences in contaminant concentrations detected in sediment and fish tissue samples collected from the various portions of the River investigated during the RI. Consequently, each reach was evaluated separately in the RI Report.

In addition, the FDA Action Level is a benchmark value used to evaluate fish tissue concentrations but does not replace site-specific risk data. In addition, this value does not consider ecological risks. The results of the Human Health and Ecological Risk Assessments were used as the basis for determining Study Areas risks.

Comment 67: One commenter pointed out that over one-third of the fish sampled contained no detectable levels of mercury, a fact not volunteered in the RI.

Response: See response to Comment 66.

Comment 68: One commenter stated that the average mercury concentrations in fish in individual sampling locations were below the FDA action level in all but two areas, in Fairhaven Bay and in Reservoir 2.

Response: See Response to Comment 66.

Comment 69: One commenter stated that by combining the discussion of average and maximum levels of mercury in fish tissue, the fish contamination situation appears more widespread and severe than it is.

Response: The RI Report presents maximum, minimum and average mercury concentrations to present a range of levels present in the Study Area.

Comment 70: One commenter indicated that by referencing only downstream areas in its discussion about mercury levels in fish tissue in the Summary, the RI fails to address the fact that the fish most highly contaminated with mercury was found in a background location, in Cedar Swamp Pond.
Response: The evaluation of maximum and average contaminant concentrations provides a range of risk results to be evaluated along with many other factors to determine if remediation is warranted. Also, the narrative is not confined to a discussion of downstream sampling locations only. With the exception of Cedar Swamp Pond, hazard indices calculated for surface water bodies upstream of the Site do not exceed 10. Cedar Swamp Pond was clearly identified as an upstream surface water body.

It should be also noted that the maximum concentration of mercury in the background samples (9.6 ppm) was a suspect result (see the discussion on page 4-75 and 4-76 of the RI Report). This result biases the average fish tissue results for the Sudbury River fish tissue samples. If this outlier were not included in the average background calculation, the mercury concentrations in fish tissue samples from Reservoir 1 and 2 would be clearly elevated above mercury concentrations detected in background fish tissue samples.

D. Contaminant Fate and Transport

D-1 General Comments

Comment 71: One commenter stated that the RI Report does not attempt to assign even relative importance to the various transport and fate mechanisms in the River. A clear and quantifiable link needs to be established between sediments and biota.

Response: Section 5.1 of the RI Report states "... sediment transport is considered the primary process for movement of contaminants in the Study Area." The uptake and transport of mercury through the food chain was also discussed in Section 5.0.

Comment 72: One commenter stated that the Fate and Transport Assessment in the RI Report should include Site-specific information on sediment transport and residence time.

Response: The Fate and Transport section addresses sediment transport in a qualitative manner using available pertinent Site-specific data.

Comment 73: One commenter stated that the Transport and Fate Assessment of the RI Report should assess other Site-related metals to determine whether levels of metals are reflective of background or the Site.

Response: The issue is not to determine whether the relative concentrations of metals are Site-related or from an off-Site source. It is understood that some percentage of metals are a result of Nyanza discharges, however, this percentage cannot be quantified without a detailed investigation of all other potential off-Site sources. This is outside of the scope of the RI process.
Comment 74: Several commenters stated that more qualitative analysis of the Eastern Wetland is needed to determine whether it is a final sink for Site-related contaminants or functions as a Continuing Source Area for the River.

Response: Observations made during the monthly sampling tasks indicate that contaminated sediment is migrating from the Wetland. Various stream bed features such as scour and ripple marks are occasionally observed in discharge streams including Trolley Brook. Also, the character of the discharge stream beds is highly variable. Sometimes they are choked with fine sediment, but at other times are relatively devoid of fine grained sediment. This indicates sediment is actively being transported into these areas and subsequently being eroded. The sediment in the stream beds was sampled during the two year history of field activities. Laboratory analyses conducted on samples collected from the areas which exhibited ripple marks indicated that these sediments were contaminated with Site-related contaminants.

Therefore, it is likely that the Eastern Wetland is acting only as a temporary retention basin for contaminated sediment and that it functions as a Continuous Source Area for the discharge streams and River.

In addition, the elimination of contaminant migration to the Sudbury River is only one of the Remedial Action Objectives of the selected remedy. Other objectives include reducing risks to human and ecological receptors in the Continuing Source Areas. These risks are discussed in the Human Health and Ecological Risk Assessments presented in Sections 6.0 and 7.0, respectively, of the RI Report.

Comment 75: One commenter asked if the Eastern Wetlands would continue to be a source of contamination after its sediments are remediated. If so, what should be done about it?

Response: Some contaminants may remain in the Wetland in low concentrations. The remaining contaminants, however, represent levels similar to background levels found in areas unaffected by the Site and are not expected to result in additional contamination of the Sudbury River.

Comment 76: One commenter asked how further downstream migration could be prevented.

Response: Remediation of the Continuing Source Areas is expected to eliminate continued migration of contamination to the Sudbury River. In addition, erosion controls such as silt fencing and stormwater management will be conducted during the Remedial Action to prevent increasing downstream migration during construction.
Comment 77: One commenter asked what EPA intended to do about Chemical Brook Culvert, which "carries contaminants to Outfall Creek".

Response: A video inspection was conducted in 1991 to determine to what extent sediments were present in the Culvert. Results indicated that sediment was present only in two locations: catch basins indicated on Figure 2-C of the RI Report at sample sites SD3-200 and SD3-201. Levels of contamination found at these locations were low compared to other Continuing Source Areas. In addition, these catch basins were removed as part of a Town of Ashland repair conducted in 1991. The lower section of the Culvert, from Downtown Ashland to Outfall Creek, was blocked by debris and could not be videotaped. Swift flowing water in the Culvert would minimize the potential for sediments to accumulate. A copy of the videotape is available at EPA Regional offices in Boston.

Comment 78: One commenter stated that EPA has failed to demonstrate that the Continuing Source Areas are, in fact, continuing sources of mercury to the River. Historic information indicates that the Eastern Wetland was not within the Nyanza facility process waste flow pathway so there is no reason to assume that the Wetland is a source of mercury contamination to the River.

Response: See response to Comment 74.

Comment 79: One commenter suggested that mercury transport through sediments and the food chain would only be a small portion of the loading to the River compared to the impact to the River by the wastewater handling operations at Nyanza. In any case, the transport has not been demonstrated in EPA’s investigations.

Response: See Response to Comment 74.

Comment 80: One commenter was disturbed that EPA made no attempt to study the surface-water hydrology of the Eastern Wetland to demonstrate whether sediment transport occurs. Studies should be conducted including gathering local precipitation data, determining inflow and outflow of water through the wetland, estimating recharge to groundwater, determining storm water gauging and sampling, and estimating evaporation and transpiration.

Response: See Response to Comment 74.
Comment 81: One commenter pointed out that the FS contradicts EPA's conclusion that sediment transport is a pathway for mercury migration to the River. EPA eliminated Alternative 13 by stating that "water flow in the Wetland is not measurable", ranging from negligible to substantial during rain events and spring runoff and based its evaluation of Alternative 13 on a "single attempted measurement taken in a culvert and an assumed flow velocity through the culvert". If flow from the Eastern Wetland cannot be measured, how can it be a sediment transport pathway?

Response: See Response to Comment 74. In addition, water flow within the Wetland is not measurable during low flow periods due to the large area covered by surface water. The water flow into the Wetland is dispersed throughout the drainage area and retention time during low flow conditions is relatively long. Water flow into the Wetland increases significantly during storm and spring runoff conditions. During these events, water flow within the Wetland is measurable, and flow from the Wetland increases dramatically. Flow measurements were collected during the one year water quality sampling program conducted during 1990 to 1991. This data is reported in Appendix L of the RI Report. The single measurement referred to in the comment was a point measurement collected from Trolley Brook during the evaluation of Alternative 13. This measurement fell within the range of flow of the year long flow monitoring study and was used in the conceptual design evaluated in the alternative. During storm and spring runoff events, flow through the Wetland is sufficient to transport fine grained sediment evidenced by the changing stream bed features noted in the Eastern Wetland drainage streams.

D-2 Specific Comments

Comment 82: One commenter asked if the RI Report evaluated sediment concentrations of Contaminants of Concern, particularly mercury, PCBs, and DDT, compared to depth of sediment?

Response: Sediments were sampled in two equal intervals to a maximum depth of one foot in the River. A discussion of the vertical distribution of mercury is presented in Section 4.3.3.16. Few organic contaminants were present in the bottom sample interval. This is briefly discussed in the same section.

Comment 83: One commenter asked if there was enough information in the USGS Study (Appendix I of the RI Report) to show whether the high depositional areas correlate with increased mercury and other sediment contaminants?
Response: The sampling program was designed to represent all sections of the River, and as a result, the areas of thickest sediment accumulations were not exclusively sampled. The distribution and number of sediment samples in these areas is not sufficient to provide a meaningful statistical analysis relating high depositional areas to contaminant concentrations.

Comment 84: One commenter asked in Section 5.2 of the RI Report, how half-lives of metals in dynamic equilibrium are determined?

Response: For toxic substances such as heavy metals, the concept of half-life is not applicable because the metallic elements do not actually break down, although some of the more toxic compounds such as methylmercury can be altered in the environment and become less biologically active. Table 7-5, referenced in Section 5.2 of the RI Report, indicates that the concept of half-life is "not applicable" for the metals listed, and indicates their high persistence in the environment.

Comment 85: One commenter asked whether the hydrolysis of methylmercury and subsequent volatilization of elemental mercury is an important mechanism in the ecosystem of the Study Area?

Response: The demethylating bacteria responsible for the hydrolysis of methylmercury and subsequent volatilization of elemental mercury are generally widespread in water, sediments, and soil (U.S. FWS 1987), and most likely occur in the Sudbury River. However, the migration of elemental mercury to the atmosphere in the Study Area has been assumed to be limited, and of secondary importance when compared to migration through the food web.


Comment 86: One commenter stated that the section on Persistence is extremely qualitative and general and is not Site-specific.

Response: Section 5.2, Persistence, is complemented with the discussion presented in Section 7.4.1, Fate and Transport of Contaminants of Concern, and the information presented in Table 7-5. These sections are all somewhat qualitative.
Comment 87: One commenter stated that the RI Report does not include analytical data correlating levels of contaminants in the various media in each location other than limited sediment-to-fish ratios calculated for seven reaches. Additional data to estimate fate and transport mechanisms should include: reach-specific fish-to-sediment ratios; ratio of concentrations in caddisfly larvae to concentrations in sediments for each reach or area; ratio of concentrations in caddisfly larvae to concentrations in fish for each reach; and correlation of River velocity to concentration.

Response: The determination of concentration ratios of caddisfly larvae to sediment and to fish was not performed because the analytical results for the larvae did not meet several data validation criteria. Also, reach-specific fish-to-sediment ratios were not evaluated because fish do not remain in one single reach; they can migrate to other reaches where contaminant concentrations in sediments are likely to be different. A quantitative determination of the correlation of River velocity to concentrations was not carried out since flow velocities were not measured at all sampling locations. However, Operable Unit IV will attempt to address some of the issues raised in this comment.

Comment 88: One commenter stated that the RI Report indicates that the analysis of six sediment samples for hexavalent chromium revealed concentrations below detection limits. Where were these samples collected?

Response: Samples were collected at sediment sample locations: SD3-104, SD3-117, SD3-120, SD3-121, SD3-122, and SD3-124. Sample location are shown on Figure 2-C. Data is reported in Appendix A, Section 12.

Comment 89: One commenter stated that the conclusion in the RI Report that neither hexavalent nor trivalent chromium significantly bioconcentrates in fish or invertebrates appears to be in contradiction with data collected as part of this study which documented measurable concentrations of chromium (as well as other metals) in both fish and macroinvertebrates.
Response: The statement "... that neither hexavalent nor trivalent chromium significantly bioconcentrates in fish or invertebrates", is not a conclusion of the RI Report but a statement made based on information presented in: U.S. EPA, 1985, "Ambient Water Quality Criteria for Chromium - 1984" (EPA 440/5-84-029), which has been referenced in the RI Report. According to this reference, three determinations of the chromium bioconcentration factor (BCF) for rainbow trout ranged between less than 1 to 2.8, and the BCFs for several invertebrates ranged from 86 to 236; in comparison, an algal community had a BCF of 8,500. Measurable concentrations of chromium in fish and macroinvertebrates at the Study Area do not necessarily imply high BCFs, since bioconcentration is defined as the organism concentration divided by the concentration in the environmental medium. The BCF reflects the concentration of the contaminant in the organism's tissue resulting from nontrophic sources.

In addition, as presented in the appendices of the RI Report, analytical results of fish samples indicated, for the most part, undetected concentrations or estimated low concentrations of chromium in the tissues; the analytical results for metals for the caddisfly larvae did not meet several data validation criteria and are considered questionable.

Comment 90: One commenter stated that the conclusions that contaminants present in surface water should be considered most hazardous because of constant exposure to organisms and that ingestion of contaminated sediments by aquatic and terrestrial biota is "generally considered a minor exposure pathway in comparison to aqueous exposure", do not agree with the conclusions reached in the Ecological Risk Assessment.

Response: The statement in Section 5.7.8, that "Contaminants that occur at relatively elevated concentrations in surface water should be considered the most hazardous because exposure duration is constant for aquatic life", perhaps should have been written "...considered the potentially most hazardous ...." However, the statement as written still is compatible with the conclusions of the Ecological Risk Assessment, since the risk characterization is the result of the integration of the hazard assessment and the exposure assessment.
In the statement "Ingestion of contaminated sediments or soils is generally considered a minor exposure pathway for most aquatic or terrestrial biota in comparison to aqueous exposure,...", the inclusion of the words generally and most, as well as the phrase in comparison to aqueous exposure, are important in the overall meaning of this statement. Nevertheless, the statement could have been better written as "... considered a minor direct exposure pathway..."; the inclusion of the word direct would make this statement more compatible with the conclusions presented in the Ecological Risk Assessment, since contaminated sediments can be a long-term source of surface water contamination when persistent chemicals are involved. (Also, see response to Comment 125).

Comment 91: One commenter stated that Section 5.7.8 of the RI Report notes that sediments can be a long-term source of surface water contamination by metals such as mercury, but that mercury is not readily desorbed from sediments. The conclusion one is expected to reach is that if contaminants remain in the sediments, there is little environmental risk. This is clearly not the case for substances that bioaccumulate and biomagnify. This summary section for the Fate and Transport Assessment appears to have been written independent of the Ecological Risk Assessment and is fragmented from the rest of the Report.

Response: This is not the conclusion the Report is suggesting. The Environmental Risk Assessment recognizes the impact of mercury-contaminated sediments to the lower food web. There are other implications of the apparent relative stability of metals adsorbed to sediment, including, for example, the fact that metals are present in surface water at very low concentrations.

Comment 92: One commenter stated that the following statement, contained in Section 5.7.8 of the RI Report, indicated that: "... contaminants dissolved in surface water are more likely to be bioavailable than those sorbed to sediments or soil." The commenter stated that for many substances this may be true, but for mercury, PCBs, and DDT, it is not.

Response: The statement in Section 5.7.8 is a correct, general statement regarding the bioavailability of contaminants, and does not refer to any specific contaminant, organism, or set of circumstances. Both organic and inorganic compounds can be sequestered by sorption or precipitation, reducing their bioavailability and exposure potential. When assessing the exposure of benthic organisms in sediments, it is a common assumption that the organisms are significantly exposed only to the chemicals dissolved in the pore water (Suter, G.W. 1993. "Ecological Risk Assessment." Lewis Publishers).

Comment 93: One commenter asked how important sediment-dwelling organisms are in fish diets?

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Response: The importance of sediment-dwelling invertebrates in fish diets will change depending on the time and the type of fish (bottom-dwellers as opposed to fish that remain in surficial waters). In general, fish that feed on invertebrates will not only depend on the invertebrates of the stream, they will also feed on terrestrial invertebrates that fall into the stream. From late spring through the beginning of fall, when terrestrial invertebrates are most abundant, they may constitute a major component of fish diets, particularly of fish that remain in surficial waters. Determining the relative importance of sediment-dwelling invertebrates in the diet of fish in the Study Area would require studies beyond the scope of OU III.

Comment 94: One commenter asked what weight in fly larvae and other benthic organisms a small fish consumes in relation to its body weight?

Response: The amount of benthic organisms that a fish consumes in relation to its body weight also depends on the type of fish and the time of year. Addressing this issue for the Study Area would require studies beyond the scope of OU III.

Comment 95: One commenter asked if fish ingest sediments while feeding and if so, how much of what is measured as 'sediment' is detritus and other organic materials? Is it possible to estimate weight of sediment and detritus ingested? How much sediment/detritus does a fish take in through gills? Are all particle sizes filtered, or is there a lower limit?

Response: Bottom-dwelling fish are generally associated with the bottom sediments for feeding, spawning, and general protection (fish may burrow into sediments). In addition to dermal exposure, these species may also ingest sediments along with prey items living on or in the sediments; suspended sediments may also come in contact with gill membranes. Ingestion of settled sediments by fish which are not bottom-dwellers is more incidental since they are not as closely associated with the bottom of the stream.

Most likely, the amount of detritus and other organic materials in the sediments of the Sudbury River within the Study Area varies with the location of the sediments along the River (River runs and dammed areas), and would need to be determined through an appropriately designed sampling and analysis program.

The determination of the amounts of detritus and inorganic sediments ingested by fish would require a complex study that was beyond the scope of Operable Unit III investigations, because the composition of the sediments is likely to vary significantly along the River (and possibly also through time), and fish do not feed in a single location.
The amount of sediment/detritus that comes in contact with the gills of a fish depends on many factors, but most importantly on the type of fish and its habitat, and the ratio of suspended to settled sediments present in the stream. The lower limit of the size of particles that will filter through the gills of a fish will mainly depend on the anatomical and histological characteristics of the fish gill. Reportedly, once in contact with the cellular membranes in the gill, molecules will penetrate or be excluded depending on, among other factors, the size and shape of the molecules (U.S. FWS. 1987). Again, the generation of data to address these issues as they relate to the Study Area would require elaborated studies which are beyond the scope of the OU III RI.


Comment 96: One commenter stated that EPA should reevaluate its fate and transport assessment to determine whether "background" contaminants such as PCBs and PAHs have migrated.

Response: This is outside of the scope of OU III investigations.

E. Baseline Public Health Risk Assessment

Comment 97: One commenter stated that, as part of the Public Health Risk Assessment, EPA should consider a further evaluation of particularly sensitive populations that may be exposed to mercury through consumption of fish from the River such as fetuses of pregnant women and others who are not adult males.

Response: More sensitive receptors may and probably do exist. Risks to these receptors are potentially higher than those for the adult receptor. However, the Risk Assessment (which evaluates an adult receptor) already predicts hazard quotients/hazard indices exceeding unity for all portions of the River evaluated (for the fish ingestion scenario). Hazard quotients/hazard indices approaching or exceeding 10 are predicted for several downstream surface water bodies. Thus, further refinement of the Risk Assessment to show risk to sensitive subpopulations becomes an interesting, but academic point.

Comment 98: One commenter stated that the RI Report confuses the line between Risk Assessment and risk management.

Response: The Risk Assessment was conducted consistent with current EPA risk assessment guidance documents. Risk assessments should be designed and presented so they facilitate risk management decisions.

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Comment 99: One commenter suggested that if EPA was to adopt the alternate exposure calculations the commenter suggested, risks to fetuses from mercury-contaminated fish would be two orders of magnitude higher than those calculated for adult males in the Human Health Risk Assessment.

Response: See response to comment 97.

Comment 100: One commenter stated that the RI Report downplays the non-carcinogenic effects of mercury; however, because they are themselves receptors, fish should be evaluated as a pathway in the full context of that concept.

Response: The Risk Assessment results for mercury are discussed in detail in the risk characterization section. Because a Cancer Slope Factor does not exist for mercury, the noncarcinogenic effects of mercury (as evaluated using the available reference dose) are the focus of the discussion presented. The Risk Assessment narrative and results tables identify when a Hazard Quotient/Hazard Index exceeds unity. The Hazard Quotient for mercury exceeds unity in many cases presented when the fish ingestion scenario is evaluated.

Comment 101: One commenter stated that by comparing risks to "background" risks in the Risk Assessment, EPA is implying that "risks from the site Study Area itself are not significant".

Response: The evaluation of background provides perspective on the contaminant concentrations detected as a result of Site-related contamination (and the associated risks) versus chemical concentrations (and the associated risks) that would be present if Site contamination did not exist. The evaluation of background is a necessary step in all risk assessments and does not imply that "risks from the site Study Area itself are not significant". The background evaluation in a risk assessment is often used to demonstrate that the opposite is true. For example, the hazard quotient calculated for mercury in background sediment samples is 0.002. However, the hazard quotient calculated for several downstream areas approaches unity, indicating a distinct difference between background and downstream locations. Since mercury is a naturally occurring metal, it is an important point to note the difference between background and downstream locations.

Comment 102: One commenter stated that the only "flaw" in EPA’s Risk Assessment is that it does not clearly describe or assess risks under future Sudbury River uses as well as those under present conditions. By failing to identify an explicit future use exposure scenario, EPA diminishes the value of the Sudbury River as a future resource.

Response: See response to comment 30.
Comment 103: One commenter stated that the risk from consuming Sudbury River fish can only be managed by controlling the amount of mercury in sediments and therefore a risk-based cleanup level for sediments in the River impoundments should be developed.

Response: Evaluations were conducted which attempted to correlate sediment to fish ratios. These relationships were examined on a River-wide and reach-by-reach basis. Although there was a correlation between these levels, alternatives to remediate the entire River were eliminated in OU III because of an inability to evaluate their effectiveness, the potential for adverse impacts during remediation, and the inordinately high costs associated with these alternatives. Cleanup levels and remediation alternatives for River Areas will be evaluated again, based on new information to be collected under OU IV.

Comment 104: One commenter stated that EPA should develop a risk-based cleanup level that considers both direct contact and ingestion as well as future uptake by fish for both the Eastern Wetland and the lower Raceway.

Response: The cleanup level for the selected remedy address these scenarios for the Eastern Wetland and lower Raceway. The selected cleanup level is protective of both human and ecological receptors in the Continuing Source Areas.

Comment 105: One commenter stated that EPA is currently re-evaluating its reference doses for both inorganic mercury and for methylmercury. If EPA changes these reference doses, the Operable Unit III dose-response assessment and Risk Assessment will have to be re-evaluated.

Response: We agree that a significant change in reference doses for mercury could alter the Risk Assessment results for OU III. The decision to revise the Risk Assessment would probably hinge on the magnitude of difference between the existing and new reference doses; a minor increase or decrease in the reference dose may not warrant a revision to the Risk Assessment.

Comment 105: One commenter asked "Is the contamination an environmental health hazard to the Ashland community?"

Response: The risks to the community are documented in the Baseline Human Health Risk Assessment, Section 6.0 of the RI Report. In addition, EPA has determined that a more conservative residential exposure scenario is appropriate to consider for the Eastern Wetland and other Continuing Source Areas. Under this scenario, there is a human health risk from direct contact or accidental ingestion of sediment in these areas.

Comment 106: One commenter requested more information on exposure pathways.
Response: The exposure pathways are described in detail in Section 6.4 of the RI Report. The exposure dose calculations are shown in the exhibits presented in Section 6.4.

Comment 107: One commenter suggested that sports fishermen were not at risk from eating mercury-contaminated fish because the Massachusetts Division of Fisheries and Wildlife stocks the reservoirs; the fish are "not given much of an opportunity to bioaccumulate contaminants from the sediment."

Response: The Massachusetts Division of Fisheries and Wildlife stocks trout in some areas of the River. The RI and risk assessments evaluated largemouth bass, which is the major sport fish taken from the Study Area by sport and subsistence fishermen.

E-2 Specific Comments

Comment 108: One commenter stated that the presence of metals and inorganics not evaluated in the risk assessment was not really discussed in the risk characterization summary or uncertainty analysis in contrast to the statement made on page 6-25 of the RI Report.

Response: The uncertainty section acknowledged that the lack of toxicity criteria for some chemicals is a source of uncertainty for the Risk Assessment. A extensive narrative was not provided. However, toxicity criteria do exist for most of the Site-related contaminants, including mercury. For most cases evaluated, it is unlikely that Risk Assessment results would be altered if toxicity criteria were available for chemicals currently lacking criteria and they had been included in the Risk Assessment.

Comment 109: One commenter stated that the summary toxicity profile for mercury in Appendix K of the RI Report does not adequately discuss potential human health effects of mercury and its compounds, particularly methyl and dimethylmercury, and particularly as they might effect the fetal central nervous system.

Response: The toxicity profiles presented in the Section 6.0 narrative and in Appendix K were not designed to provide a comprehensive summary of the health effects associated with each Contaminant of Concern. Rather, they briefly provide a qualitative weight-of-evidence that Study Area contaminants pose actual or potential hazards to human health and the environment and, consequently, should be evaluated in the Risk Assessment. We agree that a comprehensive toxicological write-up for mercury and organo-mercury compounds would include a detailed discussion of the adverse effects on the central nervous system.
Comment 110: One commenter stated that the Risk Assessment did not adequately consider the potential risks from exposure to lead, dismissing it in the risk characterization as being either not Site-related or similar to background.

Response: The Risk Assessment did not dismiss lead as a Contaminant of Concern. Page 6-24 states that lead is a Site-related contaminant. However, a quantitative risk assessment evaluation was not provided because reference doses/cancer slope factors are not currently available for lead. Although maximum lead concentrations reported for a few of the River reaches (tributaries and adjoining areas) exceed the EPA Action Level (500 mg/kg), average lead concentrations in these areas do not exceed the EPA Action Level. This indicates that localized hot spots may exist; however, pervasive, high level contamination is not present. Also, the uncertainty section presented in the Risk Assessment acknowledged that Risk Assessment results presented in Sections 6.5 and 6.6 could be affected if toxicity criteria for lead become available.

Comment 111: One commenter stated that, based on potential neurotoxic effects to fetuses, EPA should consider remediating sediments in the Eastern Wetland, Mill Pond, Reservoirs 1 and 2, and the Oxbow, for mercury and other heavy metals as well as non-Site-related contaminants such as PCBs and PAHs.

Response: The quantitative Risk Assessment results for the sediment and surface water exposure scenarios do not support remediation of these areas with the exception of the Eastern Wetland, which is being remediated under the selected remedy. With few exceptions, cancer risk levels for these areas are below 1x10^-4 and hazard indices are below unity. Hazard quotients/indexes exceed unity for the fish ingestion scenario for all River Areas evaluated. Remediation of the River will be addressed under OU IV.

Comment 112: One commenter pointed out that EPA's Human Health Risk Assessment resulted in hazard quotients of less than one for both inorganic and monomethyl mercury. Consequently, there does not appear to be a threat to human health from exposure to mercury in Eastern Wetland sediments.

Response: The Risk Assessment for the Eastern Wetland considered the recreational exposure scenario. Under this scenario, the hazard quotient was 0.95. However, EPA has determined that the more conservative residential exposure scenario is appropriate for this area due to its proximity to Ashland High School and residential areas. The hazard quotient under this scenario would be greater than one.
Comment 113: One commenter stated that the Risk Assessment summary table gives equal weight to Hazard Quotients calculated from both average fish contamination values from each reach and to maximum contamination values based in a single specimen from each reach. Also, the discussion confuses the significance of mercury hazard quotients by referencing hazard indices collectively for all Contaminants of Concern. This presentation is "pointless and misleading" and has no basis in EPA's risk assessment guidance, and makes the fish contamination appear more severe than it is.

Response: The Summary of Risk Assessment Results narrative and Table 6-48 do key on hazard indices developed for all Contaminants of Concern and hazard indices developed on a target organ-specific basis. (Hazard indices developed on a target organ-specific basis are the most appropriate indicators of a potential problem.) However, for the fish tissue results, in particular, it is noted that "the HQ calculated for mercury and/or methylmercury exceeds unity in every case that the hazard index exceeds unity". Hazard quotients greater than unity are highlighted (outlined) in Table 6-48.

The evaluation of maximum and average contaminant concentrations provides a range of risk results to be evaluated along with many other factors in determining whether remediation is warranted. Therefore, EPA disagrees that the evaluation of maximum concentrations is of no value. EPA also disagrees that only average values have any possible validity in the evaluation of health effects.

Comment 114: One commenter stated that there is no proof of the existence of subsistence fisherman. Therefore, discussion of hazard quotients for them and basing a cleanup approach on this "elusive group" is irrelevant.

Response: EPA disagrees that the evaluation of the subsistence fishermen scenario is irrelevant. As stated on page 6-52 of the RI Report, "discussions with local townspeople indicate that local ethnic groups heavily fish certain areas of the Sudbury River Study Area". Thus, conservatively, the subsistence fishermen scenario was included in the Risk Assessment.

Comment 115: One commenter pointed out that although the Risk Summary concludes that a risk from non-Site-related Contaminants of Concern exists, there is no discussion of the health effects.

Response: The focus of the RI was Nyanza Site-related contamination, and as such, mercury was studied in detail. Health effects of non-Site-related Contaminants of Concern were also evaluated in the Human Health Risk Assessment and throughout the risk document, comparisons are made between Site-related and non-Site-related contaminant health effects.
Comment 116: The Risk Assessment summary tables do not show a significant risk from dermal contact or accidental ingestion.

Response: The Risk Assessment demonstrates a risk to human health using a recreational scenario (exposure of 50 days per year) and to ecological receptors in the Eastern Wetland. Due to the proximity of both residential areas and Ashland High School to the Continuing Source Areas, EPA believes a more conservative residential exposure scenario (exposure of 270 days per year) is appropriate for these areas. This exposure scenario elevates the present risk above that presented in the Risk Assessment.

Comment 117: One commenter pointed out that the FS and Proposed Plan failed to address the residual cancer risk from non-Site-related contaminants such as PCBs and pesticides, which may be a greater threat to public health than the mercury risks.

Response: Non-Site-related contaminants were evaluated in the Human Health Risk Assessment. Results are presented in Section 6.0 of the RI Report.

F. Ecological Risk Assessment

F-1 General Comments

Comment 118: One commenter stated that the potential of the Sudbury River as an environmental resource has not been fully valued since the signs warning against consuming its fish show it to be damaged goods.

Response: In the Human Health Risk Assessment exposure scenarios, EPA considered the recreational uses of the River based on general River characteristics and Regional Risk Assessment guidance. The evaluation of these scenarios did not consider the fact that the River may be underutilized due to contamination. Therefore, the Risk Assessment did consider the full potential uses of the River.

Comment 119: One commenter stated that the RI Report should not assume that since the results of inorganic leachability analyses indicate the transfer from sediment to water in soluble form is small, that the risk associated with sediments is also small.

Response: The RI does not make this assumption and sediments are identified in both the Human Health and Ecological Risk Assessments as a primary medium of concern.

Comment 120: One commenter stated that the Ecological Risk Assessment was too general to provide specific estimates of hazard or risk presented by the Site on organisms or ecosystems.
Response: Site-specific ecological risk estimates are presented in Tables 7-17 through 7-20, and an extensive discussion of such estimates is presented within the text of the Risk Characterization section. The conclusions of the Ecological Risk Assessment highlight the Contaminants of Concern from the Site that present the highest risks.

Comment 121: One commenter stated that the Ecological Risk Assessment focused too narrowly on fish as bioaccumulators and reservoirs of mercury which pose hazards when ingested as prey, thereby concluding that the "predominant hazards...are the adverse effects to upper trophic level predators".

Response: The strong emphasis of this Ecological Risk Assessment on fish and upper trophic level predators seems appropriate since the predominant Contaminants of Concern from the Site are known to bioaccumulate and biomagnify. The adverse effects of contaminants that biomagnify tend to be more severe in top level predators than in lower trophic levels. By focusing especially in the higher trophic levels, the Ecological Risk Assessment is likely to address the most severe effects in the ecosystem since the upper predators are not only affected directly by the contaminants in the food web, but may also be affected indirectly by population changes in the lower trophic levels caused by the same contaminants. Nevertheless, lower trophic levels were also considered during the preparation of the Ecological Risk Assessment, as is indicated in Sections 7.2.4; 7.4.6.2; 7.5.3; and 7.6.5.1, and Figure 7-6.

Comment 122: One commenter stated that the effect of mercury contamination on the growth and reproduction of fish populations should be addressed.

Response: Because mercury is not the only contaminant present in the Study Area, and since the fish are not restricted to a single reach (the fish can move to downstream reaches), the effect of mercury contamination on the growth and reproduction of fish in the Study Area cannot be assessed based on the data currently available. A well designed study with suitable controls and background information, and in which data could be gathered from fish that were isolated in specific River reaches throughout their life cycles, would be required to address the growth and reproduction of fish as affected by the conditions in each of the River reaches in the Study Area. This type of study will be considered in scoping OU IV investigations.

Comment 123: One commenter stated that the possibility that other components of the ecosystem, including rooted aquatic plants and benthic invertebrates/detritivores, are potentially at risk due to direct uptake or ingestion of contaminated sediments, has not been addressed.
Response: EPA agrees that rooted aquatic plants, caddisfly larvae, and other benthic invertebrates in the Study Area are also at risk, and additional discussion could have been included to expand on this issue. Also, further studies can be carried out to provide additional information on the population dynamics of these species as affected by the Site-related contaminants. However, species at higher trophic levels tend to suffer the most pronounced adverse effects from persistent contaminants that bioaccumulate and biomagnify in an ecosystem.

Comment 124: One commenter stated that the Ecological Risk Assessment is a semi-quantitative risk analysis; there are some areas where more quantitative estimates of toxicity and risk may have been possible.

Response: Quantitative values were used where their use could make a significant contribution to the discussion.

Comment 125: One commenter stated that the conclusions of the Ecological Risk Assessment indicate that sediment contamination by mercury, PCBs, and DDT and its metabolites, is the critical factor for ecological risk. However, the discussion in the text, including the Fate and Transport Section, that sediment is of secondary importance for aquatic and terrestrial biota because of its limited ingestion, is contradictory to this conclusion.

Response: This comment seems to refer particularly to the statement made in Section 5.7.8, Chemical Fate and Transport Summary, that ingestion of contaminated sediments or soils is generally considered a minor exposure pathway for most aquatic or terrestrial biota because of its limited ingestion, is contradictory to this conclusion.

Comment 126: One commenter expressed concern that the Ecological Risk Assessment did not employ conceptual models to assess pathways, as called for in EPA guidance. The models could have been used for sediment transport, biomagnification, and sediment/fish ratios.

Response: A computer-based food chain model was used to estimate body burdens of biota Contaminants of Concern in organisms occupying various trophic levels within the aquatic system. The food chain model used in the assessment was the "Bioaccumulation Model of Organic Chemical Distribution in Aquatic Food Chains" developed by R.V. Thomann (1989). This model is discussed in Section 7.4.6.2.
Certain characteristics specific to the Study Area, such as the fact that fish can migrate to reaches located downstream and that contaminant concentrations within a reach are unlikely to be uniformly distributed, do not allow for the development and validation of Site-specific models based on currently available information.

Comment 127: One commenter concluded that the Ecological Risk Assessment did not adequately evaluate available data; only limited conclusions were drawn.

Response: Some of the aspects of the Ecological Risk Assessment could have been expanded to include additional information and discussion. However, the Ecological Risk Assessment Section of the RI Report was structured to address the goals and the outline contained in the Final Work Plan for Nyanza Operable Unit III.

Comment 128: One commenter observed that since the Great Meadows Wildlife Area is subject to the Migratory Bird Treaty Act, the presence of contaminants that pose a threat to migratory birds could be construed as a violation of the Treaty. EPA should explore this issue.

Response: The Great Meadows Wildlife Refuge will be addressed under OU IV.

Comment 129: One commenter stated that Section 7.4.2, entitled Exposure Pathways, is qualitative and does not provide enough Site-specific information to allow the reader to determine if the exposure pathways selected for the Ecological Risk Assessment are appropriate for the Site.

Response: The text in Section 7.4.2 contains general as well as Site-specific information regarding exposure pathways; the Site-specific information is then expanded and further explained in Figure 7-4 and Table 7-6 (as referenced in the text).

Comment 130: One commenter stated that the Ecological Risk Assessment failed to adequately explore bioaccumulation and biomagnification as mechanisms that can result in increased hazard over time.
Response: Bioaccumulation and biomagnification processes are not exclusive of future exposure scenarios. Due to the nature of the Contaminants of Concern from the Site, bioconcentration, bioaccumulation, and biomagnification processes have occurred in the past, currently are taking place, and would be expected to continue in the future. These processes have been specifically addressed in the Contaminant Fate and Transport section (Section 5.0), and in Sections 7.4.1; 7.4.6.2; and 7.5.3 of the Ecological Risk Assessment.

Comment 131: One commenter asked if "the species living in the wetlands [are] at risk because of the contamination?"

Response: The primary risk to species living in the Wetland is that from mercury which contributes significantly to bioaccumulation in the food chain. Ecological risks are discussed in the Ecological Risk Assessment, Section 7.0 of the RI Report. A summary of risks is presented in the Executive Summary of the same report.

Comment 132: One commenter suggested there was not enough information included in the Ecological Risk Assessment.

Response: The goal of the Ecological Risk Assessment, as defined in the Work Plan of the RI/FS Study of Nyanza Operable Unit 3, was to perform a qualitative evaluation of risks for receptors exposed to surface water and sediments of the Sudbury River and associated wetlands. The Ecological Risk Assessment prepared as part of the RI included the information necessary to fulfill this goal.

F-2 Specific Comments

Comment 133: One commenter stated that EPA did not evaluate the relationship between concentrations of mercury in sediment and caddisfly larvae.

Response: The caddisfly data was rejected in data validation and was only used for qualitative discussions.

Comment 134: One commenter stated that the Ecological Risk Assessment included no statistical analyses to determine if there were any significant differences between populations of organisms in the Study Area and in similar environments.
Response: The data from the fish survey conducted by the U.S. FWS in 1990 would not be amenable to rigorous statistical analysis because of conditions inherent to the Study Area, such as the fact that fish can migrate to reaches located downstream and that contaminant concentrations within a reach are unlikely to be uniformly distributed. Also, the study was not conducted as a community analysis, but to catch largemouth bass and yellow perch for specific analyses. Conclusions based on statistical analysis of these data would not have a high degree of confidence.

Comment 135: One commenter disagreed with the elimination of dimethylmercury from consideration as a Contaminant of Concern in sediment based on frequency of detection.

Response: EPA’s Risk Assessment guidance were followed in selecting Contaminants of Concern. In addition, in the aquatic environment, mercury may become methylated by biological and/or chemical processes. Mercury, methylmercury, and dimethylmercury can all undergo reversible intertransformations in the environment to generate either of the other two mercury species (U.S. FWS 1987). The less volatile methylmercury is usually formed under acidic conditions; the highly volatile dimethylmercury is favored under neutral and alkaline pH conditions. Methylmercury dissolves in the water, while the more volatile dimethylmercury tends to evaporate into the atmosphere (Smith, 1980). In organisms near the top of the food chain, almost all mercury accumulated is in the methylated form, primarily as a result of the consumption of prey containing methylmercury (U.S. FWS. 1987).

The information from these sources explains and justifies the elimination of dimethylmercury from consideration as a Contaminant of Concern in sediment.


Comment 136: One commenter stated that, just because inorganic mercury was detected in caddisfly larvae, EPA should not have eliminated total mercury as a Contaminant of Concern in biota.
Response: Although inorganic mercury was detected in caddisfly larvae, the results of the analyses did not meet the data validation criteria for holding times, calibration verification, matrix spike recoveries, laboratory control sample results, and serial dilution results; therefore, these results are considered questionable, without validity for meaningful interpretation. For this reason, the selection of Contaminants of Concern in biota was based on frequency of detection in fish tissue samples and bioconcentration potential of the contaminants. In addition, the elimination of inorganic mercury (and total mercury) from further consideration is supported by the fact that, reportedly, in organisms near the top of the food chain, almost all mercury accumulated is in the methylated form, primarily as a result of the consumption of prey containing methylmercury (U.S. FWS. 1987).


Comment 137: One commenter stated that biota Contaminants of Concern should be considered for trophic levels lower than fish, such as caddisfly larvae.

Response: EPA agrees that Contaminants of Concern in lower trophic levels should also be considered. However, given the quality limitations of the analytical data for caddisfly larvae, and based on the fact that species at higher trophic levels tend to suffer the most pronounced adverse effects from persistent contaminants that bioaccumulate and biomagnify in an ecosystem, this Ecological Risk Assessment had a strong emphasis on the higher trophic level receptors. Work under Operable Unit IV may address more completely the issue of Contaminants of Concern in lower trophic levels.

Comment 138: One commenter stated that the method of assessing surface water exposure in the Ecological Risk Assessment should not have used only filtered samples to evaluate uptake.
Response: Both filtered and unfiltered samples were used for selecting the Contaminants of Concern for surface water. However, the average and maximum concentrations of inorganic Contaminants of Concern presented in the surface water exposure assessment were based on filtered samples only; this was considered appropriate because the analytical results of filtered samples express concentrations of chemicals dissolved in the water, which probably best represent potentially hazardous aqueous exposure concentrations. Information contained in the literature is supportive of this rationale. Chemicals bound to particulate matter, which are measured in unfiltered samples, are not generally considered to be bioavailable (US EPA 1985). Both organic and inorganic compounds can be sequestered by sorption or precipitation, reducing their bioavailability and exposure potential. Regarding the exposure of contaminants in sediments, it is generally assumed that organisms are significantly exposed only to the chemicals dissolved in the pore water (Suter 1993).


Comment 139: One commenter wanted to know the lipid-to-protein ratios in perch and largemouth bass.

Response: The lipid-to-protein ratios in perch and largemouth bass were not determined for the fish samples collected. Lipid-to-protein ratios in fish are prone to be influenced by many factors, including age, diet, health, and environmental conditions. The experimental determination of lipid-to-protein ratios for the fish collected in the Study Area was beyond the scope of the RI.

Comment 140: One commenter asked if there are differences in age, weight, and length between fish from Reach 3 and fish from other areas that could be shown to be statistically significant?

Response: The data from the fish survey conducted by the U.S. FWS in 1990 would not be amenable to rigorous statistical analysis because of conditions inherent to the Study Area, such as the fact that fish can migrate to reaches located downstream and that contaminant concentrations within a reach are unlikely to be uniformly distributed. Conclusions based on statistical analysis of these data would not have a high degree of confidence. In addition, it was beyond the scope of the OU III investigations to conduct a comprehensive analysis of fish population parameters.

Comment 141: One commenter asked if benchmark toxicity values can be derived for representative bird and mammal species based on the food chain model?
Response: The food chain model used, "Bioaccumulation Model of Organic Chemical Distribution in Aquatic Food Chains", serves only to estimate bioaccumulation factors and body burdens of biota Contaminants of Concern in organisms occupying various trophic levels within the aquatic system, which include phytoplankton, zooplankton, small fish, and large fish.

Comment 142: One commenter asked if laboratory-derived toxicity data and information about ingestion patterns can be used to develop estimates of toxic concentrations in both sediment and biota?

Response: The generation of laboratory-toxicity data was beyond the scope of the Ecological Risk Assessment. The benchmark toxicity values for Contaminants of Concern in biota were based on the "maximum permissible tissue concentration" for fish due to the lack of other relevant data, including appropriate toxicological information. In addition, since the fish are not restricted to a single reach, environmental conditions (including sediment distribution and contaminant concentrations) are likely to vary significantly from reach to reach. The feeding patterns and home ranges of fish could not be determined based on available information. A study to gather this data was not within the scope of Operable Unit III.

Comment 143: One commenter stated that the risk may be underestimated for mammals and birds because of the benchmark toxicity values selected.

Response: Based on the information available for the preparation of the Ecological Risk Assessment, the quotient method was considered to be appropriate for the estimation of risk. Toxicological studies and bioassays were beyond the scope of this Ecological Risk Assessment.

Comment 144: One commenter pointed out that the use of "effects-based sediment quality values" to determine the effect of sediment exposure may overestimate the risk associated with sediment contaminants at the Study Area.

Response: EPA recognizes the limitations of using the "effects-based sediment quality values" (ER-L and ER-M), and these limitations have been considered among the uncertainty sources in the Ecological Risk Assessment. However, it was considered appropriate to use the "effects-based sediment quality values" due to the current unavailability of official sediment quality criteria comparable to those available for water.
Comment 145: One commenter pointed out that the FS does not address whether all the inorganic mercury present in sediment can be converted to methylmercury and therefore did not quantify whether the mercury present in the Eastern Wetland is bioavailable. Since the existing database is not sufficient to make this determination, the Preferred Alternative may not be appropriate.

Response: In aquatic environments, mercury may precipitate as a highly insoluble sulfide. Under anaerobic conditions this compound may remain in the sediments for an indefinite period; under aerobic or partially anaerobic conditions it can oxidize to the sulfate form and be subject to methylation by bacteria present in water and in sediments. When methylmercury is formed it dissolves in the water and thus its bioavailability increases (Smith 1980; U.S.FWS 1987). Since the conditions at the Study Area are not strictly anaerobic, it is likely that the sediments contaminated with mercury will constitute a source of bioavailable mercury for an extended period of time. This rationale is supportive of the selected remedy indicated in the Feasibility Study.


G. Wetland Issues

G-1 General Comments

Comment 146: One commenter thought that the characterizations of the Study Area wetlands were too general and based on only limited in-field time.

Response: The selected remedy provides for evaluation and functional assessment of the wetlands to be remediated under this OU prior to Remedial Action to provide a baseline for the wetlands restoration after construction.

Comment 147: One commenter suggested that four sediment sampling stations along River wetlands was inadequate to accurately characterize their contaminant load.

Response: Four wetlands sediment sampling locations were selected in areas of expected sediment deposition as a preliminary search for potential wetland contamination. However, the four locations indicated no significant increase in contaminant levels. If these locations were determined to be contaminated, additional sampling of the bordering wetlands would have been required.
Comment 148: One commenter stated that non-wetland areas of the floodplain along the River should be sampled.

Response: The bordering wetland areas are typically at a lower elevation than non-wetland, or upland, areas of the floodplain. The wetlands, therefore, are susceptible to more frequent flooding than upland areas and are more likely to receive sediment contaminated with Site-related contaminants than upland areas. Wetlands should, therefore, tend to have higher concentrations of contaminants than upland areas. The wetland areas which were sampled contained relatively low concentrations of Site-related contaminants.

Comment 149: One commenter expressed concern about EPA's Preferred Alternative "with respect to wetlands adjacent" to the River.

Response: Other than Outfall Creek and the lower Raceway, wetlands adjacent to the River will not be remediated under the selected remedy. Other River Areas will be further investigated under OU IV.

Comment 150: One commenter observed that longer-term analyses, including a four-season, Site-specific wildlife inventory; detailed functional wetlands analysis; plant tissue analysis; and soil biota inventory are required to assess the full impacts to the Eastern Wetland ecosystem.

Response: These long-term studies were beyond the scope of the RI. However, some of the issues raised in this comment will be addressed during the Design Phase of Operable Unit III in order to prepare a wetland restoration plan for this area.

Comment 151: One commenter asked what the present condition is of the Trolley Brook Wetland that was remediated in Operable Unit I.

Response: At the completion of OU I remediation activities, EPA determined that the culvert between the Eastern Wetland and Trolley Brook wetland (Area G) should temporarily remain blocked. This decision was made in order to prevent recontaminating the Trolley Brook Wetland with contaminants present in the Eastern Wetland. Because of this decision, the water levels in Trolley Brook Wetland are too low to allow for adequate wetland restoration. The selected remedy includes for reopening of the culvert and restoration of the Trolley Brook Wetland following the remediation of the Eastern Wetland.

Comment 152: One commenter stated that more than two upstream wetlands should have been evaluated to more fully characterize non-impacted wetlands.
Response: The wetland areas upstream were evaluated to the extent necessary for the level of evaluation which was conducted on the wetlands downstream. If a more thorough investigation is conducted in later phases, the appropriate background evaluations will be performed.

Comment 153: One commenter asked if a published method was used to establish wetland functions.

Response: Professional judgement was used due to the reconnaissance nature of the survey and the size of the Study Area. Further assessment of wetland functions for the Continuing Source Areas will be conducted during predesign studies.

Comment 154: One commenter stated that the RI Report should have evaluated wetland areas outside of the influence of the Site and compared these areas to the bordering wetlands subject to periodic inundation in areas affected by the Site.

Response: The investigation of bordering wetlands subject to impacts of Site-related contamination indicated very low concentrations of these contaminants in sediments. Further action was not warranted at this time.

Comment 155: One commenter expressed concern about the lack of information included on the flood control properties of the wetlands. For what part of the watershed area do the wetlands provide flood control? What is the import/export of potentially contaminated sediments and detritus within the wetland system?

Response: The flood control properties of the wetlands in the Study Area are addressed in Section 4.2 of the Wetland Assessment. Because the subject reach of the Sudbury River is impounded at several locations, the wetlands would not be expected to play a major role in flood regulation. This assumption assumes that the impoundments can effectively handle the 100-year and 500-year floods. No hydrological investigation of the impoundments was performed as a part of the Wetlands Assessment to test this assumption.
All of the wetlands studied in the Wetland Assessment occur on low-lying lands adjacent to the Sudbury River. All of the Lacustrine and many of the Palustrine Emergent Wetlands experience water flow from the River during most of the year. Any contaminated sediment carried in the River water could be deposited (imported) into these wetlands. The other wetlands occur within what was once the floodplain of the Sudbury River. When the River is at flood stage, contaminated sediments could be introduced into these wetlands. However, because of the impoundments, the exact extent of the floodplain is not necessarily evident from topography. Detailed hydrological calculations would be necessary to delineate the floodplain, and thereby delineate which wetlands are subject to deposition of contaminated sediments.

Any contaminated sediments that are deposited in wetlands by normal or flood-level River flows could subsequently be carried out of the wetlands by the same forces. However, some contaminants could become permanently bound to wetland soils or vegetation and resist subsequent waters. The ability of wetlands to serve as a permanent sink for contaminants in this system is not well understood.

Comment 156: One commenter stated that no evaluation was made of the water cleansing or pollutant attenuation properties of the wetland system. Wetland soils, sediment, and vegetation should be tested for Contaminants of Concern and other target chemicals.

Response: The objective of the wetlands study was to provide a characterization of the wetland resources in the River system. The "cleansing properties" of wetlands in general is not well understood, and no studies were conducted during the RI.

Comment 157: One commenter stated that a functional assessment of wildlife habitat in the wetland would more accurately characterize habitat values.

Response: A functional assessment of wildlife habitat in the Continuing Source Areas will be conducted prior to initiation of a Remedial Action as part of the Remedial Design to provide a baseline study for post-remediation wetland replication.

G-2 Specific Comments

Comment 158: One commenter inquired about the Soil Conservation Service mapping units for the Eastern Wetlands system. What does "6 to 12 inches of vegetation or a peat layer" mean, fibrous peat or a thick litter layer?

Response: This layer is a decomposed root zone and minor accumulation of organic litter.
Comment 159: One commenter stated that several soil sampling and characterization points should have been collected to establish the variety of soil types throughout the Study Area.

Response: Soil types within the Sudbury River drainage basin are established by the USGS Soil Survey Maps of Massachusetts. Further analysis of soil types through sample collection was not required to meet the objectives of the RI.

Comment 160: One commenter asked what the sizes of the vegetative sampling plots were and if Army Corps of Engineers/Federal Manual standard-size vegetative plots were sampled?

Response: The vegetative sampling plots were the standard 30 foot radius plot which were visually estimated. The Routine Onsite Determination Method from the Federal Manual (1989) was used.

Comment 161: One commenter asked why ten percent vegetative cover in each stratum was used as a dominance indicator and was a specific methodology used for data collection?

Response: The wetlands along the Sudbury River were evaluated using the Routine Onsite Determination Method outlined in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989). The vegetative dominance indicator (10 percent vegetative cover in each stratum) was selected as an objective and fast means of determining dominance because of the extensive wetland system of the Study Area.

Comment 162: One commenter asked if soils were really ‘dry’ most of the year in the wooded swamp; what is meant by upland soils, non-saturated soils, and non-hydric soils; and whether indicators such as water marks on trees or drift lines were observed.

Response: Section 3.1 of the Wetland Assessment states, "The soils of these lands (the Palustrine Forested Wetlands in the Study Area) are typically dry most of the year, only becoming saturated or inundated for a few weeks". Better wording would be, "The soils of these lands are typically saturated or inundated only for a few weeks each year".

Each area visited as a part of the Wetland Assessment was inspected for all of the field indicators of wetland hydrology listed in Section 3.37 of the Federal Manual, with the exception of those indicators that could only be observed by digging holes (oxidized channels associated with living roots and rhizomes). The hydrology discussions in Section 3.1 through 3.5 of the Wetlands Assessment discuss all appropriate hydrological indicators that were observed, not just observations of saturation and inundation.

Comment 163: One commenter asked if baseline measures of the wetlands and water quality were collected.
Response: Water quality samples were not collected from wetlands other than the Eastern Wetland. Sediment samples were collected from six bordering wetland areas. These results are discussed in Section 4.3.3.11 of the RI Report.

G-3 Specific Comments Concerning the Eastern Wetland

Comment 164: One commenter stated that surface water samples in the Eastern Wetland are not adequate to characterize surface water contamination. Were stagnant areas in the Eastern Wetland sampled?

Response: The water samples collected are considered to be representative of water being discharged from the Eastern Wetland to the Sudbury River. Water samples were not collected from stagnant areas, but sediment samples were collected from isolated ponds and wetland areas, as shown on Figure 1-D.

Comment 165: One commenter asked if results from zero to six feet below ground surface indicate an increase or decrease in contamination with depth in the second round of sampling of the Eastern Wetland? Are Contaminants of Concern spatially and/or vertically patterned through the Wetland or are they randomly varied? What is the cause of refusal in wetland soil borings - bedrock or dense sediment/stoniness? How will refusal in borings be overcome to collect at-depth soil/sediment samples? What is the potential for contamination migrating to or emanating from groundwater below six feet?

Response: Contaminant distribution, both horizontally and vertically, is discussed in Section 4.7 and shown on Figure 1-D. Generally inorganic contaminants are present in higher concentrations in the upper one foot of sediment. Concentrations decrease with depth. Organic contaminants follow this trend, but concentrations are more erratic. Complete analytical results are presented in Appendix D. Depth to bedrock is significantly deeper than the maximum depth of sampling in the Eastern Wetland. The depth to bedrock was investigated in Operable Unit II. Contamination may migrate to groundwater from contaminated soils and sediment.

Comment 166: One commenter questioned the extent and area of disturbance caused by remediation activities in wetlands. Have wetland functions been altered or impaired?

Response: No remedial activities have been conducted under Operable Unit III, however, a wetland functionality assessment will be conducted prior to initiating remedial activities.

Comment 167: One commenter asked if there are shallow and deep groundwater monitoring wells in the Eastern Wetland to characterize the seasonal hydrologic regime of the wetland? What is the seasonal/annual fluctuation of shallow groundwater in wetlands?
Response: Monitoring wells were installed as part of Operable Unit II to characterize seasonal hydrologic regimes. The seasonal fluctuation of groundwater in the general area of the Eastern Wetland is approximately 2 feet. This is reflected in the water level of the wetland.

Comment 168: One commenter asked what the parent material of the Eastern Wetland soils is—outwash/alluvium? How does this influence infiltration, hydraulic conductivity?

Response: Soils underlying the Eastern Wetland are glacial lake deposits consisting of silty fine to medium sands. Hydraulic conductivities were not measured, however, they can be characterized by soil types as being in the moderate range.

Comment 169: One commenter stated that the Eastern Wetland should be evaluated for potential microbial activity and organic accumulation relative to Site Contaminants of Concern and other target chemicals to determine if there is some degree of natural bioremediation underway.

Response: Natural bioremedial activities are long-term events. Contaminants will continue to cause a risk to both human and ecological receptors and will continue to migrate from the Continuing Source Areas during this process.

H. Feasibility Study

H-1 General Comments

Comment 170: One commenter stated that the RI Report suggests that the Eastern Wetland is a continuing source of contamination to the River. The Operable Unit III Feasibility Study should focus on the Eastern Wetland for remediation.

Response: The Continuing Source Areas, which include the Eastern Wetland, will be remediated as part of the selected remedy.

Comment 171: One commenter asked what effect EPA’s failure to propose to remediate the Sudbury River would have on Reservoirs 1 and 2 as passive recreation areas.

Response: The primary exposure route for effects to human health are ingestion of fish and contact/accidental ingestion of sediment. However, the only areas in the River which have sediment contamination at levels that would result in human health risk are under 8 to 10 feet of water. Therefore, human exposure to these contaminants is unlikely. Consumption of fish caught in the River, including the Reservoirs should be avoided. Other recreational uses of the Reservoirs will not be affected.
Comment 172: One commenter expressed concern about the vague reference in the Feasibility Study and Proposed Plan to possible recreational restrictions. Since the RI did not indicate risks from recreational activities, it is not clear on what basis these restrictions would be imposed.

Response: EPA does not anticipate that recreational restriction will be imposed. The selected remedy, however, includes coordination between representatives of EPA, DEP and the affected towns to evaluate and implement public awareness activities. If it is discovered during this coordination that restrictions may be appropriate, EPA would evaluate and possibly implement these restrictions.

Comment 173: One commenter stated that if EPA is not going to cleanup the Sudbury River to a fishable level, then it makes no sense to spend large amounts of money cleaning up the wetland to a fishable level. Several commenters supported Alternative 3B as more cost-effective and an approach that would not involve reopening the Operable Unit I cap.

Response: The proposed cleanup of the Eastern Wetland is based on mitigating unacceptable risks to human health and the environment in this area. Direct contact with sediments in the Continuing Source Areas by humans, uptake and biomagnification of mercury by ecological receptors and the migration of mercury to the Sudbury River are several of the hazards posed by mercury-contaminated sediments to various receptors.

Alternative 3B, with a target cleanup level of 7 mg/kg of mercury would offer protection to humans from direct contact with sediments but would not afford protection to ecological receptors in the Continuing Source Areas.

Comment 174: One commenter requested that any information EPA has on soil washing be made available.

Response: EPA has published several technical reports and evaluations of soil washing and solvent technology. A few of these reports are: Summary of Treatment Technology Effectiveness for Contaminated Soil (EPA: PB92-963351, 1990), The Superfund Innovative Technology Program: Technology Profiles Fourth Edition (EPA/540/5-91/008, 1991), and Cleaning Excavated Soil Using Extraction Agents: A State-of-the-Art Review (EPA/600/2-89/034, 1989). Additional references are included in the cited documents. Technology vendors can also be contacted to obtain specific information about the processes.

Comment 175: One commenter suggested that additional studies should be performed before implementing the Preferred Alternative.
Response: Additional predesign studies will be conducted prior to implementing the selected remedy. These studies include additional delineation of contaminated areas, wetlands functionality assessments and engineering studies.

Comment 176: Several commenters urged EPA to consider selection of Alternative 3A as its remediation approach.

Response: Remedial alternatives (including Alternative 3A) were evaluated in detail in Section 6.0 of the FS in accordance with statutory requirements of CERCLA Section 121. This evaluation compares remedial alternatives using the nine evaluation criteria set forth in Section 300.430(e)(9)(iii) of the NCP. Results of this evaluation indicated that the selected remedy offered the best balance of trade-offs of any alternative.

Comment 177: One commenter asked "Why were the wetlands not cleaned up in the 1980s when the Nyanza project was active?"

Response: See response to Comment 29. In addition, at the time of the remedy selection decision under OU I, there was not enough data about the Continuing Source Areas on which to base a decision. Therefore, these areas were reserved for later Remedial Action.

Comment 178: One commenter suggested that treatability studies should have been conducted during the FS (as EPA guidelines recommend) to develop better information about the treatment technologies.

Response: EPA believes that sufficient information was available during the preparation of the FS to adequately evaluate the technologies for treating mercury-contaminated sediments.

Comment 179: One commenter requested that since treatability studies will not be conducted until the Remedial Design phase, EPA should submit their results for public comment before a final decision is made to treat the sediments or place them under the cap.

Response: No treatment of contaminated sediments will be conducted under the selected remedy. Therefore, no treatability studies will be conducted during Remedial Design.

Comment 180: One commenter stated that the Feasibility Study should have included consideration of a separate capped area on the Property.

Response: This alternative was considered during the Feasibility Study process but the alternative was eliminated, in part, because of the lack of sufficient remaining space on the Property. The Property is a developed commercial area with active industries and open areas are generally wetlands.
Comment 181: There is no data to suggest that the proposed remedial action will have any measurable impact on protection of human health and the environment. Based on the documents in the public record, it is impossible to evaluate whether the proposed remediation will contribute to the overall protection of human health and the environment. Notwithstanding the total absence of any information suggesting a connection between mercury levels in the sediments and in fish, the FS assumes that the Preferred Alternative will offer "some protection" to the environment simply by removing certain mercury-containing sediments from the environment. Since the assumed diminution of risk as a result of the remediation cannot be quantified nor can the remaining risk be quantified, the risk weighing exercise in the FS is a pretense. When combined with EPA’s own admission that dredging as part of the Preferred Alternative will actually increase the mobility of sediments, the unavoidable conclusion is that the Preferred Alternative will not be protective of human health and the environment.

Response: The commenter has incorrectly focused his analysis solely on the effectiveness of the Remedial Action in protecting human health and the environment in the Sudbury River, without regard to the impact on the environment within the Continuing Source Areas. In addition, the commenter incorrectly assumes that the NCP requires a strict, quantitative measure of the level of protection and the level of risk reduction provided by an alternative.

The selected remedy addresses both risks to human health and the environment within the Continuing Source Areas, including the Eastern Wetland, and risks to human health and the environment within the Sudbury River. By removing mercury contaminated sediments in the Continuing Source Areas to a level of 1 mg/kg, which is equivalent to the general background level, the remedy will afford a level of protection to environmental receptors in those areas similar to that in the Sudbury River upstream of the Site. The selected cleanup level is also below the median biological effects level (ER-M) reported by NOAA in "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (NOS OMA 52). This ER-M, the contaminant level above which adverse effects to ecological receptors are expected, is 1.3 ppm for mercury in sediment. This cleanup level is also expected to result in attainment of the ambient water quality criterion for mercury in the Eastern Wetland, Trolley Brook, and Outfall Creek which is currently being exceeded. The selected cleanup level is expected to result in a Hazard Index of less than one for all exposure scenarios in the Continuing Source Areas and is protective of human health for all accidental ingestion and dermal exposure scenarios. Documents in the Administrative Record, including the RI Report, FS, and FS Addendum, support EPA’s conclusion that the selected remedy is protective.
EPA agrees with the commenter that the level of protection and level of risk reduction to be afforded by the selected remedy cannot be strictly quantified. However, there is no requirement in the NCP for a strict, quantitative measure of risk reduction or of protectiveness. The determination of "Overall Protection of Human Health and the Environment" under § 300.430(e)(9)(iii)(A) of the NCP does not involve a mathematical calculation of the level of protection or risk reduction afforded by alternatives, but rather entails an assessment which "draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs."

At § 300.430 (e)(9)(iii)(C)(1) of the NCP, it states that in evaluating the long-term effectiveness and permanence of an alternative, factors to be considered shall include "the magnitude of residual risk remaining from untreated wastes or from waste residuals remaining at the conclusion of the remedial activities" (emphasis added). These factors were carefully considered in evaluating the overall protection to be afforded by the selected remedy.

EPA acknowledges that implementation of the selected remedy will not be protective of human health and the environment in the River. These risks are being addressed under OU IV. Nevertheless, by removing mercury contaminated sediments from the Continuing Source Areas, the selected remedy will eliminate these areas as a future source of mercury to the Sudbury River and thus avoid aggravating the existing problem in the River itself.

The commenter's statement that "the FS itself states that the long term effectiveness of the remedy is questionable (FS p.5-63)" is taken out of context. The quoted language from the FS pertains only to the ability of the selected remedy to control human health risks from fish ingestion in the Sudbury River through institutional controls. The FS does not characterize the effectiveness of the entire selected remedy as "questionable."

Furthermore, under the selected remedy, institutional controls will only be in place for a limited time until a final remedy for the Sudbury River is selected.

The commenter's statement that there is no information to suggest a connection between mercury levels in the sediments and in fish is completely untrue. The FS only acknowledges the current lack of a defined, mathematical relationship between sediment mercury levels and fish tissue mercury levels. As noted on pages 1-23 and 2-25/26 of the FS and previously in the Remedial Investigation Report, "there is a general correlation between the average fish and sediment mercury concentrations on an area-wide basis. " This correlation will be further defined as part of OU IV.
The referenced increase in mobility of mercury during dredging operations as part of the selected remedy is a short term impact only and can be adequately controlled in the Continuing Source Areas through the use of mitigative measures.

Comment 182: The Preferred Alternative is not cost-effective. There is no evidence that it will be effective. The $20 million cost of the Preferred Alternative is grossly excessive. The expenditure is ineffective since institutional controls will still be required to warn people against consumption of contaminated fish in the Sudbury River. Institutional controls alone may be acceptable here because active controls are not practicable.

Response: EPA disagrees with the commenter’s contention that the remedy will not be effective. As discussed above, the remedy will be effective in controlling the risks to human and ecological receptors within the Continuing Source Areas and in eliminating the possibility of future migration of mercury contamination from the Continuing Source Areas to the Sudbury River. EPA acknowledges that the remedy will be of questionable effectiveness in reducing the mercury content in fish in the Sudbury River and that the primary, remaining human health threat will be from the consumption of fish by either sport or subsistence fishermen. Consequently, the remedy includes creation of OU IV to address this threat and a continuation of institutional controls supplemented by a public awareness program as a necessary, temporary measure until such time as a permanent remedy can be implemented under OU IV.

With respect to cost, of the alternatives which employ the 1 mg/kg clean-up level and would thereby be protective of both human and ecological receptors within the Continuing Source Areas, the selected remedy is the least costly ($20,419,000 as compared to $24,593,000 and 47,799,000). Moreover, the remediation cost of the selected remedy will actually be significantly less than $20 million since that cost includes approximately $7 million in operation and maintenance costs over a 30 year period. These operation and maintenance costs were calculated in the FS to include activities such as annual monitoring and institutional controls for the Sudbury River. However, because investigations under OU IV will be performed concurrently with the implementation of the OU III remedy, monitoring of the River will be conducted as part of these OU IV investigations. In addition, institutional controls are an interim remedy only, pending the OU IV remedy decision. Therefore, the long-term costs are expected to be far less than the 30-year estimate. Consequently, the selected remedy is cost-effective since it achieves a protective clean-up level at the smallest cost.
The NCP, at § 300.430 (a)(1)(iii)(D), states that the use of institutional controls shall not substitute for active response measures as the sole remedy unless such active measures are determined not to be practicable. EPA has no basis to find the remedy to be impracticable, since it will be effective and is implementable.

Comment 183: The Ashland community is opposed to the Preferred Alternative and EPA must consider the lack of community acceptance in its decision-making.

Response: EPA has considered the concerns of the community in its remedy selection. The responses to the officials, citizens, and others who have provided comments to the FS and the Proposed Plan are contained in this Responsiveness Summary.

Comment 184: The proposed plan is inconsistent with EPA’s program management principles for operable units. EPA cannot justify its decision to subdivide Operable Unit III as necessary to achieve significant risk reduction early when by its own admission, the proposed remedy may not reduce any risk at all. Dividing the remediation planned for Operable Unit III into two separate operable units is not necessary for purposes of a phased analysis, because extensive analysis of the Sudbury River was already accomplished in the RI. Finally, implementation of the Proposed Plan will serve to delay, not expedite, EPA’s consideration of whether any action is necessary or appropriate for the Sudbury River. EPA’s proposal reverses certain actions taken in Operable Unit I. The possible relationship between Operable Units I and II and the need for Operable Unit III has not been addressed. If the Eastern Wetland was, as EPA believes, affected by runoff from the Property, it would make sense to evaluate the impact of source control and groundwater studies before determining whether anything further needs to be done.

Response: The commenter’s arguments that the remedy selection is inconsistent with EPA’s program management principles is flawed. Given the size and complexity of the mercury problem in the Sudbury River and in the Continuing Source Areas and the huge, potential costs to remediate the River sediments to protective levels, EPA appropriately decided to delay the decision on a final remedy for the River pending additional study. The Agency believes this is not only prudent but fully consistent with § 300.430 (a)(1)(ii)(A) of the NCP. Contrary to the commenter’s statement, the remedy will provide substantial risk reduction within the Continuing Source Areas while also preventing any future migration of contamination.
from these areas to the Sudbury River. Phased response is appropriate since a cost-effective remedy can be selected for the Continuing Source Areas based on the currently available information, whereas more information is needed prior to making a final decision on the Sudbury River. The remedy will be implemented concurrently with the Operable Unit IV studies and thus will not delay the decision on the final Remedial Action for the River.

The overall remedy for the Site to date includes containment of metal sludges and sediments, excavation and incineration of the highly contaminated soils within the Vault area (which acted as a source of groundwater contamination), and extraction and treatment of contaminated groundwater. The excavation and containment of the contaminated sediments from the Continuing Source Areas is consistent with this approach, utilizing the same containment option chosen in the first Operable Unit. The remedy proposes to use only the currently available capacity of the Operable Unit I cap, without altering the cap design, and thus is not inconsistent with the first Operable Unit.

EPA acknowledges the commenter’s point that the selected remedy entails opening a portion of the cap constructed under OU I, removal of the clean fill, and disposal of the dredged, contaminated sediments, followed by rebuilding of a portion of the cap at "considerable additional expense". However, this additional expense is considerably less than the cost of off-Site landfiling and thus, the selected remedy is more cost-effective than the alternatives involving the use of off-Site landfills.

EPA believes the first Operable Unit Remedial Action has successfully prevented the further contamination of the Eastern Wetland and other Continuing Source Areas by controlling contaminated runoff from the Hill area of the Property to these areas. However, these areas remain contaminated, and will not cleanse themselves in the foreseeable future due to mercury’s persistence and propensity to bioaccumulate. These areas constitute a present threat to human health and the environment and will continue to act as potential source areas for downstream areas. Therefore, it is appropriate to address these areas now as opposed to waiting as the commenter suggests.

Comment 185: One commenter stated that EPA’s development of remedial alternatives in the FS and its selection of the Preferred Alternative in the Proposed Plan are inconsistent with CERCLA and the NCP.

Response: CERCLA Section 121 and Section 300.430 of the NCP set forth the process by which Remedial Actions are evaluated and selected. The development of alternatives and selection of the selected remedy followed the statutory and regulatory process.

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In accordance with Section 300.430(e)(3) of the NCP, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances in the Continuing Source Areas was a principal element.

As discussed in Chapters 4 and 5 of the FS, the RI/FS identified, assessed and screened technologies based on implementability, effectiveness, and cost in accordance with Section 300.430(e)(7) of the NCP. These technologies were combined into source control alternatives. Chapter 5 of the FS presented the remedial alternatives developed by combining 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. Finally, a detailed evaluation of each alternative was performed in Chapter 6 of the FS and in the FS Addendum Report, using the nine evaluation criteria set forth in Section 300.430(e)(9)(iii) of the NCP. The alternative that best met those criteria, the selected remedy, was presented to the public in the Proposed Plan as required by Section 300.430(f)(2) of the NCP.

Comment 186: One commenter stated that the FS made no connection between mercury in sediment in the Continuing Source Areas and mercury in sediment and fish tissue in the River.

Response: See response to Comment 181.

Comment 187: One commenter stated that during Operable Unit I, EPA "did not perceive the Eastern Wetland to be a time-critical problem", that it was an "off-site area" which could be addressed in conjunction with the Sudbury River. "Without explanation, the USEPA has changed its position on the Eastern Wetland from being 'an off-site area' to 'a continuing and significant' source" of contamination. There is no justification for designating the Eastern Wetland as either a source area or a separate Operable Unit from the Sudbury River.

Response: Limited water quality and sediment analyses of the Eastern Wetland were available at the time of the OU I ROD. Investigation of this area was more fully performed during Operable Unit III. Based on data collected, the risk assessment identified unacceptable risks to human health and the environment from sediments in the Eastern Wetland. Consequently, it is appropriate to remediate the area under OU III. With regard to separation of the Continuing Source Areas and the Sudbury River into separate operable units, see response to Comment 184.

Comment 188: One commenter stated that of the 118 samples collected during the RI, only 36 collected over a ten acre area met the worst-case criteria. This is not sufficient justification for characterizing the Eastern Wetland as a Continuing Source Area.
Response: Sampling conducted in the Continuing Source Areas delineated a discernable area of contaminated sediment. Mercury concentrations in sediments in this area targeted for remediation range up to 152 mg/kg and the average concentration of mercury in these sediments is significantly higher than the average of 44.84 mg/kg for all surface sediments in the Eastern Wetland. The areas with mercury contamination above the cleanup level will be further delineated during Remedial Design.

Comment 189: One commenter stated that data collected during the RI was presented such that it emphasized the worst-case scenario. "These instances lead to the conclusion that the study was not carried out in an objective and scientific manner." The commenter believes EPA should re-evaluate the mercury database and justify why certain data sets (in particular the first and second rounds of Eastern Wetland sediment sampling) were used and others not used.

Response: The first round of Eastern Wetland sediment sampling results were collected from the upper foot of sediment. This sample interval is comparable to sampling conducted throughout the Study Area. The objective of the second round of Eastern Wetland sampling was to delineate the horizontal and vertical extent of contamination in the Wetland. Sampling extended to depths of 6 feet, and upper samples were composited over 2 foot intervals. Comparison of the two data sets indicated that the highest mercury concentrations were present at the sediment surface. Compositing samples from the second round of sampling over a two foot interval biased surface sediment concentrations to lower concentrations. Data from the first round was used for the risk assessments and in other comparisons to data collected in the River, which was also collected from the upper foot of the sediment surface. This allowed the use of comparable data sets in data evaluation tasks.

Comment 190: One commenter stated that the majority of mercury data used to select the Preferred Alternative were estimated values. The commenter believes EPA should re-evaluate the validity of this data and disclose the reasons and limitations of using estimated values.

Response: These values were evaluated and found suitable to use to determine the extent of contamination and risks in the Study Area.

Comment 191: One commenter stated that EPA has no basis on which to divide its remedial efforts into two operable units, one for the Eastern Wetland and another for the River.

Response: See response to Comment 184.
Comment 192: One commenter suggested that the sediment cover envisioned for the Eastern Wetland under Alternative 7, which was screened out for detailed evaluation, has precedent at the Hudson River PCB Superfund Site. Should the cover fail, the cost expended will have been minimized and other, more acceptable remediation techniques might be available at that time. This commenter suggested the rationale for eliminating this alternative "appear very weak, at best..." and that Alternative 7 be re-examined as less disruptive (no cap reopening, less dredging, retaining the existing wetland function of the Eastern Wetland), less time consuming, and less costly than the Preferred Alternative. If EPA refuses to select a combination of Alternatives 1 and 2 as its remedy, the commenter would support adoption of Alternative 7.

Response: A sediment cover was evaluated for the Eastern Wetland and other areas in the Study Area. This alternative was eliminated from further evaluation during the technology screening process. In the Eastern Wetland, the proposed cover was a soil layer 2 feet thick; in some areas it would be seasonally underwater. The cover would be installed within an area which is in proximity to the current (or available) outflow area of the Wetland. Therefore, a major portion of the cover would have been susceptible to erosion during flood events thereby creating a risk of re-exposure of the contaminated sediments.

In addition, the Wetland is the only basin acting to retain storm and spring runoff water in an industrially developed area. Filling the Eastern Wetland, as contemplated by Alternative 7, would have required the waiver of a State ARAR, 310 CMR 10.00. The regulation addresses protection of flood control areas and states that a variance may be issued if there are not reasonable conditions or alternatives that would allow the project to proceed in compliance with the regulations. Because other alternatives were present which would not result in permanent loss of flood storage capacity, obtaining a State waiver would have been unlikely. Filling this wetland would also have required waiving Federal wetland ARARs, including Executive Order 11990 and Section 404 of the Clean Water Act.

Comment 193: One commenter stated that the target cleanup level of 1 mg/kg of mercury in sediments is unnecessarily low and scientifically unproven and unsupported.

Response: The cleanup level of 1 mg/kg of mercury in sediment is equivalent to the general background level and affords a level of protection to environmental receptors in those areas similar to that in the Sudbury River upstream of the Site. The selected cleanup level is also slightly below the median biological effects level (ER-M) reported by NOAA in "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (NOS OMA 52). This ER-M, the contaminant level above which adverse effects to ecological
receptors are expected, is 1.3 ppm for mercury in sediment. This cleanup level is also expected to result in attainment of the ambient water quality criterion for mercury in the Eastern Wetland, Trolley Brook, and Outfall Creek which is currently being exceeded. In addition, the selected cleanup level is expected to result in a Hazard Index of less than one for all exposure scenarios in the Continuing Source Areas and is protective of human health for all accidental ingestion and dermal exposure scenarios.

Comment 194: One commenter quotes older area residents indicating at a local meeting that they had been warned as children never to swim or bathe in the River, thereby undermining the Proposed Plan’s statement that historically the River had been used by sports fishermen and as a source of food for emigrants.

Response: During the sampling events on the River, HNUS personnel often saw evidence of fishing (discarded bait cans, clearings along the River at optimum fishing points) and encountered a number of people who volunteered that either they or their children fished in the River. During public meetings on the RI results and Community Relations interviews, several people indicated they had seen "non-residents" fishing in the River. In addition, a warning against swimming and bathing in the River, as referenced in the comment, does not in any way indicate that the River was not historically fished.

Comment 195: One commenter indicated that EPA should conduct treatability studies during the design phase to determine whether Alternative 3A is feasible. If Alternative 3A is shown to be feasible, then the sediments should be treated and redeposited in the remediated areas.

Response: See response to Comment 176.

Comment 196: Several commenters expressed concern about the ability of the cap to handle the quantity of contaminated sediments and vegetation to be removed. One commenter requested that if the Preferred Alternative is selected in a Record of Decision, that EPA, during the pre-design phase: conduct studies to more accurately characterize the nature and extent of mercury-contaminated sediments needing excavation; commit to initiating a ROD amendment for Operable Unit III if the Remedial Action necessitates an increase in the height of the existing cap or if space in a cell is needed beyond the one specified in the Preferred Alternative; and develop a contingency plan for handling volume exceedances that may not be discovered until construction is underway.
Response: The predesign investigation includes a task to more fully delineate the extent of contamination in the Continuing Source Areas. If this investigation reveals that the amount of sediments to be excavated and disposed of are likely to exceed the cap capacity, or if this is found to be the case during cap construction, EPA will proceed in accordance with Section 300.435(c)(2) of the NCP. The areal extent and vertical profile of the existing cap will not be increased under the selected remedy.

Comment 197: One commenter indicated that only Alternative 3A will permanently reduce the mobility of contaminants and reduce their toxicity and volume in the context of the NCP's balancing criteria.

Response: EPA acknowledges that Alternative 3A would permanently reduce the volume of contaminants through treatment. However, because there is currently no destructive treatment for metals, this treatment alternative would result in a smaller volume of more toxic material (treatment residuals) which would need to be disposed off-Site. This evaluation is discussed in more detail in Section IX of the ROD.

Comment 198: One commenter stated that it is impractical to meaningfully evaluate the differences between Alternatives 3A and 11A in the absence of a treatability study for solvent extraction/solvent washing.

Response: EPA disagrees with the commenter. EPA believes that sufficient process performance data was available during preparation of the FS to allow a meaningful evaluation of the applicability of the solvent extract/soil washing process and a compatible evaluation of the process with Alternative 11A.

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Comment 199: Two commenters expressed general concern about the proposed reopening of the cap.

Response: A representative of the Army Corps of Engineers (COE) was present at the Public Hearing to address the public's concerns about the conceptual plan for the cap opening. Significant issues were discussed. The COE representative agreed with EPA's determination that the cap could be temporarily opened to emplace contaminated sediment from the Eastern Wetland without undue risks to the public. The COE representative stated that the technology to open and close the cap is readily available and can be implemented and that the cap can be reconstructed and secured to the original specifications.

Comment 200: One commenter requested EPA assurance that any remediation conducted in the Eastern Wetland "is consistent with reclamation efforts to the Sudbury River".
Response: Due to the fact that, without remediation, the contaminated sediments in the Continuing Source Areas would continue to migrate to the Sudbury River, the remediation of these areas is consistent with the overall remediation of the Site, including the Sudbury River. This issue is further addressed in the response to Comment 184.

Comment 201: One commenter generally supported removal of contaminated sediments from the Continuing Source Areas because it will diminish ongoing harm to the downstream environment.

Response: EPA agrees with this comment.

Comment 202: One commenter supported EPA's Preferred Alternative, including placing dredged sediment from the Continuing Source Areas under the Operable Unit I cap, and encouraged the Agency not to delay its implementation.

Response: EPA agrees with this comment.

Comment 203: One commenter requested that EPA coordinate its "proposed cleaning and restoration of the wetland area" with the Ashland Conservation Commission.

Response: EPA plans to coordinate Remedial Design and construction activities with local officials from the Town of Ashland.

Comment 204: Several commenters stated, that in the absence of Site-specific data, they endorsed EPA's proposal to remediate contaminated sediments to a level of 1 ppm of mercury in the Continuing Source Areas. Attaining that cleanup level should be protective of migratory birds.

Response: EPA agrees with this comment.

Comment 205: Two commenters encouraged EPA to proceed with remediation and restoration of the Eastern Wetland despite the fact that wetlands restoration has a generally poor track record because the Eastern Wetland is too important a fish and wildlife resource to be subject to a "no action" alternative.

Response: The Eastern Wetland will be remediated under OU III.

Comment 206: One commenter asked if there were "any hazards to reopening the cap at the Nyanza Site?"

Response: The cell of the cap which will be opened contains clean fill. A buffer of clean soil will be left between the contaminated materials under the cap and the limits of excavation. Air monitoring will be conducted during construction activities and, if necessary, engineering controls will be implemented to control emissions.
Comment 207: One commenter asked whether "the mud [can] be treated at the wetland site?"

Response: Excavated sediment will not be treated under the selected remedy. The dewatered sediments will be buried untreated under the impermeable cap.

Comment 208: One commenter expressed concern that dredging heavy metals could adversely affect people living or working nearby.

Response: A health and safety plan will be prepared prior to beginning construction. The issue of protection of Site workers and the local population will be thoroughly addressed. A health and safety officer will be assigned to implement and monitor the effectiveness of the plan.

Comment 209: One commenter expressed support for the institutional controls portion of the Preferred Alternative, particularly the public awareness program, maintenance of warning signs, and annual sampling.

Response: NO RESPONSE

Comment 210: One commenter requested that EPA postpone Remedial Action in Operable Unit III until it has more precisely identified the sources of contamination and until cleanup technologies become more advanced.

Response: The source of contamination was the Property. Remediation of the most highly contaminated soils and sludges under the first operable unit was completed in 1991. However, contaminants from the Continuing Source Areas continue to migrate to the Sudbury River. Additional migration of contaminants could occur while awaiting technologies to be developed.

Comment 211: Two commenters asked whether remediation activities themselves could affect contaminant migration into the River.

Response: Engineering controls designed to manage sediment resuspension and further migration will be implemented during construction of the selected remedy. These controls include such measures as silt fencing and drainage ditches.

Comment 212: Several commenters expressed concern about possible health and safety issues of transporting contaminated materials through the Town of Ashland.
Response: An estimated total of 121 cubic yards of sediment located in Outfall Creek and lower Raceway will be transported for a short distance on public roads. These materials will be transported in accordance with Massachusetts Hazardous Waste Transporter Requirements. Sediments dredged from the Eastern Wetland and Trolley Brook will only require transport across the Property. A transportation plan which minimizes impacts to high traffic and residential areas will be developed during Remedial Design. A Health and Safety plan will also be implemented which addresses these issues.

Comment 213: One commenter was concerned about the increased truck traffic the Preferred Alternative would generate.

Response: See response to Comment 212. Efforts would be taken to minimize noise and congestion from vehicles used in implementation of the selected remedy.

Comment 214: One commenter stated that the Preferred Alternative had not been described in enough detail to determine whether it is consistent with the National Contingency Plan and EPA's Feasibility Study evaluation criteria.

Response: The selected remedy was described in Section 5.2.6 of the FS and on pages 9-10 of the Proposed Plan. It was evaluated against the other alternatives using the nine evaluation criteria, including compliance with ARARs, technical implementability, and effectiveness. The detailed analysis was set forth in Section 6 of the FS and on pages 15-19 of the Proposed Plan.

Comment 215: One commenter asked for more information on "how and under what conditions treatment of the in-water sediments would occur and the associated impacts on cost and conformance with ARARs."

Response: Under the selected remedy, the "in-water" sediments would be removed from the Continuing Source Areas by dredging and dewatered prior to disposal. No treatment of excavated sediments will occur. Land Disposal Restrictions under RCRA are not applicable to the selected remedy since the excavation of sediments and consolidation with buried soils and sludges under the OU I cap does not constitute "land disposal" as defined by RCRA.

Comment 216: One commenter stated that there is no information in the Administrative Record which supports EPA's plan to dispose of dewatered sediments under the Operable Unit I cap.

Response: The Operable Unit III RI and FS present extensive data and evaluations of disposal options to support the disposal of dewatered sediments under the Operable Unit I cap. These documents are in the Administrative Record.
Comment 217: One commenter stated that if written information exists that supports the verbal assurances made by the representative from the Corps of Engineers concerning the Operable Unit I cap, it should be made available to the public. Information that would be particularly pertinent would include the nature and chemical composition of the fill and its suitability to support successfully the reconstruction of the wetlands. The commenter also indicated that EPA should conduct a study of the Eastern Wetlands before backfilling it with material from the Operable Unit I cell. During the design phase, EPA should reassess the volume of sediment to be excavated and determine whether the cell material will sustain the wetland community or contribute new contaminants to River water or sediment. The original source of the material should be identified and "a certificate of analysis must be provided."

Response: As-built drawings and reports addressing the Operable Unit I construction are available in the Town library and at EPA Regiona 1 offices in Boston. In addition, a memo dated January 12, 1993 from Ira Nadelman of the Army Corps of Engineers is part of the Administrative Record and is available at the information repositories. The fill material under the cap, which came from an area of the Property, will be sampled prior to use as backfill in the wetlands and will only be used for these activities if it is determined to be suitable.

Comment 218: One commenter stated that in the absence of more detailed information about the fill under the Operable Unit I cap, EPA’s Preferred Alternative has not been shown to meet "the executive order on wetlands and the dredge-and-fill requirements under the Clean Water Act regarding impacts to the wetland...."

Response: See response to Comment 217. If the fill is found unsuitable for use as wetland backfill, it will not be used.

Comment 219: One commenter expressed concern about on- and off-Site security for construction sites.

Response: Security will be implemented in a similar manner to security for Operable Unit I. Fencing and security guards will provide full-time security at work areas.

Comment 220: One commenter requested an update of training and protection for handling of truck contents regarding motor vehicle accidents during implementation of Remedial Actions.

Response: EPA will work with the Town of Ashland to ensure that emergency responders are adequately trained prior to construction activities.

Comment 221: One commenter expressed concern about emergency response plans for on- and off-Site emergencies.
Response: An emergency response plan will be prepared and included in the Health and Safety Plan. EPA will work with local authorities during the preparation of the plan.

Comment 222: One commenter raised concerns regarding the exposure of contaminated soils to air, and the health issues relevant thereto.

Response: Emissions will be monitored and engineering controls implemented if emissions exceed the governing State requirements.

Comment 223: One commenter expressed concern regarding the dumping of contaminated materials under the cap in an unlined area and the possibility of further contamination of groundwater.

Response: The final design and construction of the Operable Unit I cell and cap took the nature of the waste into consideration. EPA evaluated several alternatives and selected a design which would effectively contain the type of wastes identified on the Site under OU I. The OU I cap was designed and constructed as an impermeable cap which prevents surface water from coming in contact with the wastes. In addition, the upgradient water diversion trench lowers the groundwater table in the vicinity of the cap to prevent additional groundwater contamination as a result of the buried wastes. The contaminated sediments of the Continuing Source Areas have similar characteristics to wastes previously placed in the cell, therefore, EPA expects the cell design to be adequate to contain the contaminated sediments.

Comment 224: One commenter indicated that studies should be conducted with regard to the impact of implementing the Preferred Alternative on the neighborhood and the Town of Ashland in general.

Response: Predesign studies will include traffic impacts, potential for off-Site impacts of dust emissions, and wastewater disposal practices. Steps will be taken to minimize adverse impacts to the community.

Comment 225: One commenter was concerned that studies should be conducted regarding the treatment and disposal of water extracted from the wetlands.

Response: Water from the sediment dewatering process will be treated if necessary. Design studies will be conducted to determine if this water needs to be treated. Surface water from the Continuing Source Areas Wetland will not be treated.

Comment 226: One commenter requested an update of training for First Responders in the event of on-Site incidents.

Response: See response to comment 220.
Comment 227: One commenter requested that rules and regulations for the reopening of the cap should be made available for public review to evaluate the feasibility of the Preferred Alternative.

Response: The applicable Federal and State regulations were evaluated in Sections 2.0 and 6.0 of the FS and in Section XI.B. of the ROD.

Comment 228: One commenter suggested that the Preferred Alternative contained too many unknowns which will not be addressed before remediation begins and requested that EPA not proceed with remediation until after necessary studies have been performed.

Response: Some technical issues remain unresolved but will be addressed during the Remedial Design, prior to construction. Several issues to be addressed include sampling of the clean fill presently under the cap, wetlands functionality assessments and dredging studies to determine the most appropriate dredging, and engineering control technologies.

Comment 229: One commenter expressed concern that EPA does not intend to conduct a "health-risk assessment" to determine if the Preferred Alternative will cause increased mercury in the River or any other increased health risks.

Response: One of the nine evaluation criteria, short-term effectiveness, considers the short-term risks that might be posed to the community during implementation of the remedy and the reliability of protective measures. These risks were evaluated for the selected remedy and protective measures, such as silt fencing and stormwater management, will be implemented as part of the selected remedy. In addition, EPA will monitor air emissions during remediation.

Comment 230: One commenter suggested that by proposing the Preferred Alternative, "EPA has failed to perform any risk assessment other than the Corps of Engineers's assurance that the project is feasible from an engineering standpoint".

Response: See response to Comment 229.

Comment 231: One commenter suggested that EPA's goal of reducing mercury contamination in the wetland to allow "safe fishing" does not make sense in light of the fact that "nobody fishes in a wetland".

Response: See response to Comment 181.

Comment 232: One commenter stated that the Preferred Alternative is unwarranted, costly, overly ambitious, and of doubtful effect in addressing mercury contamination in the River.
Response: See response to Comments 181 and 182.

Comment 233: One commenter recommended that instead of implementing the Preferred Alternative, EPA should consider removing surficial soils from areas identified as collection zones of mercury-contaminated runoff.

Response: The Eastern Wetland is such a collection zone and contaminated surficial soils will be removed, along with an area where contaminated soils are present to a depth of six feet.

Comment 234: One commenter indicated that since the River and most of the Continuing Source Areas meet federal Ambient Water Quality Criteria (AWQC) for aquatic life, the criteria will continue to be met without implementing the Preferred Alternative.

Response: Surface water in the Eastern Wetland exceeds the federal acute and chronic AWQC, and thus does not meet this ARAR. Surface water in Trolley Brook and Outfall Creek exceeds the chronic AWQC. If EPA selects a No Action or Limited Action Alternative, ARARs would not be met. As explained in Section IX.B.2 of the ROD, implementation of the selected remedy is expected to meet AWQC in Continuing Source Areas.

Comment 235: One commenter pointed out that the FS stated that beyond mercury, the primary threats to aquatic life and surface-water drinking birds are from non-Site-related contaminants. The Preferred Alternative would "have no effect on levels of these major contaminants."

Response: The selected remedy addresses risks associated with the Site. While it is true that this remedy will only address mercury, it will also remove non-Site-related contaminants which are present in mercury-contaminated sediments that exceed the target clean-up goals.

Comment 236: One commenter indicated general agreement with EPA's Preferred Alternative.

Response: EPA agrees with this comment.

Comment 237: One commenter supported EPA's proceeding with its Record of Decision for the Preferred Alternative but "only if appropriate public review and input provisions are made explicit during design".

Response: EPA will work with the Town of Ashland and interested citizens during Remedial Design and Construction activities.
Comment 238: One commenter stated that there is no documentation to support EPA's thesis that its proposed cleanup level for mercury will also remediate the other Contaminants of Concern in the Continuing Source Areas. EPA should conduct additional studies during the Operable Unit III design phase to determine whether these contaminants behave differently during remedial activities.

Response: See response to Comment 235. EPA acknowledges that the OU III remedy will not remediate all or the Contaminants of Concern. Most of these contaminants, however, are not Site-related. Of the Site-related contaminants, mercury comprises the primary risk to both ecological and human receptors from sediments. Remediation of mercury-contaminated sediments will lower the risk to acceptable levels in the Continuing Source Areas.

Comment 239: The FS indicates that other Contaminants of Concern will be treated to background concentrations in areas which will be remediated.

Response: The FS evaluates alternatives for which mercury will be remediated to 1 mg/kg. EPA did not determine cleanup goals for other contaminants which are present in these areas because they were not Site-related or did not significantly contribute to risk. With the remediation of mercury in the Continuing Source Areas, risks in these areas are reduced to acceptable levels.

Comment 240: One commenter indicated that information should be developed about the location, water quality status, and impacts from supernatant/filtrate to the receiving "surface waterbody".

Response: Predesign studies will be conducted to determine the need for treatment of the supernatant. This water must meet State Surface Water Quality Standards (314 CMR 4.00) prior to discharge. The receiving on-Site surface water body will be identified during the design phase.

Comment 241: One commenter indicated that EPA had not addressed the possible need for a treatability variance for sediments that do not meet TCLP levels prior to disposal.

Response: Land Disposal Restrictions under RCRA are not applicable to the selected remedy since the excavation of sediments and consolidation with buried soils and sludges under the OU I cap does not constitute "land disposal" as defined by RCRA. Therefore, TCLP testing of contaminated sediments will not be done.

Comment 242: One commenter expressed concern about the capacity of the Operable Unit I cell to accept the necessary volume of excavated wetland sediment. Have conservative estimates been used? Is the volume to be removed expressed as in place volume or the volume of sediment/water slurry which will be removed?
Response: See response to Comment 196. The excavation calculations are conservative to minimize the possibility of underestimating the volume of sediment to be dredged and disposed of in the cell. Contaminated sediments were investigated by collecting and analyzing continuous samples vertically through contaminated sediments. The horizontal limits were delineated by including identified contaminated sediments and additional adjacent areas to provide a conservative estimate. Estimated volumes take into consideration factors such as water content, excavation "fluff factors", and compaction of material placed in the cell to established specifications. Calculations are presented in Appendix B of the FS.

Comment 243: One commenter indicated that the Preferred Alternative does not meet the requirements of the National Contingency Plan to prefer alternatives that permanently reduce contaminant toxicity, mobility or volume through treatment.

Response: EPA acknowledges that the selected remedy does not meet the NCP preference for remedies that permanently reduce toxicity, mobility or volume through treatment. However, as explained in Section IX of the ROD, EPA believes that the selected remedy provides the best balance of trade-offs of any alternative with respect to the nine criteria.

Comment 244: One commenter recommended that Alternative 3A be selected as the Preferred Alternative and that Alternative 11A serve as a contingency remedy.

Response: Alternative 11A was selected in accordance with the remedy selection requirements identified in the NCP. The alternative is protective of human health and the environment and complies with all existing ARARs. EPA believes that Alternative 11A represents the best balance of the remaining five evaluation criteria. Alternative 11A and 3A are equivalent in their long-term effectiveness and short-term effectiveness. Alternative 11A can be more easily implemented than Alternative 3A. While Alternative 11A does not provide irreversible treatment or reduction in volume of contaminated sediments (as does Alternative 3A), by isolating the sediments in the Operable Unit I cell, Alternative 11A reduces the hazards posed by the contaminated sediments to the same degree as Alternative 3A. The net present worth cost of Alternative 11A is approximately $4 million lower than that of Alternative 3A.

H-3 Institutional Controls

Comment 245: One commenter thought that the portion of the Preferred Alternative dealing with institutional controls contained too few details to enable the public to determine if it will be protective of public health.
Response: The institutional controls will be planned by EPA in conjunction with officials from affected towns, representatives from existing River groups (e.g. Framingham Advocates for the Sudbury River, Sudbury Valley Trustees, Wild and Scenic Rivers Study Committee) and other interested community groups.

Comment 246: One commenter requested that EPA develop the public awareness program in conjunction with the public and local boards of health.

Response: See response to Comment 245.

Comment 247: One commenter stated that, based on existing data, no Remedial Action should take place in the Wetland System.

Response: See response to Comment 181.

Comment 248: One commenter indicated that if EPA implements Operable Unit III, "it should focus on minimizing perceived or potential risks," such as the imposition of institutional controls and security measures, "as opposed to undertaking extensive source control measures".

Response: See response to Comment 182.

Comment 249: One commenter indicated that to be consistent with the NCP, EPA should not implement Remedial Actions beyond Alternatives 1 or 2.

Response: See response to Comment 181.

Comment 250: One commenter stated that since the highest "reported average" concentration of mercury in Continuing Source Area sediments was only 36 mg/kg, any transport of these sediments during storm events "would have no measurable adverse effect on the overall mercury contamination levels of the Sudbury River...." surface water or sediment. Hence, the term "Continuing Source Areas" is a misnomer.

Response: Mercury concentrations in surface sediments range up to 152 mg/kg and risks resulting from human contact or ingestion of sediments and biomagnification in the food chain are documented in the Risk Assessments (Section 6.0 and 7.0 of the RI Report). Because the Continuing Source Areas drain into the River, they allow continued migration of the sediments to the River. Given this migration pathway and the current risks posed to human health and the environment by these areas, EPA has determined that these areas should be remediated under the selected remedy.
Comment 251: One commenter indicated that the criteria for evaluating alternatives requires a determination that they protect humans and the environment from "unacceptable risks". The Continuing Source Areas present no unacceptable risk. Because the NCP eliminates the requirement that ARARs be met in cases where no unacceptable risk exists, EPA should implement some combination of Alternatives 1 and 2.

Response: Based on the Ecological Risk Assessment presented Section 7.0 of the RI Report, EPA has determined that there are unacceptable risks to ecological receptors from exposure to sediments in the Continuing Source Areas. In addition, EPA has determined that the sediments in the Continuing Source Areas pose unacceptable risks to human health when a residential exposure scenario is considered.

Comment 252: One commenter suggested that an on-going public awareness program, overseen by one agency, could assure the success of a sign posting program. The commenter also suggested that fishing and sign vandalism result in a substantial fine and that the signs themselves state the fine amount.

Response: As part of the selected remedy, EPA will implement institutional controls including sign maintenance and a public awareness campaign until a final remedy decision is made under OU IV. EPA will work in conjunction with DEP, local officials, existing River groups and interested community groups for the public awareness campaign. The effectiveness of current warning signs will be considered when planning the public awareness campaign.

Comment 253: One commenter emphasized the importance of the proposed institutional controls and the public awareness program. The commenter stressed that the public awareness program "must be developed with the benefit of public input, including that of local health officials". The program must afford protection of the River as a resource, and provide sufficient information to the public on the beneficial uses of the River that are not impacted.

Response: See response to Comment 245.

Comment 254: One commenter suggested that risk communications expertise should be considered in the design and implementation of the public education program included in the Preferred Alternative.

Response: See response to Comment 245.

Comment 255: One commenter contended that maintenance of institutional controls and monitoring of the River are "interim" measures, not operation and maintenance activities, because the Preferred Alternative does not include remediation of the River itself.
Response: EPA considers the institutional controls, including sign maintenance and public awareness activities, to be an interim remedy for the River. Monitoring of the River will not be conducted under the selected remedy because OU IV investigations will include sampling and analysis of River Areas.

Comment 256: One commenter recommended that the public awareness program envisioned as a part of the Preferred Alternative include a task force of representatives from the six Study Area communities, EPA, DEP, and other interested state and federal agencies. Goals of the task force would include: identifying the effected target population; identifying how to educate them; determining how to measure program effectiveness; and establishing a timeframe for conducting these activities.

Response: See response to Comment 245.

H-4 Wetland Restoration

Comment 257: Two commenter stated that EPA should develop a wetlands restoration plan that evaluates both fill from the cap and treated sediments. The wetlands restoration plan should be subject to public comment before a final decision is made to treat sediments or place them under the cap.

Response: See response to Comment 217. EPA will develop a wetland restoration plan during Remedial Design. Because no treatment of contaminated sediments will be conducted under the selected remedy, this plan will not evaluate the use of treated sediments to backfill the wetland areas. EPA intends to schedule a public meeting at the end of the design phase to consult with those members of the public who are interested in discussing the findings of this and other studies.

Comment 258: One commenter stated that the database and the Preferred Alternative are not consistent with past EPA wetland investigations and remediation.

RESPONSE: The Remedial Investigation, including the Risk Assessments and the Feasibility Study were conducted in compliance with appropriate EPA guidance documents. In addition, the selected remedy is consistent with past EPA remedial decisions where unacceptable risks to human and ecological receptors are remediated to protective levels. See response to comment 181 for more information regarding the unacceptable risks.

Comment 259: One commenter stated that the Preferred Alternative would destroy an established and viable wetland system and that EPA has not considered how to minimize the effects to it or the probability that wetland reconstruction would succeed.
Response: EPA has considered the short-term effects on the wetland system in evaluating the selected remedy. Appropriate measures to minimize impacts to wetlands and restore these areas in accordance with appropriate Federal and State regulations will be evaluated during Remedial Design and implemented during construction.

Comment 260: One commenter stated that based on the absence of scientifically valid information to support implementation of the Preferred Alternative, EPA cannot justify destroying the Eastern Wetland, particularly in light of the federal government's policy of no net loss of wetlands.

Response: See response to Comment 181 regarding the need to remediate the Continuing Source Areas, including the Eastern Wetland. See response to Comment 259 regarding activities to be conducted to minimize adverse impacts to wetlands and to restore disturbed areas.

Comment 261: One commenter expressed concern that the physical and ecological characteristics of the Eastern Wetland cannot be duplicated and could be severely constrained by: insufficient nutrients in the replacement fill to support wetland plants; a difference in the permeability of the replacement fill to that currently existing on-Site; the effect of dewatering the Eastern Wetland during excavation on nearby wetland areas; reducing plant diversity which will result in a lower value wetland; the certainty that replanting will not be 100 percent successful.

Response: The restoration program will be developed during design of the selected remedy to replace wetland functions and habitat areas. Pre-remediation conditions in wetlands likely to be impacted by remedial activities shall be assessed prior to disturbance. This pre-remediation assessment shall be the baseline by which compliance with wetland restoration performance standards shall be measured. This baseline assessment shall characterize the existing wetlands with regard to hydrology, soil characteristics, depth of organic soils, vegetation, diversity, and other appropriate criteria and shall include a thorough analysis of the existing and potential values and functions of the wetland. This assessment shall also include a field investigation to determine the presence of and map the occurrence of any Federal Endangered or Threatened Species and Massachusetts Rare Species within areas likely to be impacted by remedial activities. Based on the pre-remediation assessment, the wetlands restoration plan will identify the factors which are key to a successful restoration and/or enhancement of the altered wetlands. Factors will include, but not necessarily be limited to, replacing and regrading hydric soils, provisions for hydraulic control and provisions for vegetative reestablishment, including transplanting, seeding, or some combination thereof. For restored areas, wetland plant species shall be of sufficient diversity to provide habitat for a variety of indigenous animal species equivalent to conditions existing...
prior to remedial activities. Habitat value will be evaluated using three endemic species (2 plant/1 animal) to monitor for successful restoration. Quality assurance measures shall include; (1) detailed topographic and vegetative surveys to ensure replication of proper surface elevations and vegetation; (2) engagement of a wetland replication specialist; (3) establishment of work area limits for equipment to prevent inadvertent placement of fill; (4) production of a reproducible base map and a detailed planting scheme; (5) photographic documentation; and (6) description of pre-remediation conditions.

EPA, in consultation with DEP, shall determine when specific restoration activities shall be performed. Consideration shall be given to breeding seasons, climatic conditions, and the time frame between excavation activities and restoration activities.

The restoration program will include monitoring requirements to determine the success of the restoration. Periodic maintenance (e.g. planting) may also be necessary to ensure final restoration of the designated wetland areas.

Comment 262: One commenter stated that without a thorough characterization of the fill material from under the cap, it is not possible to determine whether it contains the appropriate characteristics to sustain a wetland community. This commenter also indicated that EPA should be sure that if material from other sources is used to backfill the wetland, it should be compatible with existing soil types and suitable substrate for aquatic plants.

Response: See responses to Comment 217 and 261.

Comment 263: One commenter indicated that the goal of the wetlands replication should be to recreate its values and functions to the greatest extent possible. Accordingly, EPA must thoroughly characterize the wetland's existing hydrology, soil characteristics, depth of organic soils, vegetation, etc.

Response: See response to Comment 261.

Comment 264: One commenter stated that EPA should consider the impacts on the ecosystem of the disturbance to the wetlands over the two year remediation period. During the design phase, the wetland restoration plan should address such issues as: scheduling the remediation activities to avoid impacting the breeding periods of transient species; specifying erosion and turbidity control measures; mapping the distribution of rare and endangered species; specifying a method for delineating contaminated areas vs. background areas and identifying mechanisms to separate "clean" wetland areas from being excavated; and specifying soil "structure" to be created as part of the backfill process.

Response: See response to Comment 261.
Comment 265: One commenter stated that the MA DEP must determine whether the Operable Unit III remedy meets the requirements of the Wetland's Protection Act and Regulations. The ROD must establish criteria upon which the wetland restoration plan will be developed so the DEP will be able to make this assessment, including whether the conditions for a variance are met.

Response: MA DEP, through concurrence with the ROD, has determined that these requirements, including the conditions for a variance, will be met by the selected remedy.

Comment 266: One commenter stated that if the ROD-selected remedy for Operable Unit III includes alteration of the Eastern Wetlands or other wetland areas, maintenance of the wetlands restoration program will need to be included as an O&M component.

Response: Long-term monitoring of the Continuing Source Areas to ensure the long-term effectiveness of the wetland restoration program will be conducted under the selected remedy.

H-5 Target Cleanup Goals

Comment 267: One commenter stated that the target cleanup levels must protect both human health and the environment.

Response: Target cleanup levels were evaluated on the basis of levels of protection provided to both human and ecological receptors and the selected cleanup level will be protective of human health and the environment.

Comment 268: One commenter stated that the target cleanup levels are not based on "sound scientific or engineering practices".

Response: See response to Comment 181.

Comment 269: One commenter pointed out that the selection of the target cleanup goal of 1 mg/kg is a default value which the FS indicates "may offer some protection to environmental receptors". No data has been presented which justifies a relationship between mercury in sediment and mercury in fish tissue. The same commenter questioned the process EPA used to determine the target cleanup goal. EPA acknowledged that the process used to determine the cleanup goal for subsistence fisherman was invalid but proceeded to use it again to determine the cleanup goal for sports fishermen. This acknowledgement undercuts the scientific basis for EPA's assumption of a relationship between mercury in fish and sediment concentrations. This commenter also stated that the lack of a scientific basis for EPA's selection of the target cleanup goal effects the alternatives evaluation, including the technological approach and costs.

Response: See response to Comment 181.
Comment 270: One commenter stated that if EPA is determined to proceed with Alternative 11, the target cleanup goal is unrealistic and should be replaced with Alternative 11C, which has less stringent, disruptive, and costly cleanup goals. The commenter would support Alternative 11 with a target cleanup level no lower than 30 mg/kg.

Response: The proposed cleanup of the Eastern Wetland is based on mitigating unacceptable risks to human health and the environment in this area. Alternative 11C, with a target cleanup level of 30 mg/kg of mercury would offer protection to humans from direct contact with sediments but would not afford protection to ecological receptors in the Continuing Source Areas.

Comment 271: One commenter indicated that a simple mathematical model was used to determine the three target cleanup goals for the three technology-based alternatives that were evaluated in detail. Although goals of 30 mg/kg and 7 mg/kg may have a scientific basis, the goal of the Preferred Alternative, 1 mg/kg, "cannot be supported...since its selection is totally arbitrary, and lacks logic." The commenter stated that the number "was basically pulled out of the air".

Response: See response to Comment 181.

Comment 272: One commenter cited internal EPA correspondence stating that a clean-up level of 10 mg/kg was established with no basis other than do-ability and that current information in the RI does not allow the Agency to quantify the risk reduction associated with various clean-up levels.

Response: A cleanup level of 10 was not selected, or even evaluated in the FS. See response to Comment 181 regarding other issues raised in the comment.

Comment 273: One commenter indicated that by adopting a target cleanup goal of 1 mg/kg mercury, which is the background level, EPA has inevitably underestimated the volume of contaminated sediment needing excavation as well as the costs to implement the Preferred Alternative.

Response: Remediation to the target cleanup goal can be achieved in the Continuing Source Areas based on the distribution and volume of contamination present in these areas. A volume of 20,206 cubic yards of contaminated sediment was delineated in these areas during OU III field investigations. The investigation was of sufficient detail to minimize the possibility of discovery of significant additional amounts of contaminated sediment. The volume of contaminated sediment to be excavated will be further refined during Remedial Design.
Comment 274: One commenter stated that the regression analysis used to attempt to correlate mercury levels in sediment with those of surface water is "probably no better than guesswork".

Response: The limitations of the regression analysis are recognized. The target clean-up goal which attempts to correlate mercury levels in sediment with those in surface water was not used in the evaluations conducted in the FS. This analysis was used in a general, qualitative manner only.

Comment 275: One commenter indicated that Operable Unit IV must address the fate and transport of mercury-contaminated sediment and other Contaminants of Concern to validate the 1 mg/kg cleanup level.

Response: The 1 mg/kg cleanup level of selected remedy addresses risks to human health and the environment within the Continuing Source Areas and prevents continued migration of contamination from these areas to the Sudbury River. OU IV will only focus on the River Areas, not the Continuing Source Areas.

H-6 Costs

Comment 276: One commenter asked for a breakdown of costs and tasks from the $7.5 million earmarked for monitoring.

Response: These costs are detailed in the Alternative 1 costing section of Appendix C in the Feasibility Study.

Comment 277: One commenter stated that since the Preferred Alternative cannot demonstrate that it will not result in any adverse environmental effects or that it will meet ARARs, the true cost of this alternative cannot be known.

Response: Potential adverse impacts to the environment from implementation of the selected remedy were evaluated in the FS. The results of this evaluation indicated that short-term adverse environments impacts were possible during implementation of the alternative, but that these impacts could be controlled by proper design. One such impact is represented by the possible resuspension of contaminated sediments during dredging. This can be controlled by silt curtains or other engineering controls. ARARs will be met by this Alternative, as discussed in Section XI.B. of the ROD.

Comment 278: One commenter stated that the Feasibility Study contained no information on costs to obtain alternate fill should the fill under the cap be determined unsuitable for backfill in the remediated areas. These costs should be included in calculating the full cost of Alternative 11A to make an accurate comparison of costs among the alternatives.
Response: There is no reason to believe, at this time, that the fill cannot be utilized as backfill. The Remedial Action cost estimates are calculated to an accuracy of +30 percent and -50 percent and a variation in this cost item should not severely impact the estimate.

Comment 279: One commenter expressed concern that the operating costs over 30 years would be $450,000 annually, a cost beyond the $13 million estimated to conduct the Preferred Alternative.

Response: The actual annual Operation and Maintenance costs for this alternative will be substantially less than costs as estimated in the FS. The majority of the annual costs in the FS estimate (approximately $390,000) are for sampling and analysis activities in the Sudbury River which will not be conducted as Operation and Maintenance for the selected remedy. Instead, sampling and analysis will be conducted during OU IV investigations and a final monitoring plan for the Sudbury River will be included as part of the OU IV remedy decision. In addition, the institutional controls which will be implemented as part of OU III (e.g. sign maintenance and public awareness activities) are an interim remedy only, pending the OU IV remedy decision. Therefore, these activities will be conducted for a much shorter period than the 30 years calculated in the FS. The only Operation and Maintenance costs associated with OU III are the costs associated with ensuring the long-term effectiveness of the wetland restoration program. Thus, the long-term costs of this remedy are expected to be far less than the 30-year cost estimate, closer, in fact, to the capital costs.

Comment 280: One commenter called on EPA to reduce the fudge factors included in the estimated remediation costs without reducing the efficiency of the cleanup.

Response: Remedial costs were estimated using accepted engineering practice to achieve an accuracy of +30 percent and -50 percent of the calculated cost. Many cost items presented cannot be precisely estimated for a variety of reasons. For example, disposal costs for solidified contaminated sediments considered in Alternatives 4A, 4B, and 4C are driven by ever-changing Federal, State, and local policies and regulations which can significantly impact the cost estimate.

Comment 281: One commenter asked "What would be the projected cost of cleaning up the wetlands?"

Response: Estimated costs of various remedial alternatives are presented in Section 6.6 of the Feasibility Study report. The estimated total cost of the Preferred Alternative is $20,419,000; approximately $13.1 million of the total will be used to remediate the wetlands, while the cost of O&M and institutional controls is approximately $7.3 million.
Comment 282: One commenter stated that, although costing more than $20 million, the Preferred Alternative would "have no measurable effect on the Sudbury River....".

Response: See responses to Comments 181 and 182.

Comment 283: One commenter suggested that the existing data cannot justify the expenditure of $1,000 per yard to carry out the Preferred Alternative.

Response: See responses to Comment 182 and 279.

Comment 284: One commenter indicated that the FS Report did not provide sufficient information to evaluate costs of the evaluated alternatives. Documentation of the assumptions used in determining costs should be provided.

Response: Additional detail on costing backup is available in Appendix C of the FS. Other documentation in the project files is extensive and is not appropriate to include in the FS Report.

I. Operable Unit IV

Comment 285: One commenter requested that EPA conduct additional fish tissue analyses to determine whether metals such as lead, chromium, and arsenic are present.

Response: Additional fish tissue analyses will be considered in scoping OU IV investigations.

Comment 286: One commenter stated that the RI Report does not discuss the effect of man-made alterations to the River; areas no longer directly affected by the River may contain high concentrations of Site-related contaminants as a result of having once been in the River's pathway. These areas should be considered for future sampling.

Response: These areas will be considered in scoping OU IV investigations.

Comment 287: One commenter stated that EPA should conduct additional fish sampling to confirm the presence of metals such as lead, chromium, and arsenic in fish tissue. EPA should also evaluate the partitioning between fillet and viscera, particularly for PCBs and PAHs.

Response: These analyses will be considered in scoping OU IV investigations. However, it should be noted that OU IV will focus on Site-related contamination.
Comment 288: One commenter expressed concern that follow up studies have not been conducted on metal uptake in caddisfly larvae.

Response: The need for follow up studies on metal uptake in caddisfly larvae will be evaluated in scoping OU IV investigations.

Comment 289: One commenter expressed support for the studies proposed for Operable Unit IV which would determine a sediment cleanup level that would reduce the impact of contamination in the food chain.

Response: EPA agrees with this comment.

Comment 290: One commenter requested that EPA keep the Wild and Scenic River Study Committee informed about progress in initiating the proposed Operable Unit IV.

Response: EPA will be work with the Wild and Scenic Rivers Study Committee in planning and implementing public awareness activities for the River and throughout OU IV investigations.

Comment 291: One commenter indicated that the Preferred Alternative should not be implemented until a decision is made on whether and how to remediate the Sudbury River.

Response: See response to Comment 184.

Comment 292: One commenter stated that dredging the Sudbury River, the goal of Operable Unit IV, is unsupportable scientifically and fiscally. The commenter also stated that major "dredging of the River cannot be justified" based on protecting subsistence fisherman and based on the inevitable disturbance of the layer of uncontaminated sediments that serve as a natural cap for contaminated sediments.

Response: The commenter incorrectly assumes that EPA has already determined that dredging of the Sudbury River is the goal of OU IV. Under OU IV, EPA will collect additional information on the Sudbury River in order to select a final remedy for the River. Once such additional information is gathered and evaluated, remedial goals under OU IV will be established.
Comment 293: One commenter stated that target cleanup goals established for Operable Unit IV "should envision no more than protection of the sports fisherman as the ultimate goal...."

Response: EPA will consider the protection of all human and ecological receptors from impacts of Site contaminants in establishing target cleanup goals under OU IV.

Comment 294: One commenter requested that EPA involve its group in developing the scope of work for Operable Unit IV.

Response: EPA plans to work with some of the existing River groups in scoping OU IV investigations.

Comment 295: One commenter emphasized that the scope of Operable Unit IV should include studies to determine the relationships between and among Site contaminants in the continuing source areas and in the River water, sediment, and biota.

Response: The Continuing Source Areas will be remediated under the selected remedy. The relationships between water, sediment and biota in the River will be considered in scoping OU IV investigations.

Comment 296: One commenter suggested that Operable Unit IV must adopt action levels that address the continuing preservation of the Sudbury River as an important natural resource.

Response: The natural resource value of the River will be considered in scoping OU IV investigations.

Comment 297: One commenter stated that the Preferred Alternative does not address ecological risk, which is higher in the River itself than in the continuing source areas. Operable Unit IV must fully evaluate ecological risk in the River.

Response: The goal of OU IV is to collect additional information on the Sudbury River in order to select a final remedy for the River. Alternatives addressing contamination in the River were eliminated from consideration under OU III because of an inability to evaluate their effectiveness using current data, the potential for adverse impacts, and the inordinately high costs associated with these alternatives. Additional investigation of the River is necessary to make a final remedy decision.

Comment 298: One commenter stated that Operable Unit IV should include further studies of the Raceway, and Reaches 2 and 3.

Response: These areas will be considered in scoping OU IV investigations. It should be noted, however, that the lower Raceway will be remediated as part of the selected remedy for OU III.
Comment 299: One commenter requested that risk-based studies be included in Operable Unit IV to enable risk-based cleanup goals to be established for River sediments which are protective of environmental receptors and ultimately fish consumption.

Response: Risk-based studies will be considered in scoping OU IV investigations.

Comment 300: One commenter requested that risks from both Site and non-Site related contaminants should be considered in Operable Unit IV.

Response: OU IV investigations will focus on Site-related contamination in the Sudbury River.

Comment 301: One commenter suggested that EPA consider synergistic effects among Site- and non Site-related contaminants in its risk assessment in Operable Unit IV.

Response: These effects will be considered in scoping OU IV investigations.

Comment 302: One commenter indicated that the following issues should be addressed in the Operable Unit IV scope of work: documentation of fish-to-sediment ratios of mercury and other contaminants for each reach; determination of the ratio of contaminant concentration in benthic macroinvertebrates (including representative detrial and filter feeding benthic organisms) to concentrations in sediment for each reach or area; determination of the ratio of contaminant concentration in benthic organisms to concentrations in fish in several trophic levels for each reach; correlation of river velocity to concentrations of mercury and other contaminants; and completion of bioassays to evaluate environmental fate in biota and toxicity of contaminated sediments to these organisms.

Response: These issues will be considered in scoping OU IV investigations.

Comment 303: One commenter suggested that EPA evaluate and validate existing data from Operable Units I through III to determine how much of it can be used to support Operable Unit IV sampling.

Response: Available data will be used as appropriate to avoid duplicating past field efforts.

Comment 304: One commenter recommended that EPA establish a technical advisory working group with which to work from the scoping through the implementation of Operable Unit IV.
Response: EPA will be working with DEP, officials from affected towns, representatives from existing River groups (e.g. Framingham Advocates for the Sudbury River, Sudbury Valley Trustees, Wild and Scenic Rivers Study Committee) and other interested community groups to evaluate and implement public awareness activities. This campaign will include measures to promote information exchange between EPA and the public.

Comment 305: One commenter stated that monitoring of the river areas should be incorporated into the scope of the additional studies proposed as part of the Preferred Alternative. Information gathered from these studies should be used to determine long-term monitoring needs in the river areas.

Response: Sampling and analysis activities in the Sudbury River will be conducted under OU IV and, therefore, are not part of the selected remedy for OU III.

J. Miscellaneous

Comment 306: One commenter supported the imposition of institutional controls that increase public awareness associated with eating mercury-contaminated fish from the River.

Response: EPA agrees with this comment.

Comment 307: One commenter requested to be kept informed if EPA decides to consider imposing restricted recreational access to any of the area between the Danforth Street Bridge in Framingham through the Study Area in Concord.

Response: EPA will be working with DEP, officials from affected towns, representatives from existing River groups (e.g. Framingham Advocates for the Sudbury River, Sudbury Valley Trustees, Wild and Scenic Rivers Study Committee) and other interested community groups to evaluate and implement public awareness activities. This campaign will include measures to promote information exchange between EPA and the public.

Comment 308: Two commenters thought the structure of the Proposed Plan was confusing, that it mixed discussion of the Continuing Source Areas and the proposed Sudbury River investigations slated for Operable Unit IV.

Response: EPA acknowledges that the structure may have been confusing. An effort was made in the ROD to clarify the distinction between the Continuing Source Areas to be addressed under OU III and the proposed Sudbury River investigations under OU IV.
Comment 309: Two commenters stated that the Proposed Plan should have mentioned discrepancies between fish tissue data used in the RI and data analyzed by the US Fish and Wildlife Service. The Fish and Wildlife Service data revealed mercury concentrations in fish tissue at levels five times lower than those used by EPA.

Response: The data used in the RI/FS, including the Risk Assessments passed EPA's data validation procedures. Consideration to data discrepancies will be considered in scoping OU IV investigations.

Comment 310: Two commenters recommended that EPA attempt again to restore the wetlands that were subject to remediation in Operable Unit I.

Response: The five year review for OU I is planned for summer or fall of 1993. The success of wetlands restoration activities will be evaluated in this review.

Comment 311: Two commenters thought the government's priorities should be questioned spending millions of dollars to remediate a River and wetland areas when other social and public health concerns remain underfunded.

Response: Congress has provided for funding to address hazardous waste site cleanups under CERCLA, as amended by SARA.

Comment 312: One commenter stated that EPA was breaking its promise not to reopen the cap constructed during Operable Unit I.

Response: EPA did not promise not to reopen the OU I cap. The OU III remedy proposes to use only the currently available capacity of the Operable Unit I cap, without altering the cap design, and therefore is consistent with the first Operable Unit remedy.

Comment 313: One commenter asked how the wetland "went from a stable repository of mercury" during Operable Unit I to a site needing "a twenty million dollar clean-up".

Response: The Eastern Wetland was never considered a "stable repository of mercury". At the time of the remedy selection decision under OU I, there was not enough data about the Continuing Source Areas on which to base a decision. Therefore, these areas were reserved for later Remedial Action.
ATTACHMENT A
COMMUNITY RELATIONS CONDUCTED FOR
THE NYANZA III SUDBURY RIVER STUDY
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 3, 1986</td>
<td>The Commonwealth of Massachusetts issued a press release warning anglers to avoid eating fish from the Sudbury River because of high levels of mercury found in the fish.</td>
</tr>
<tr>
<td>April 24, 1987</td>
<td>The Massachusetts Department of Environmental Quality Engineering issued a press release announcing the posting of permanent signs along the Sudbury River warning anglers not to consume fish taken from the River.</td>
</tr>
<tr>
<td>February 1991</td>
<td>EPA released an information update describing plans for the Sudbury River Study Phase of the Nyanza Site cleanup.</td>
</tr>
<tr>
<td>March &amp; April 1991</td>
<td>EPA conducted interviews with the public and local officials in Ashland, Framingham, Sudbury, Wayland, Lincoln, and Concord to gather information to update the Community Relations Plan.</td>
</tr>
<tr>
<td>July 26, 1991</td>
<td>EPA released a press release announcing the results of fish, surface water, and sediment sampling for Operable Unit III.</td>
</tr>
<tr>
<td>December 1991</td>
<td>EPA published a legal notice announcing application by the Framingham Advocates for the Sudbury River for an EPA Technical Assistance Grant.</td>
</tr>
<tr>
<td>February 1992</td>
<td>EPA awarded Framingham Advocates for the Sudbury River a $50,000 Technical Assistance Grant.</td>
</tr>
<tr>
<td>June 8-11, 1992</td>
<td>EPA conducted public information meetings in Framingham, Sudbury, and Concord to discuss findings of Sudbury River RI and results of the Risk Assessments.</td>
</tr>
</tbody>
</table>
June 11, 1992  EPA released a press release and posts multi-lingual signs in the Sudbury River from Mill Pond in Ashland to Nashawatuc Road in Concord to warn anglers of mercury contamination in fish.

December 1992  EPA published a Proposed Plan for remediation of the Continuing Source Areas and further study of the Sudbury River.


December 29, 1992  EPA published a notice in the Middlesex News inviting public comment on the Proposed Plan and announcing the availability of the Administrative Record.

January 6, 1993  EPA conducted a public information meeting on its Feasibility Study and Proposed Plan at Ashland High School.

January 27, 1993  EPA conducted a public hearing on its Feasibility Study and Proposed Plan at Ashland High School.

February 2, 1993  EPA published a press release announcing a 30-day extension of the public comment period, at the public’s request, to March 10, 1993.
NYANZA CHEMICAL WASTE DUMP SITE
PUBLIC HEARING
ON PROPOSED PLAN FOR THE CONTINUING SOURCE
AREAS OF THE SUDBURY RIVER STUDY AREA

Wednesday, January 27, 1993, 7:00 p.m.
Ashland High School, Ashland, Massachusetts

Robert Cianciarulo, Hearing Officer
U.S. Environmental Protection Agency
MR. CIANCIARULO: We are here at this hearing to discuss EPA's Proposed Cleanup Plan for Operable Unit III, for the Sediment Contamination in the Continuing Source Areas in the Sudbury River study area of the Nyanza Chemical Waste Superfund Site in Ashland, Massachusetts. Everything from this point on will be transcribed into the record. The first speaker is a T.P. Murphy, a citizen and taxpayer.

MR. MURPHY: I'll defer to my friend from Ashland. I'd like to reserve my time until after the technical experts from FASR have spoken.

MR. CIANCIARULO: Let me just state we do have a -- well, there is no microphone on there. If you'd like to face the crowd, face the audience, you can stand over there; if not, you can just stand in your seat.

Next we have David Foster, from the planning board and open space committee.

MR. FOSTER: I defer to Susan Santos.
MR. CIANCIARULO: Okay, deferring to Susan Santos... you were second. Okay. David Foster.

MR. FOSTER: I'll just stand here, and I am going to just rattle off questions that I put together here. A few of them have been answered already this evening in regard to the information that Ira has presented to us, but here goes, and a lot of it comes from reports that I have been reading for the last couple of weeks.

Has sampling been done at the intersection of Fountain Street and 135, any water sampling or soil samplings whatsoever? Has -- let's see, the fate and transport assessment should be reevaluated, which includes background contaminants, and I underline "background contaminants," which include PCB's and PAH's. Only mercury or what they call methylmercury, was measured for movement. What about other site-related contaminants and their transport? Has there been any documentation on any of that movement whatsoever?
The Eastern Wetland, will it be a future source of contamination after this is completed, and if so, what should be done about it? In the risk assessment, we would like more information on the future, as well as present conditions. This refers to the risk assessment that has been published.

If the EPA decides not to clean up the river, what effect will that have on Reservoirs 1 and 2 as a passive recreation area listed by the State of Mass. as a Class B waters for suitable drinking and recreation use? Will that be changed at all?

Reservoirs 1 and 2, I believe, are designated as backup drinking water sources. And if so, the EPA must be -- must do comparisons of service water with MCL's for waters classified as potential drinking waters. I am not sure if that is still -- Reservoirs 1 and 2 are still on line as a backup source, but if so, could that be addressed?

Also to conduct additional fish samplings and analysis to confirm other
metals, and I refer to other metals as the background contaminants such as lead, chromium and arsenic. There is not enough information on that, and we would like to see some.

I feel strongly that the cleanup target levels must consider the movement of mercury, as well as other site-related contaminants. Who will this be -- or when will this be accomplished, and that refers to there is no monitoring, as I know of, of the mercury, and the movement of the mercury to the river. I would request that the -- some monitoring would be put in before anything is done on the site.

You see, first of all, however long this gets delayed before it is started, if there is any movement of mercury, and if there is no movement of mercury at this time, once they start the work, is there movement, movement done by the work itself?

Let's see. More information is requested on the exposure pathways. The exposure pathways, there is not enough
adequate information and that refers to one of the things which is the monitoring of the mercury and which direction it is heading and how fast.

See, the seven-and-a-half million dollars has been set aside for monitoring. I would like to see in detail what this consists of. What all the monitoring that you are talking about, what it consists of, and the findings, or what you are trying to find from those monitorings.

Monitoring the Eastern Wetlands is critical for movement now and as work is being done. That is just a note to let you know that I am just repeating myself.

Transportation of contaminants. You have eliminated cleaning up contaminants from Outfall Creek and the Lower Raceway. I am concerned about the transportation of that, the health and safety issues and how will they be handled. Those contaminants will have to be picked up. I don’t know if they are cleaned on site or if they have to be moved, they will have to be moved through the
town, and there is a lot of health and safety issues in regard to that.

The ecological risk assessment, there is not enough information. This should be studied further by the EPA and I am asking them to do so.

And one of the questions I have is how do you prevent further downstream migration? I'm not sure if we've come to any answers on that one, but I would be more than happy to see if we could find some.

And one issue that was never addressed is the Chemical Brook Culvert, the culvert that runs underneath the streets in town and carries the contaminants to the Outfall Creek. There is no mention of that in anything so far, and is the EPA going to look at that, and I would request some further information on that.

And I think that's all for now. Thank you.

MR. CIANCIARULO: Thank you.
Next, Susan Santos, commenting on behalf of the Framingham Advocates for the Sudbury
MS. SANTOS: Since you didn't offer to yield to the microphone, I'll make them from here. These comments are being submitted on the behalf of the Framingham Advocates for the Sudbury River, and I'd first like to recognize the presence of several FASR representatives and Ed Morrier's presence tonight at this hearing.

In September of 1992, the Framingham Advocates for the Sudbury River submitted comments prepared by FASR's technical consultants on the OU III Remedial Investigation Report. We request that those comments be made a formal part of this administrative record this evening. Those comments included recommendations regarding the development of the feasibility study and the need for cleanup to mitigate identified risks to the public health and environment for mercury and other heavy metal contamination in sediments and fish tissue.

In our review of EPA's feasibility study for OU III, we are pleased to note that
two of our primary concerns have been addressed. Specifically, one, that action has been taken to remove contaminated sediments from areas considered as a continuing source, specifically the Eastern Wetland, Trolley Brook, Outfall Creek, and the Lower Raceway.

And, two, that further studies are needed to better understand the transport and fate of mercury contamination, to determine levels of background contamination, especially mercury, lead, chromium and arsenic, and lastly, to establish a link between sediments and fish tissues, prior to establishing target cleanup levels or taking action on the rest of the river.

As such, we agree with the key elements of EPA's proposed alternative in that it does call for immediate action to stop the continuing source of contamination and undertake further river studies.

We also agree with the proposed target cleanup goal of one milligram per kilogram mercury. While the Preferred Alternative
and EPA's proposed plan respond to these major issues, we still have several major concerns regarding the specifics of the Preferred Alternative that we request EPA to consider prior to taking action.

Number 1, the Preferred Alternative has not been adequately described to allow for thorough evaluation in order for us to ensure consistency with the NCP and the FS evaluation criteria. Dredging and the dewatering of sediments may be an appropriate alternative, if the EPA will provide more information on how and under what conditions treatment of the in-water sediments would occur and the associated impacts on cost and conformance with ARARs.

More importantly, based on the information that was provided in the feasibility study and the administrative record, FASR takes exception to the disposal of dewatered sediments under the cap constructed in OU I. No information other than the information we have received verbally this evening was provided in the FS
or from the agency to document the suitability of fill as replacement material in excavated areas. I would request if there are analyses that would support Ira's comments, that those be made available for us to review.

In particular, documented information on the nature and chemical composition of the fill should be provided. EPA must also evaluate the suitability of the fill to support reconstruction of the wetlands and also consider the effect of the two-year period wetland displacement.

Without such information, the Preferred Alternative has not been shown to meet location-specific ARARs, specifically the executive order on wetlands and the dredge-and-fill requirements under the Clean Water Act regarding impacts to the wetland or demonstrate that it would not result in any adverse environmental impacts.

Because the need for treatment and suitability of fill material and the impacts of that on reconstruction of the wetlands has
not been demonstrated in the material, EPA has not met the requirements shown that this alternative will not result in any adverse environmental effects or meet ARARs. Without such information, the full cost of this alternative cannot be known.

Information was not provided in the feasibility study that would detail, if, for example, none of the fill material was going to be suitable for use. Those costs should be included in alternative 11A in order for an accurate comparison to be made of the alternatives.

Treatment by solvent extraction, soil washing or other suitable alternatives, and subsequent redeposition may be preferred. Treatability studies should have been performed in the FS as is the normal procedure as recommended in feasibility studies guidelines.

Since these were not performed, we recommend that this be done as part of the remedial design, in order not to delay action on OU III, with the caveat that the results
be subject to public comment prior to EPA's final decision to either treat the sediment or place it under the OU I cap.

Also, the wetlands restoration plan should evaluate both use of fill from the cap and treated sediments. The public should be allowed, again, to review and comment.

And lastly, the FS also did not consider construction of a separate capped area on the site. That was not included as part of the feasibility study.

Second, the Preferred Alternative also includes establishing institutional controls to protect humans from the risks by the consumption of contaminated fish from the Sudbury River. FASR agrees that some institutional controls will be necessary during the period of further study to protect human health. However, the feasibility study was glib in its recommendations regarding the proposed public awareness program, maintenance of warning signs, and possible restrictions on recreational activities along the river.
Once again, the feasibility study has not provided sufficient detail to enable the public or agency to base its decision to document that this alternative will in fact be protective of public health. At a minimum, this public awareness program must be developed in conjunction with the local board of health and in consultation with members of the public.

Finally, the Framingham Advocates for the Sudbury River are concerned over the vague reference in the Preferred Alternative to the possible recreational restrictions. FASR is intent on preserving the Sudbury River as a public resource. The RI did not indicate risks from recreational activities such as boating or swimming, thus it is not clear what the basis would be, if any, for the restriction of these activities.

In sum, FASR asks the EPA to take action on the continuing source areas, and to undertake appropriate further studies before taking action in the river. We are pleased that EPA has been responsive to our request.
that the public be brought into the scoping of these studies to assure that OU IV addresses concerns identified by FASR and the public from the review of the RI report prior to undertaking those studies, and we thank, in particular, Pam Shields for that.

However, the Preferred Alternative has not documented that placement of sediments under the OU I cap and backfill with materials from under the cap is a suitable treatment method. We would support this as part of the design to the extent that the public is given formal opportunities to comment. We will be submitting more detailed comments in writing before the closing of the comment period.

MR. CIANCIARULO: Thank you. Mr. Murphy, would you like to speak now? Mr. Murphy, citizen, taxpayer.

MR. MURPHY: I am a chemist and chemical engineer. My generation contaminated this land and this river and wherever you want to go, so I guess I was appalled last night when I went to the
Sudbury Public Library, and that's where I live, and I was convinced by the Sudbury Valley Trustees to do pro bono work on this, but I was a little bit appalled in going to the library to see what the cost of this is turning out to be, and on top of this, we have about $450,000 a year, which if I understand it correctly, will be operating costs over 30 years, and not $13 million.

But I did go through the pricing on this -- I did it on both 11A and 3A, 11A is the Preferred Alternative, 3A is the soil washing, and I happen to have a certain amount of expertise in that area. I found that the treatment of the contaminated water coming from the soil washing is going to be unusually high, and I found that probably I couldn't quibble with a lot of the price elements in there, and please believe me, I want the river to be as clean as all of you do, but -- and because I want my children and grandchildren to enjoy the recreational benefits from that river, but also, I don't want them to pay for it.
So I'm suggesting we have a slight dichotomy here of some unrealistic elements. It's my understanding, and I may be wrong on this, that this project went out for open bid. I can see some facets of this, 40 percent contribution of margin. Those of you who are in business, know that's a pretty nice burden, contribution to margin. I'd like to have that sort of margin to play with.

And it's for fudge factors. All of us like to be protected, but you can be sure when this goes out for contract, those fudge factors will get included. The final recommendation would be that people like FASR, if they are so inclined, with their technical representatives, do some of this work themselves. They are dedicated to the river, they have got the technical expertise behind them, and I am sure they certainly can do it a lot cheaper than some of the so-called professional experts.

I think it would be a natural thing -- EPA, for your information, has finally come
to the realization that the cost of doing the cleanup is becoming quite onerous, and is finally instituting studies to reduce the cost of cleanup, primarily energy, but other facets.

So as a taxpayer and a concerned citizen, I would like to recommend that EPA take deeper steps or greater steps to reduce the cost of the cleanup, without reducing the efficiency of the cleanup, so that we have some satisfaction two generations and three generations hence.

MR. CIANCIARULO: Thank you.

Next we have David Teller.

MR. TELLER: I’d like to pass at this time.

MR. CIANCIARULO: Okay, next is Barry Bresnick. And Mr. Bresnick, if you could state your affiliation for the record.

MR. BRESNICK: Barry/Bresnick, board of selectman, citizen, taxpayer. I have a couple of things. They have been partially touched on. First off, we’ve heard reference several times to this area that
we’re looking to remediate as a continuing source of contaminants to the Sudbury River. Again, we have not gotten any information whatsoever regarding any studies, and I don’t believe any have been performed which indicate to what degree it’s continuing, and if it is, indeed, a continuing source.

And I submit it is very difficult to contemplate spending multiple millions of dollars on cleanup for the purpose of stopping migration that we have not identified or measured, and I would not be in favor of this project until we have identified statistically, numerically, what it is that we are cleaning up, so that we know we are getting a cost benefit to it.

The other point I’d like to make, is that there are several references in the document, which I picked up today, of two levels of cleanup, one is to a background level of 1 mg/kg -- I don’t know, I’m not a chemist, whatever that is -- of mercury, and another -- to another level, which is usually 7 mg/kg to protect fishermen.
Now, the justification for the cleanup to 1 mg is that at that level you clean it to the degree where the area would be fishable, but that the 7 mg/kg is considered safe for human inhabitants to come in contact with the area, so that the additional cleanup is basically for the health of anyone that would be involved with fishing in that area.

However, we're talking about a wetland, and we're talking about a brook. Now, I can see cleaning that up to a fishable level, if in conjunction you are cleaning up the Sudbury River to a fishable level. But if you have no intention of cleaning the Sudbury River to the background level to a fishable level, then why go to the huge expense of bringing the wetlands to a fishable level?

Now, if you go to this 7 mg/kg, which is the -- which is the safe level for coming in contact with humans, and then you go to Alternative 3, which is cleaning it at the site, reclamation at the site and then putting the sediment back where it was and it
belongs, 3B, relationship, so that's three with a level of 7 mg/kg, so that 3B, versus your Preferred Alternative, 11A, which is digging up our cap.

If you went to 3B, you save an additional $3 million, and you don't disturb the cap area. And my feeling is, if you are not going to clean the whole Sudbury River to the same degree that you are going to clean the wetlands, then you don't need to go to 11A, you can stay with 11B -- I mean with 3B, save the money, and not have to dig up your cap. Thank you.

MR. CIANCIARULO: Thank you.

Mr. Teller.

MR. TELLER: I pass.

MR. CIANCIARULO: Okay. Is there anyone else who has a question for the record, would like to make a comment to put on the record?

Okay. If no one else wants to comment, I will officially close the hearing---

MS. SANTOS: Can I just for the
record request that if any treatability information exists on soil washing or anything that was done, that that would be provided.

MR. CIANCIARULO: That was Susan Santos, Framingham Advocates.

Thank you for your participation tonight in this formal hearing portion this evening. Remember, you can also submit written comments, and we have extended the public comment until March the 10th. Letters dated -- postmarked by March the 10th sent to Pam Shields, EPA, the address is in the proposed plan document, those will also be part of the record and part of EPA's responsiveness summary.

(Whereupon, the hearing was adjourned.)
CERTIFICATE

I, Pamela Carle, Certified Shorthand Reporter, do hereby certify that the foregoing Pages 3 through 21 to be a true, complete and accurate transcript RE: EPA Public Hearing, held at the time and place hereinbefore set forth, to the best of my knowledge, skill and ability.

Pamela Carle

FLYNN & SLOAN REPORTING, INC.
APPENDIX B

CONCURRENCE LETTER FROM THE

COMMONWEALTH OF MASSACHUSETTS
March 29, 1993

Mr. Paul Keough
Acting Regional Administrator
U.S. Environmental Protection Agency
Region I
JFK Federal Building
Boston, MA 02203-2211

RE: Nyanza Chemical Waste Dump
Federal Superfund Site --
Operable Unit Three
ROD CONCURRENCE

Dear Mr. Keough:

The Department of Environmental Protection (the "Department") has reviewed the preferred remedial alternative selected by the Environmental Protection Agency ("EPA") for the Operable Unit Three Nyanza Chemical Waste Dump Federal Superfund Site cleanup. Based upon its review, the Department concurs with EPA's choice of this alternative as the selected remedial action.

The preferred alternative provides a source control remedy for the Continuing Source Areas and institutional controls and a public awareness program for the Sudbury River Area. Key components of the preferred alternative include:

1. performance of certain pre-design studies including refined delineation of locations in the Continuing Source Areas exceeding the target sediment/soil cleanup goal;

2. excavation and dewatering of contaminated sediments and soils from portions of the Continuing Source Areas;

3. excavation of imported fill from beneath a portion of the cap that was previously constructed as part of the Operable Unit One remedy;

4. disposal of dewatered, contaminated sediments/soils beneath the opened portion of the Operable Unit One cap and rebuilding of the cap;
5. treatment, if necessary, of water from the dewatering operation with discharge to an on-site surface water body;

6. restoration of all impacted wetlands;

7. implementation of a public awareness program regarding Sudbury River Area contamination;

8. institutional controls to limit exposure to contaminants in the Sudbury River Area; and

9. creation of a Fourth Operable Unit to develop a final cleanup plan for the Sudbury River Area.

The selected remedy contains several modifications from the preferred alternative presented in EPA’s Proposed Plan. These modifications, in part, address concerns raised during the public comment period, and include the following:

1. a requirement that the areal extent and vertical profile of the existing cap will not be increased as a result of the disposal of the contaminated material;

2. performance of predesign sampling to refine volume estimates of the contaminated material to be excavated;

3. during remedial design, a detailed evaluation of existing cap storage capacity and the refined volume of contaminated sediments/soils requiring disposal, using the information obtained pursuant to the above paragraph; the purpose of this evaluation will be to determine, based upon best engineering practices, whether there is sufficient storage capacity in the cap for that material within the dimensional parameters set forth above; and

4. if it is determined pursuant to this evaluation that the cap’s storage capacity is insufficient for disposal of this material, then the selected remedy will be re-examined through an "explanation of significant differences" or an amendment to the record of decision, as necessary, pursuant to the relevant provisions of CERCLA, SARA and/or the NCP.

Notwithstanding the foregoing modifications, the Department notes that the preferred remedial alternative does not fully accommodate certain public concerns raised during the public
comment period. Therefore, the Department strongly recommends that EPA, as the lead agency for this site, establish an ongoing dialogue with citizens and local officials to address public concerns throughout the remediation process. The Department is willing and eager to assist EPA in developing and implementing a public involvement process for this purpose.

The Department has evaluated the preferred alternative for consistency with M.G.L. c. 21E and the Massachusetts Contingency Plan (the "MCP"), as well as with proposed revisions to the MCP currently under consideration. Based upon this review, the Department has determined that the preferred alternative would constitute a temporary solution consistent with the requirements of the MCP, as part of the phased implementation of a temporary and permanent solution. The Department notes, however, that a permanent solution determination cannot be made until it has been demonstrated that the remedial measure or combination of measures will meet both the total site cancer and non-cancer risk limits as set forth in the MCP for the entire site.

The selected remedy appears to meet all applicable or relevant and appropriate requirements ("ARARs") of the Commonwealth, based on information presently available. The Department will continue to evaluate whether the preferred alternative will satisfy the Commonwealth’s ARARs as remedial design progresses and during implementation and operation.

The Department looks forward to continuing to work with you in implementing the selected remedial actions. If you have any questions, please contact Charla Reinganum of my staff at 292-5826.

Very truly yours,

Daniel S. Greenbaum
Commissioner

DSG/BWSC/cbr
cc: Dick Chaplin, NERO
    Andrew Cohen, OGC
    Ashland Board of Selectmen
    State Senator David Magnani
    State Representative John Stephanini
    Ed Morrier, Framingham Advocates for the Sudbury River
APPENDIX C

ADMINISTRATIVE RECORD INDEX

NYANZA OPERABLE UNIT III
Nyanza Chemical Waste Dump
(Operable Unit III)

Superfund Site Administrative Record

Index

Compiled: May 22, 1992
Updated: December 31, 1992
ROD Signed: March 30, 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 March 30, 1993 Record of Decision (ROD) Administrative Record for the Nyanza Chemical Waste Dump (Operable Unit III) Superfund 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 included in the September 4, 1985 Record of Decision Administrative Record (Operable Unit I) and the September 23, 1991 Record of Decision Administrative Record (Operable Unit II) are incorporated by reference herein, and are expressly made a part of the Administrative Record for the present Operable Unit. The September 4, 1985 Record of Decision Administrative Record (Operable Unit I) and the September 23, 1991 Record of Decision Administrative Record (Operable Unit II) are available for public review at EPA Region I's Office in Boston, Massachusetts and at the Ashland Public Library, 66 Front Street, Ashland, Massachusetts, 01721. In addition, this index contains documents that are available only for judicial review.

The Administrative Record for Operable Unit III is available for public review at EPA Region I's Records Center in Boston, Massachusetts, the Ashland Public Library, 66 Front Street, Ashland, Massachusetts, 01721, the Framingham Public Library, 49 Lexington Street, Framingham, Massachusetts, 01701, the Wayland Public Library, 5 Concord Road, Wayland, Massachusetts, 01778, the Goodnow Public Library, 21 Concord Road, Sudbury, Massachusetts, 01776, the Lincoln Public Library, Bedford Road, Lincoln, Massachusetts, 01773, and at the Concord Free Public Library, Environmental Resource Center, 129 Main Street, Concord, Massachusetts, 01742. 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
Nyanza Chemical Waste Dump Superfund Site
(Operable Unit III)
(ROD Signed: March 30, 1993)

2.0 Removal Response

2.1 Correspondence

1. Letter from Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection to Richard Cavagnero, EPA Region I (November 5, 1991) with the attached Letter from Ngozi T. Oleru, Commonwealth of Massachusetts Department of Public Health to Madeline Snow, Commonwealth of Massachusetts Department of Environmental Protection. Concerning a request for EPA to post warning signs along the banks of the Sudbury River.

2. Letter from Charla Reinganum, Commonwealth of Massachusetts Department of Environmental Protection to Richard A. Haworth, EPA Region I (May 8, 1992). Concerning Commonwealth of Massachusetts Department of Environmental Protection's permission to remove any fish consumption warning signs along the banks of the Sudbury River.

2.9 Action Memoranda

The Enforcement section of the Memorandum cited below as entry number 1 is withheld as CONFIDENTIAL and is available only for judicial review.

1. Memorandum from Richard A. Haworth, EPA Region I to Julie Belaga, EPA Region I (April 28, 1992) with the attached "Warning - Sudbury River Fish Contaminated With Mercury." Concerning a request for funding to continue removal actions at the site.

3.0 Remedial Investigation (RI)

3.1 Correspondence

1. Letter from William G. Murray, NUS Corporation to David O. Lederer, EPA Region I (September 5, 1989). Concerning August 11, 1989 meeting with Massachusetts Division of Water Pollution Control and revisions to Water Quality Sampling Program.


3.2 Sampling and Analysis Data


Maps associated with documents numbered 2 and 3 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

2. "Final Sampling and Analysis Plan Amendment No. 2 - Remedial Investigation/Feasibility Study," NUS Corporation (October 1990).


Additional Sampling and Analysis Data may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.

3.4 Interim Deliverables


Maps associated with document number 2 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.


The videotape cited as document number 3 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.


3.6 Remedial Investigation (RI) Reports


The document cited as number 4 is oversized and may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.


Comments

3.7 Work Plans and Progress Reports

Reports

1. "Commonwealth of Massachusetts Department of Environmental Quality Engineering Work Order" (June 2, 1989).

Comments


4.0 Feasibility Study (FS)

4.1 Correspondence

4.1 Correspondence (cont'd.)

5. Letter from Merrill S. Hohman, EPA Region I to Peter O. Broussard, Hoechst Celanese Corporation (December 31, 1992). Concerning transmittal of the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I and notification that Hoechst Celanese Corporation may be potentially interested in the site cleanup.


12. Memorandum from Susan Svirsky, EPA Region I to File (January 11, 1993). Concerning ecological remediation goals at the site.

4.5 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Letter from Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection to Pamela Shields, EPA Region I (November 3, 1992). Concerning identification of Applicable or Relevant and Appropriate Requirements (ARARs).
4.5 Applicable or Relevant and Appropriate Requirements (ARARs) (cont'd.)

2. Letter from Richard Cavagnero, EPA Region I to Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection (December 23, 1992). Concerning EPA's response to the November 3, 1992 letter regarding Applicable or Relevant and Appropriate Requirements (ARARs) and the following attachments:
   A. Letter from William Walsh-Rogalski, EPA Region I to Ann Bingham, Commonwealth of Massachusetts Department of Environmental Quality Engineering (August 18, 1988).
   B. Letter from William Walsh-Rogalski, EPA Region I to Thomas Powers, Commonwealth of Massachusetts Department of Environmental Quality Engineering (July 14, 1987).

4.6 Feasibility Study (FS) Reports

Reports


   The maps associated with the record cited below as entry number 2 are oversized and are available for review, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.


Comments


4.6 Feasibility Study (FS) Reports (cont'd.)


4.9 Proposed Plans for Selected Remedial Action


5.0 Record of Decision (ROD)

5.3 Responsiveness Summaries

1. Cross-Reference: Responsiveness Summary is an attachment to the March 30, 1993 "Record of Decision," EPA Region I [Filed and cited as entry number 1 in 5.4 Record of Decision (ROD)].

The following citations indicate documents received by EPA Region I during the formal comment period.


5.3 Responsiveness Summaries (cont'd.)


5.3 Responsiveness Summaries (cont'd.)


23. Comments Dated January 22, 1993 from Linda and Harvey Hecker on the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I.


29. Cross-Reference: Transcript, Public Hearing on Proposed Plan for the Continuing Source Areas of the Sudbury River Study Area (January 27, 1993) [Filed and cited as entry number 3 in 13.4 Public Meetings].


32. Comments Dated February 1, 1993 from Robert Scherer on the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I.

5.3 Responsiveness Summaries (cont'd.)

34. Comments Dated February 7, 1993 from Constance Mannal on the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I.

35. Comments Dated February 7, 1993 from Carol Tessier on the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I with the attached Letter Dated March 1, 1993 from Pamela J. Shields, EPA Region I.


37. Comments Dated February 17, 1993 from Deborah S.S. Macchi on the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I.


41. Comments Dated March 10, 1993 from Helen Waldorf, Commonwealth of Massachusetts Department of Environmental Protection on the December 1992 "EPA Proposes Cleanup Plan to Address Sediment Contamination in the Continuing Source Areas of the Sudbury River Study Area," EPA Region I.

5.3 Responsiveness Summaries (cont'd.)


5.4 Record of Decision (ROD)

The map associated with the document cited below as entry number 1 may be reviewed, by appointment only, at the EPA Region I Records Center in Boston, Massachusetts.


11.0 Potentially Responsible Party (PRP)

11.9 PRP-Specific Correspondence


11.9 PRP-Specific Correspondence (cont’d.)

17. Letter from Richard A. Haworth, EPA Region I to John Glynn, Jr., AIF Realty Trust (July 6, 1992). Concerning notification of the removal action at the site and potential liability for that action.

13.0 Community Relations

13.3 News Clippings/Press Releases

Press Releases

13.3 News Clippings/Press Releases (cont'd.)


13.4 Public Meetings


13.5 Fact Sheets


13.7 Technical Assistance Grants


16.0 Natural Resource Trustee

16.1 Correspondence

1. Cross-Reference: Memorandum from Susan Svirsky, EPA Region I to Ken Carr and Steve Mierzykowski, United States Department of the Interior, Fish and Wildlife Service (May 21, 1992). Concerning a summary of outstanding issues at the site [Filed and cited as entry number 1 in 4.1 Correspondence].

2. Cross-Reference: Letter from Kenneth Finkelstein, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) to Pamela Shields, EPA Region I (December 24, 1992). Concerning NOAA's comments on the draft Proposed Plan for the site [Filed and cited as entry number 2 in 4.1 Correspondence].

17.0 Site Management Records

17.7 Reference Documents

17.8 State and Local Technical Records


7. Letter from Charla Reinganum, Commonwealth of Massachusetts Department of Environmental Protection to Patricia Corcoran, Massachusetts Water Resources Authority (March 8, 1991). Concerning usage of Framingham reservoirs.

Section II

Guidance Documents
GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region I Records Center in Boston, Massachusetts.

General EPA Guidance Documents


