RECORD OF DECISION

OPERABLE UNIT 2 – CHARLES RIVER OPERABLE UNIT

ARMY MATERIALS TECHNOLOGY LABORATORY
WATERTOWN, MASSACHUSETTS

SEPTEMBER 2005

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1.0 THE DECLARATION

1.1 Site Name and Location

Former Army Materials Technology Laboratory (AMTL)
Arsenal Street
Watertown, Massachusetts
U.S. EPA ID# MA0213820939
Charles River, Operable Unit 2

1.2 Statement of Basis and Purpose

This decision document presents the No Action decision for the Charles River Operable Unit (OU) 2 at the Army Materials Technology Laboratory (AMTL) in Watertown, Massachusetts. The No Action decision was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The regulatory program performed under the context of these combined laws and regulations is commonly referred to as "Superfund." The AMTL site has been listed on U.S. EPA's National Priorities List (NPL) since 1994 and the Federal Facility Agreement (FFA) executed by the Army and U.S. EPA has been in effect since 2000.

This decision is based on the Administrative Record (AR), which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the U.S. National Archives and Records Administration's Northeast Region facility in Waltham, Massachusetts. A public information repository is also kept at the Watertown Public Library, 123 Main Street, Watertown, Massachusetts (temporary 2005 location due to construction is 30 Common Street, Watertown, Massachusetts). The AR Index (Appendix D) identifies the items comprising the AR upon which the selection of this decision is based.

The U.S. Department of the Army (Army) has investigated the Charles River OU site in accordance with CERCLA and the NCP. The results of these investigations, including the human health and ecological risk assessments, support a No Action decision [as described below] for the Charles River OU under CERCLA because there are no unacceptable risks to human health and the environment in the Charles River OU that are attributable to releases of hazardous substances from AMTL.

This No Action decision has been selected by the Army and the United States Environmental Protection Agency (U.S. EPA). The Massachusetts Department of Environmental Protection (MADEP) concurs with this decision (Appendix A).

1.3 Description of the Selected Decision

Based on the results of the Remedial Investigation, including the Baseline Human Health and Ecological Risk Assessments, the Army has determined that No CERCLA Remedial Action by it in its role as lead agency at the AMTL site is necessary to protect human health or the environment for the Charles River OU because there are no unacceptable risks to human health and the environment in the Charles River OU that are attributable to releases of hazardous substances from AMTL. This Record of Decision (ROD) sets forth the No Action under CERCLA decision for the Charles River OU at the AMTL. As a result, the Army will cease CERCLA activity at this portion of the AMTL CERCLA site, and the U.S. EPA will de-list the Charles River OU from the NPL once this ROD has been finalized and signed by the Army and U.S. EPA

The Charles River OU is one of several operable units at the AMTL Site. The Charles River OU is being addressed separately from the other operable units (OU 1 and OU 3) at the AMTL site. The No Action decision for the Charles River OU has no impact on the remedial actions completed or ongoing at the other OUs of the AMTL site.

1.4 Statutory Determinations

The Army has determined, with concurrence from the U.S. EPA and MADEP that no remedial action by it in its role as lead agency at the AMTL site is necessary at the Charles River OU under CERCLA to ensure the protection of human health and the environment because there are no unacceptable risks to human health and the environment in the Charles River OU that are attributable to releases of hazardous substances from AMTL.

While the Army, U.S. EPA, and MADEP agree that No Action under CERCLA as described above is appropriate for the Charles River OU, additional contamination migrating into the Charles River could increase the potential risks associated with exposures to these areas. With that in mind, the Army will accelerate the Charles River Park (OU 1) five-year review from March 2007 to March 2006 in order to examine the OU 1 remedial action and its effectiveness in containing the Charles River Park soils. The Army will take additional actions along the bank as determined appropriate by the five-year review to ensure that no unacceptable levels of contamination are further migrating from the AMTL into the Charles River. If the OU 1 five-year review results in a determination that there are potential unacceptable risks to human health and the environment in the river caused by migration of contamination from the AMTL property, those risks will be addressed either through an OU 1 remedial action or through an OU 1 ROD change.

1.5 Authorizing Signatures

This ROD documents that No Action under CERCLA is necessary to ensure the protection of human health and the environment at the Charles River Operable Unit at the AMTL Site. This No Action ROD does not preclude further CERCLA investigations or response actions anywhere in the Charles River, and is limited to the Army's determination regarding its responsibilities as lead agency with respect to the Charles River OU of the AMTL Superfund site. This decision was selected by the Army and U.S. EPA, with concurrence by MADEP.

Concur and recommended for immediate implementation:

U.S. Department of the Army

By: Thomas E. Lederle Date: 9 Sep 2005
Mr. Thomas E. Lederle
Director, Base Realignment and Closure
Hampton Field Office
3A Bernard Rd (Bldg 105A)
Fort Monroe, VA 23651-5000

Record of Decision
Army Materials Testing Laboratory, Charles River Operable Unit (OU 2)
Part 1: The Declaration

This ROD documents that No Action under CERCLA is necessary to ensure the protection of human health and the environment at the Charles River Operable Unit at the AMTL Site. This No Action ROD does not preclude further CERCLA investigations or response actions anywhere in the Charles River, and is limited to the Army's determination regarding its responsibilities as lead agency with respect to the Charles River OU of the AMTL Superfund site. This decision was selected by the Army and U.S. EPA, with concurrence by MADEP.

Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency, Region I

for By: _____ Date: 9-29-05
Susan Studlien, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region 1
1 Congress Street
Boston, MA 02114-2023

2.0 THE DECISION SUMMARY

2.1 Site Name, Location and Description

Former Army Materials Technology Laboratory (AMTL)
Arsenal Street
Watertown, Massachusetts
U.S. EPA ID# MA0213820939
Charles River, Operable Unit 2

The Army Materials Technology Laboratory (AMTL) was placed on the NPL in May, 1994 by U.S. EPA pursuant to CERCLA. The upland portion of the AMTL Site is located on the north bank of the Charles River, approximately 5 miles west of Boston, Massachusetts (Figure 1).

The AMTL facility was established in 1816, and was originally used for the storage, cleaning, repair, and issuance of small arms. During the mid-1800's, the mission was expanded to include ammunition and pyrotechnics production; materials testing and experimentation with paints, lubricants, and cartridges; and the manufacture of breech loading steel guns and cartridges for field and siege guns. The mission, staff, and facilities continued to expand until after World War II, at which time the facility encompassed 131 acres, including 53 buildings and structures, and employed 10,000 people. Arms manufacturing continued until an operational phase down was initiated in 1967. At the time of the operational phase down, much of the AMTL was transferred to the General Services Administration (GSA). In 1968, GSA sold approximately 55 acres to the Town of Watertown. This property was subsequently used for the construction of apartment buildings, the Arsenal Mall, and a public park and playground.

In 1987, the U.S. Army initiated preliminary site studies, the first stage of the facility's closure plan. In late 1988, Congress officially recommended the closure of the facility, and the facility was officially closed on September 29, 1995 pursuant to the Defense Base Realignment and Closure Act (BRAC).

The U.S. Army is the lead agency and U.S. EPA is the lead regulatory agency for CERCLA activities at AMTL. There are three OUs within the AMTL NPL Site (MA0213820939) that the Army has addressed or is addressing under CERCLA. This ROD relates to the Charles River OU, which is also called AMTL OU 2. The Charles River was identified as an OU because of concerns that potential releases from terrestrial portions of the former AMTL facility may have impacted the river. Thus, the portion the river adjacent to the AMTL property was named as part of the CERCLA site.

The other two named OUs (AMTL OU 1 and AMTL OU 3) have been independently evaluated and cleaned up through the CERCLA assessment process. The ROD for the Charles River OU is not expected to have an impact on the progress of activities at the other sites at AMTL. In fact, the Charles River OU is the sole remaining OU being evaluated under the CERCLA process at the AMTL. As of 2004, cleanup activities were completed for the other two OUs and these OUs have been de-listed (i.e., removed from the CERLCA process) by U.S. EPA.

A more complete description of AMTL and the Charles River OU can be found in several technical documents completed as part of the Charles River OU site closure process (e.g., Section 1 of the ENSR (2005) Baseline Ecological Risk Assessment (BERA); Sections 1 and 2 of the Plexus (1998) Supplemental Phase II Remedial Investigation Report.

2.2 Site History and Enforcement Activities

2.2.1 Site History

The Charles River was identified as an OU because of concerns that potential releases from terrestrial portions of the former AMTL facility may have impacted the river. A 1979 stormwater survey indicated that seven AMTL stormwater outfalls discharged directly to the Charles River or through the Metropolitan District Commission (MDC) stormwater system into the Charles River (Plexus, 1998). Six outfalls discharged immediately south of the AMTL and one discharged at the Watertown Yacht Club.

2.2.2 History of Investigations

The Charles River OU of the AMTL has been the subject of numerous environmental investigations conducted during the past two decades (Figure 2). The U.S. Army, including the Corps of Engineers-New England District, has conducted the majority of these investigations, the majority of which are summarized below:

- ***1979:*** The Army completed a study to verify where stormwater pipes were located at the facility, to collect samples, and to identify potential sources of pollutants in the stormwater. The study found that seven stormwater pipes were present at AMTL that discharged either directly into the Charles River or through the stormwater system and into the Charles River.
- ***1991:*** A detailed Remedial Investigation (RI) was initiated in 1991. Potential threats posed to human health and the environment from chemicals present at the AMTL were evaluated as part of the RI.
- ***1994:*** As part of the RI, surface water and sediment samples were collected at locations upstream and downstream of the stormwater outfalls at the AMTL. These samples were

taken to determine what impact, if any, storm-water from the AMTL has had on the Charles River.

- ***1996:*** The impact of groundwater on the Charles River was addressed in the Outdoor Feasibility Study Report (Weston, 1996). Although some of the groundwater moving beneath the AMTL is likely to discharge into the Charles River, the Outdoor Feasibility Study concluded that the contribution of groundwater from AMTL to the Charles River would not be expected to result in any adverse effects to the river.

  Also in 1996, the U.S. EPA collected surface water and sediment samples from 9 sites along the entire Charles River (from the headwaters at Echo Lake to between the Harvard and Longfellow Bridges). This study concluded that the conditions in the river are the result of current and historical pollution sources (not only AMTL), and that the lower basin (below the Watertown Dam) was influenced by point sources, stormwater runoff, and combined sewer overflows.

- ***1998:*** Additional RI studies were completed. These studies concluded that the potential exists for impacts to the Charles River ecology based on exposure to numerous physical and chemical stressors in the River adjacent to the AMTL. The study also concluded that much of the sediment contamination in the Charles River is associated with the long industrial history and urbanized watershed of the Charles River, and is not necessarily attributable to former AMTL operations. In order to reach consensus with the state and federal agencies regarding this conclusion, all parties agreed that additional evaluation of the potential ecological impacts to the Charles River from AMTL activities was warranted.

- ***2000:*** The United States Geological Survey (USGS) completed a major study of the Charles River sediment chemistry. The results of this study indicated that there are chemicals present in the Charles River sediment adjacent to, upstream, and downstream of AMTL, and that, in addition to AMTL, there are numerous potential current and historic sources of environmental contaminants to this urban riverine system (USGS, 2000). According to the USGS, urban runoff, atmospheric deposition, inadvertent spills, combined sewer overflows, and illegal sewage connections have contributed fine-grain sediment, inorganic, and organic chemicals to the Charles River basin over the past hundred years.

- ***2002-2005:*** A comprehensive evaluation of sediment quality in the Charles River and a detailed description of the condition of those portions of the Charles River that might be affected by the release of chemicals from the AMTL was completed. This tiered study was designed to complete the U.S. EPA's ecological risk assessment process, and included chemical, biological, and toxicological studies of the river conditions. As described in more detail Section 2.7.2 of this ROD, the ecological risk assessment showed that potential risks

in the Charles River OU were not distinguishable from urban background conditions that characterize the Lower Charles River Basin (ENSR, 2005).

2.2.3 History of CERCLA Enforcement Activities

In May 1994, the AMTL site was listed on U.S. EPA's NPL, indicating that the AMTL property was a priority for environmental investigation and cleanup. Environmental studies and activities at ATML have been conducted by the Army in accordance with CERCLA and the NCP.

Based on the designation of the AMTL site as an NPL site, a FFA was executed by the Army and U.S. EPA. The FFA became effective in February 2000. This agreement establishes the Army as the lead agency for the investigation and cleanup of designated OUs within the AMTL site, with U.S. EPA providing oversight. The MADEP is not party to the FFA, but in accordance with CERCLA and the NCP, MADEP has participated in ongoing discussions and strategy sessions, as well as provided oversight and guidance through their review of site documents.

2.3 Community Participation

Throughout the OU's history, community involvement has been ongoing. The Army has kept the community and other interested parties apprised of site activities through informational meetings, fact sheets, press releases, public meetings, and regular contact with local officials. Also, the Army meets on a regular basis to discuss the status and progress of activities at the AMTL Site with the Restoration Advisory Board (RAB), which includes representatives from the neighboring community. Representatives from the Army, U.S. EPA Region I, MADEP, and local government have attended the public meetings and hearings.

The following is a brief chronology of the Army's public outreach efforts with regard to the Charles River OU:

- In 1993, the Army initiated a series of public meetings, at which the RAB process was explained and community members were asked to join the RAB. A sufficient number of volunteers were assembled and the initial RAB meetings were held in January 1994. Since that time, the Army has attended monthly or bi-monthly RAB meetings at AMTL to keep the public informed of CERCLA activities. At a number of these meetings technical presentations have been made regarding the Charles River OU and the various studies conducted as part of the remedial investigation and risk assessment process.
- In February 1992, the Army released a Public Involvement and Response Plan outlining a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. The Army revised and updated this plan, and in May

1995 released an updated Community Relations Plan, which summarized information about the environmental studies, identified community concerns, and outlined additional community relations activities.

- A public information repository was established in the spring of 1994 to allow the public to review documents, meeting minutes, and other information to keep informed about on-going site activities.
- In 1998, the Watertown Citizen's for Environmental Safety (WCES) applied for and was awarded a Technical Advisory Grant (TAG) from the U.S. EPA. The TAG allows the WCES to hire a Technical Advisor to review documents, attend meetings, and prepare evaluation reports. The Technical Advisor attends most RAB and a number of technical project meetings related to the Charles River OU.
- The RAB for AMTL has applied for and been granted a Technical Assistance for Public Participation (TAPP) grant from the Department of Defense. This grant allows the RAB to obtain technical assistance from experts in the environmental field to help them understand the environmental cleanup programs at AMTL**.**
- Several fact sheets have been prepared about the AMTL property during the course of investigation and study at the facility. These fact sheets have been provided to the public mailing list for AMTL.
- A Proposed Plan was issued for the Charles River OU on April 29, 2005. The Army also published a press release describing the proposed plan and distributed this press release to multiple major news outlets. Notice of the proposed plan was published in the Boston Globe, Boston Herald, and Watertown Tab on April 29, 2005. In addition, the Army provided copies of the Proposed Plan to the community mailing list maintained for the Site, and placed multiple copies of the Proposed Plan in the Watertown Public Library, in Watertown, MA.
- On May 16, 2005 a public hearing and informational public meeting were held to solicit public input on the Proposed Plan, which documented the rationale for a No Further Action decision at the Charles River OU (subsequent review of this ROD by the U.S. EPA has indicated that a No Action, rather than No Further Action, decision is more appropriate for the Charles River OU). At the informational meeting, representatives from the Army answered questions from the public. In addition, the Army held a public hearing, at which oral comments on the Proposed Plan were recorded for the record. A transcript of the oral comments received at the public hearing is included as Appendix E2.
- A 50-day public comment period (April 29 through June 20, 2005) was held for the No Further Action decision at the Charles River OU. This public comment period was extended from 30 to 50 days due to the Army's receiving notice at the May 16, 2005 public

hearing that construction activities were occurring at the Information Repository for this project (Watertown Free Public Library, 123 Main Street, Watertown, MA). Due to these construction activities, the Army issued a press release and public notice extending the public comment period, and indicating that the AMTL Charles River Operable Unit documents are available for review at the temporary location of the Main Library (30 Common Street, Watertown, MA). The public notice was published in the May 20, 2005 Watertown Tab.

All comments received as part of the public comment period were addressed as part of the Responsiveness Summary, which is summarized in Section 3 of this ROD.

2.4 Scope and Role of Operable Unit or Response Action

In addition to the Charles River OU, two other OU's exist at the AMTL site (Table 1). Each of the other two OUs at AMTL has progressed through the CERCLA cleanup process independent of each other.

- OU 1 is Soil and Groundwater at AMTL. A ROD addressing contaminated soil outside of Area 1 (see OU 3 description below) was signed in September 1996. This ROD indicated that the groundwater beneath the site was not a medium of concern. This ROD also selected soil excavation, off-site disposal, and institutional controls as the remediation action. Soil excavation on 36.5 acres of the facility has been completed, and a subsequent partial deletion of this parcel from the NPL was achieved in November 1999. Soil excavation within the remaining 11 acres of this OU (this area is also known as Charles River Park and Squibnocket Park) was completed in September 2001. Institutional controls were developed and implemented for the Charles River Park parcel before transfer of this parcel.
- OU 3 is Area 1 of AMTL. A ROD for OU 3 was signed in June 1996, which called for removal of contaminated soils and off-site disposal. This action was completed in August 1996. This parcel was also deleted from the NPL in November 1999 (see OU 1 above).

The ROD for OU 2 is one component of the CERCLA program at AMTL. It has proceeded on an independent track from cleanup of other OUs to enable the Army to expedite site closure. The selected remedy for OU 2 is not expected to have an impact on the progress of activities at the rest of the OUs at AMTL.

2.5 Site Characteristics

A detailed description of the Charles River OU is presented in the BERA (ENSR, 2005) for the site. The following text summarizes this information.

The Charles River is approximately 80 miles long and flows through 23 towns and cities in eastern Massachusetts. Its watershed is comprised of 35 towns and cities. The Charles River has 20 dams along its length, and Charles River OU of the AMTL site is located approximately 0.5 miles downstream of the Watertown Dam.

Undeveloped portions of the stream banks and adjacent lands along the Charles River in the vicinity of AMTL are vegetated with a continuous cover of diverse trees, shrubs, and dense grasses. AMTL had an active landscaping program in the 19th century; more recently, undeveloped areas along both banks have been maintained as parks and recreation areas.

Historically, the Charles River has experienced a number of natural and man-made water quality problems. Runoff from forested portions of the Charles River Watershed is highly colored by dissolved organic constituents (e.g., humic acids) and sediments. Because the resulting turbid waters have limited photosynthetic activity, lower portions of the water column may become deoxygenated from bacterial respiration (Life Systems, Inc., 1993). These naturally low levels of dissolved oxygen (DO) are aggravated by combined sewer overflows (CSOs) and municipal stormwater discharges from nearby communities. The combination of CSOs and stormwater discharges may contain high concentrations of organic matter, solids, oils, petrochemicals, coliform bacteria, and other constituents that contribute to high biological oxygen demand (BOD), all of which may result in lower water column DO concentrations (MDEQ, 1988). In fact, according to the 1990 Charles River Bacteria Study, the worst water quality within the Charles River Drainage Basin is typically found at the Watertown Dam (MADEP, 1991). The Massachusetts Water Resources Authority (MWRA) is currently reviewing CSOs on the river to identify water quality improvement measures (MWRA, 2001).

A 1979 stormwater survey indicated that seven AMTL stormwater outfalls discharged directly to the Charles River or through the MDC stormwater system into the Charles River (Plexus, 1998). Six outfalls discharged immediately south of the AMTL and one discharged at the Watertown Yacht Club. A recent Global Positioning System (GPS) survey of outfalls (Figure 3) conducted during the 2003 Baseline Ecological Risk Assessment field effort indicated that 43 outfalls were located along the Charles River in the full reach of the river considered in this ROD (from just upstream of the Newton Yacht Club to the Arsenal Street bridge). These outfalls included the seven known AMTL outfalls, as well as numerous other outfalls from a number of different sources. The majority of the outfalls observed on the June 3, 2003 survey were pipes ranging from 6 to 48 inches in diameter. Additional information regarding the potential contribution of the AMTL stormwater outfalls as well as other non-site related sources of contamination is presented in Section 4.6 of the ENSR (2005) BERA.

The Massachusetts Department of Fisheries and Wildlife manages the Charles River as a warm water fishery. The Charles River supports substantial recreational fishing. Included among the fish sought by

anglers are white catfish (*Ictalurus catus*), brown bullhead (*Ictalurus nebulosus*), largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis* sp.) and pike (*Esox lucius*).

National Oceanic and Atmospheric Administration (NOAA) and U.S. Fish and Wildlife Service (USFWS) trust resources found in the vicinity of the site include four anadromous (fish that migrate from the sea upriver to breed) species: blueback herring (*Alosa aestivalis*), rainbow smelt (*Osmerus mordax*), alewife (*Alosa pseudoharengus*), and American shad (*Alosa sapidissima*) (NOAA, 1994). The blueback herring run on the Charles River is considered one of the largest in the Commonwealth of Massachusetts; densities of this anadromous species are highest in the vicinity of the AMTL site. Both blueback herring and rainbow smelt use the riffle habitat below the Watertown Dam as spawning ground. Alewife and American shad occur in low numbers in the Charles River.

Migratory waterfowl such as black ducks, mallards, and Canada geese occasionally inhabit the Charles River. Although the river is not normally considered a critical habitat for these recreationally important species, it may serve as a critical secondary habitat during winter months, when small ponds and lakes in the vicinity of the river freeze.

While pollution inputs to the Charles River have decreased over time, in 1996 the Commonwealth issued a warning about elevated polychlorinated biphenyls (PCB) levels in Charles River fish. The reach of the Charles River which encompasses the Charles River OU was included in the Public Health Fish Consumption Advisory issued by the Massachusetts Department of Public Health (MDPH) on May 3, 1996, for the lower Charles River between Hemlock Gorge Dam in Needham/Newton and the Charles River Dam located at the Museum of Science in Boston/Cambridge. The MDPH advised that PCBs were detected in carp from this area at levels below the Food and Drug Administration (FDA) action level of 2.0 mg/kg, but at a level that may pose health concerns for some individuals (Krueger, 1996). According to the MDPH Freshwater Fish Consumption Advisory List (available on-line at http://db.state.ma.us/dph/fishadvisory/), the PCB fish advisory remains in place, and fish advisories for pesticides and mercury have also been placed on portions of the Charles River. The Charles River is also included in a statewide fish consumption advisory for mercury, which was issued by MDPH In 2001. Additional information regarding the 2001 MDPH statewide advisory can be found online at: http://www.mass.gov/dph/media/2001/pr0724.htm).

According to the Massachusetts Natural Heritage and Endangered Species Program Atlas (MNHESP, 2003), no threatened and endangered species occur in the Charles River in the vicinity of the AMTL. Written correspondence from the MNHESP, the National Marine Fisheries Service (NMFS), and the USFWS confirm the lack of rare and endangered species at or in the vicinity of the AMTL Site (Appendix C of the ENSR (2002) Screening Ecological Risk Assessment (SERA)).

2.5.1 Conceptual Site Model

The conceptual site model (CSM) for the Site describes the origin, and potential fate, transport, exposure pathways, and receptors of concern. The long history of industrial use in Greater Boston and Cambridge has resulted in surface water and sediment contamination in the Lower Charles River. The Supplemental Phase II RI (Plexus, 1998) contains detailed information regarding the numerous potential sources of contaminants in the Charles River. Contamination is generally due to releases and discharges from industry, the surrounding urban community, and recreational water activities on the Charles River. Contaminants from these sources can migrate to the Charles River surface water and sediments by direct discharge, over-land runoff, bank erosion, and groundwater migration. According to the USGS (2000), urban runoff, atmospheric deposition, inadvertent spills, CSOs, and illegal sewage connections have contributed fine-grain sediment, inorganic, and organic compounds to the Charles River basin over the past hundred years. These contaminants, including PCBs, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons, pesticides, and inorganic elements, have degraded the quality of the water, biota, and sediment. Construction of the Charles River Dam in 1908 reduced hydraulic gradients and eliminated tidal flow within the basin, essentially creating a 'settling basin' for the Charles River watershed. The creation of this basin, combined with sediment loading from the expanding urbanization of the watershed, has resulted in deposition and entrapment of more than 53 million cubic feet of sediment since 1908 (USGS, 2000).

Several direct discharge outfalls are located in the general vicinity of the AMTL, and four of the seven former AMTL stormwater system outfalls discharged to the Back Channel (Figure 4). These outfalls carry stormwater runoff from the surrounding community, as well as industrial discharges from stormwater and sanitary sewer systems. Other potential sources of contaminants include overland runoff from land surfaces, roadways, parking lots, roofs and structures, and snow melt. In addition, there may be instream sources of contaminants associated with maintenance and operation of boats, marinas, and wooden structures in the river.

The Supplemental Phase II RI (Plexus, 1998) described the potential AMTL site contributions to seven outfalls that discharge into the Charles River in the following manner:

- **RI Outfall 1** serviced the western portions of the AMTL site, including the parking lot, former Buildings 246 and 39, and the area in between. At the time of the Plexus investigation, the outfall also serviced combined flows from the Town of Watertown storm drains. RI Outfall 1 is approximately 275 feet upstream of RI Outfall 2; two BERA sampling locations (SDB23 and SDB24) are located near its discharge.
- **RI Outfall 2**, which is located on the east end of the Watertown Yacht Club, serviced runoff from the roof of former Building 36 and catch basins along Craig Street. Three BERA

sampling locations (SDB21, SDB22, and SDB23) are located either near the historic discharge or immediately downstream of RI Outfall 2, and upstream of RI Outfall 3.

- **RI Outfall 3** is a submerged system that received discharge from the roof of a former steam power plant building (Building 60) and a catch basin near petroleum storage tank fill pipes. This outfall is located within approximately 25 linear feet of sampling locations SDB18, SDB19, and SDB20 and approximately 250 linear feet upstream of sampling locations SDB49.
- **RI Outfall 4** collected stormwater from eighteen drop boxes from the MDC stormwater system on North Beacon Street and from a portion of the former AMTL site, north of Building 60. Two sampling locations are situated in the immediate vicinity of RI Outfall 4 (SDB49, immediately upstream of the outfall, and SDA17, immediately downstream of this outfall).
- **RI Outfall 5** received stormwater runoff from the majority of the eastern portion of the former AMTL site. This outfall is located approximately 100 to 120 linear feet upstream of sampling locations SDA15 and SDA16.
- **RI Outfall 6** was historically depicted on figures showing AMTL storm drains. However, this outfall was not located in the field by Plexus (1998) or the Army in the 2003 BERA field effort.
- **RI Outfall 7** discharged at the easternmost portion of the former AMTL site servicing a series of catch basins along Talcott Avenue and runoff from roads and from the vicinity of a former housing building (Building 111). This outfall is located approximately 100 to 200 linear feet upstream, respectively, of sampling locations SDA12 and SDA11.

A review of town engineering maps indicates that it is apparent that off-site contributions have the potential to influence the conditions at the majority of the near-shore sediment sampling stations evaluated in the BERA. In an attempt to determine if observed conditions in near-shore sampling locations could potentially be influenced by outfall discharge, the storm sewer system configuration in the vicinity was investigated using historical drainage maps provided the Town of Watertown's Town Engineer[1] and figures included in Weston's Outdoor Feasibility Study dated January 1996 (Weston, 1996).

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[1] "Watertown Arsenal Warehouse Plot Plan and Borings", J.R. Worcester & Co., June 5, 1941
"General Storm Drainage Map", Facilities Engineering Branch, Watertown Arsenal, June 15, 1963
"Arsenal Marketplace, Watertown, MA", Sumner Schein Architects and Engineers, May 1, 1981

Plans obtained from the Town of Watertown agreed with the aforementioned on-site drainage systems descriptions and provided limited additional information regarding off-site drainage. The plans indicate that there are substantial off-site contributions to certain segments of the sewer systems discharging to RI Outfalls 1, 2, 3, 4, 5 and 7 (i.e., some of the surrounding streets' storm sewer systems tie into these systems). The Town of Watertown's plans indicate the following:

- Drainage from North Beacon Street discharges into the Charles River via several outfalls upstream of the nearshore sediment sampling locations. A portion of the drainage may be diverted south and west via Bay Street. Plans indicate that a storm sewer was installed along Bay Street, which connects North Beacon Street and Charles River Road (south of the AMTL site). According to the plans, the storm sewer carries a portion of the North Beacon Street system's flow south and west, along Charles River Road (away from the AMTL site).
- Plans indicate that a system of storm sewers exists along North Beacon Street and Charles W. Greenough Boulevard (east of the junction between North Beacon Street and Charles River Road), which drains south into the Charles River via several outfalls, including RI Outfalls 1, 2, 3, 4, 5 and 7.
- The School Street sewer system, which ties into Arsenal Street's sewer system, north of the AMTL site, may contribute to the onsite drainage which discharges to RI Outfalls 1, 2, 3, 4, 5 and 7. A portion of the flow likely continues along Arsenal Street; it is either diverted away from the Charles River via the Elm Street sewer system (downstream of SDB20, SDA16 and SDD10, and upstream of SDD02), or it continues on and could potentially discharge via outfalls located along Charles W. Greenough Boulevard. These outfalls are in the general proximity (but on the opposite side of the river) from sampling location SDD02.

Figure 4 indicates the off-site contributions to outfalls in the vicinity of the AMTL site. The historic outfalls as well as outfalls that were located during the 2003 field investigation are depicted on this figure. Arrows indicate the direction of flow for storm sewer systems that were shown on the plans provided by Watertown's Town Engineer.

The CSM suggests that, if the AMTL facility was a primary source of chemical stressors which may pose a potential risk to ecological receptors, the Back Channel sampling reach (immediately adjacent to the AMTL facility and the majority of its outfalls) would exhibit the greatest potential for ecological risks. Risks to ecological receptors associated with former AMTL operations would be expected to be lower in the Adjacent and Downstream reaches (which also reflect numerous other potential sources of chemical stressors) and no AMTL-related risk would be expected in the Upstream reach.

Three specific former AMTL sources may potentially have historically contributed to the Charles River contaminant burden. Based on current information, the potential contribution of these sources has been much diminished and/or eliminated from past conditions.

Groundwater Discharge: Groundwater migrating from beneath contaminated sites near the river has the potential to transport constituents to the Charles River. The following text (excerpted directly from the 1998 Plexus Supplemental Phase II RI Report) describes the historic evaluation of potential groundwater impacts on the Charles River. "*The impact of groundwater on the Charles River was addressed in the Outdoor Feasibility Study Report (Weston, 1996). According to that report, some of the groundwater moving beneath AMTL is likely to discharge into the Charles River. This conclusion was based on a simple calculation. The concentrations of contaminants in wells at the southern boundary of AMTL were compared to concentrations for protection of aquatic life (AWQCs). Of the 13 contaminants detected in the southern boundary wells for which AWQCs are available, AWQC exceedances were noted for six inorganics (cadmium, chromium, copper, cyanide, iron, and lead) and one pesticide (DDT). This initial comparison did not consider surface water dilution of AMTL groundwater following discharge to the river. The maximum detected concentration of DDT was 0.0388 μg/L in the southern boundary wells with an average detected concentration of 0.0061 μg/L. Additional attenuation would occur between the wells and the river and thus any additional impact on sediment quality is unlikely. Moreover, when dilution of groundwater and river water concentrations was calculated, it was concluded that the contribution of contaminants from AMTL groundwater would not be expected to result in exceedances of any AWQC values for protection of ecological receptors in the river. Additional details are provided in Section 1.2.4.3.3 of the Outdoor Feasibility Study (Weston, 1996)*."

Direct Discharge/Spillage: According to the Supplemental Phase II RI (Plexus, 1998), the former stormwater system within AMTL consisted of 15,800 feet of pipe varying in diameter from six to 30 inches, 137 catch basins, and 33 drain manholes. The stormwater exited the AMTL complex at 10 separate locations along Arsenal and North Beacon Streets. Of these outlets, three entered the Watertown stormwater system on Arsenal Street and the other seven discharged either directly into the Charles River or through the former MDC stormwater system into the Charles River. Six of the outfalls discharged to the Charles River immediately south of AMTL. One of the stormdrains originating in Watertown enters AMTL at the intersection of School Street and Arsenal Street and passes through AMTL before discharging into the Charles River at the Watertown Yacht Club. Seven stormwater outfalls into the Charles River were identified and assessed in the Phase II RI. It is possible that stormwater discharges of runoff from AMTL land surfaces, roadways, parking lots, roofs and structure may contain contaminants resulting from motor vehicle operations, fall-out of airborne pollutants, and any uncontrolled chemical spills or surface contamination.

Since the AMTL facility is no longer active and the property has been transferred, surface water discharge is currently limited to stormwater releases that are the responsibility of the current owners

and/or the Town of Watertown (several of the former AMTL outfalls also receive runoff from Watertown), precluding direct impacts from the Site. As indicated in Figure 4, nine stormwater outfalls were identified during the 2003 field effort within the Back Channel and Adjacent reaches. Some of these may overlap with the seven historic outfalls from the AMTL facility.

The CSM in the SERA was updated to reflect regulatory comments regarding historic uses of the AMTL and its stormwater systems. Information from earlier reports was reviewed and appended, as appropriate. No additional investigative work was performed; however, the historic activities at the AMTL and the stormwater drainage system studies were described to better relate the site history to the Charles River sediment quality. As discussed at the July 10, 2001 BRAC Cleanup Team (BCT) meeting, the CSM has been revised to clearly indicate that the surface soil and groundwater OUs at the AMTL have been closed, and therefore there are only limited potential current transport pathways from the terrestrial portions of the former AMTL property to the Charles River. Therefore, although potential current and future exposure scenarios would be the same in this urban river, in the absence of any future DOD releases, potential future incremental ecological risks associated with the former AMTL site would be equal to or less than the current incremental ecological risk associated with the former AMTL site.

Overland Flow: Overland runoff occurs throughout the watershed from stormwater and snowmelt, accumulating and potentially transporting contaminants that may be present on the vegetation or soils. It is possible that, before site remediation, overland runoff could have carried soils from the upland portions of the former AMTL and Charles River Park into the Charles River. However, all upland areas of the park were remediated as of 2001, and therefore this pathway would not be expected to continue to contribute to unacceptable risks to the Charles River.

2.6 Current and Potential Future Site and Resource Uses

According to the Massachusetts Surface Water Quality Standards, the Charles River in the vicinity of the former AMTL is a Class B water body. These waters are designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value. The future use of the Charles River OU portion of the river is expected to remain identical to the current condition.

2.7 Summary of Potential Site Risks

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. The results of the human health and ecological risk

assessment are used to determine whether there is a basis for taking action and to identify the contaminants and exposure pathways that need to be addressed by the remedial action. These evaluations indicated that releases to the Charles River potentially associated with the AMTL facility do not pose an unacceptable risk to human health or the environment.

2.7.1 Human Health Risk Assessment

The human health risk assessment was completed by the Army in 1994 as part of the RI (Weston, 1994). This risk assessment was conducted in accordance with the following four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the site were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates.

Sixty-two of the chemicals detected at the site were selected for evaluation in the human health risk assessment as chemicals of potential concern. The chemicals of potential concern (COPCs) were selected to represent potential site related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Table 6-7 in the Phase II RI Report (Weston, 1994). This list includes chemicals detected in all media and not all chemicals on this list were detected in the Charles River media (i.e., surface water and sediment). No chemicals were identified in the RI as presenting a significant current or future risk (chemicals of concern) in this ROD. The total potential carcinogenic risk for recreational use of the Charles River was 2 in 1,000,000, which is below the levels set by both Massachusetts and the federal government that require further action. The total hazard index (HI) for potential non cancer risks for the use of the Charles River was approximately 0.02, which is well below 1.0, a level commonly used by the state and federal agencies to determine the need for further action.

As of 1994, the facility employed approximately 500 people and had a resident population of 21 (Weston, 1994). In 1989, 26,279 people lived within a 1-mile radius of the facility, and 98,900 lived between 1 and 2 miles from the site (Weston, 1994). The riverfront near the site is open for recreational land use and a marina is located in the back channel reach. These land uses are expected to continue in the future. There is the potential that the recreational land along the river could be upgraded to include a beach and/or playground equipment (Weston, 1994). The following is a brief summary of the human health risk assessment for the Charles River.

Potential human health effects associated with exposure to the COPCs were estimated quantitatively or qualitatively through the development of several hypothetical exposure scenarios (receptor/exposure pathway combinations). These scenarios were developed to reflect the potential for exposure to hazardous substances in Charles River surface water and sediment based on the present uses, potential future uses, and location of the Site. Human populations can be exposed to chemicals by the following four routes: ingestion, inhalation, dermal contact, and radiation exposure. Based on the nature of the chemicals and anticipated activities at the site, inhalation was not considered to be a relevant route of exposure. Thus the following routes of exposure were evaluated:

- Consumption of fish by sport anglers and families;
- Ingestion and dermal contact with Charles River water and sediment by children and adults during recreational activities (i.e., swimming and wading); and
- External exposure to radiation released from radionuclides in sediments.

Surface water and sediment samples were collected from 5 upstream locations and 14 downstream locations to determine what impact, if any, the runoff from the installation had on the Charles River (Weston, 1994). Average daily doses of COPCs were estimated using conservative assumptions relative to the rates, frequency, and duration of potential contact with surface water and sediment. Conservative assumptions were also used to model fish tissue concentrations and evaluate exposure due to consumption of fish tissue. Exposure assumptions for the Charles River evaluation are presented in Tables 6-17 through 6-21 of the Phase II RI Report (Weston, 1994).

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical specific cancer potency factor. Cancer potency factors have been developed by U.S. 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 likely to be less than the predicted risk. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an “excess lifetime cancer risk” – or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site related) causes has been estimated to be as high as one in three (Jemal et al., 2002). U.S. EPA’s generally acceptable risk range for site related exposure is 10^{-4} to 10^{-6} with risks greater than 10^{-4} generally requiring some sort of remediation. Current U.S. EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. No carcinogenic chemicals requiring further evaluation were identified in the risk assessment.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake level by the reference dose (RfD) or other suitable benchmark. Reference doses have been developed by U.S. EPA and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A HQ $\leq$ 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g. liver) within or across those media to which the same individual may reasonably be exposed. A HI $\leq$ 1 indicates that adverse non-carcinogenic health effects are unlikely. No toxic non-carcinogenic chemicals requiring further evaluation were identified in the risk assessment.

Table 2 summarizes the results of the human health risk assessment conducted for potential exposure to hazardous substances in Charles River surface water and sediment. This table depicts the carcinogenic risk summary for the relevant exposure media evaluated to reflect potential future exposure for the two receptors evaluated for the Charles River (the Resident Adult and Park Visitor). Table 2 also depicts the non-carcinogenic risk summary for the relevant exposure media evaluated to reflect potential future exposure for the two receptors evaluated for the Charles River (the Resident Child and Park Visitor). Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Section 6.3 of the Phase II RI Report (Weston, 1994) for a more comprehensive risk summary of all exposure pathways evaluated.

The human health risk assessment determined that the AMTL has not contributed to conditions in the Charles River causing a cancer risk above 1 in 100,000 or acute or chronic adverse health effects (Weston, 1994).

There is some uncertainty in the human health risk assessment. Uncertainty can be introduced by a number of factors:

- There is the potential that a chemical with potential human health implications was not included in the COPCs and therefore was not analyzed.
- Not every conceivable exposure pathway was evaluated. However, it is believed that all major exposure pathways were evaluated.
- Toxicity values are uncertain or not available for some chemicals.
- The synergistic effects of multiple chemicals are unpredictable.

In general, health-protective assumptions were used, thus it is unlikely that risks are underestimated.

2.7.2 Ecological Risk Assessment

In addition to the human health risk assessment described above, an ecological risk assessment was also performed (ENSR, 2005). The ecological risk assessment evaluated potential risks to ecological receptors that may occur in the presence of chemical stressors in environmental media. The ecological risk assessment was completed in three steps 1) problem formulation, 2) risk analysis, and 3) risk characterization.

The Charles River OU of the AMTL has been the subject of several environmental investigations conducted during the past two decades. The U.S. Army has conducted the majority of these investigations. The results of these historic studies have suggested that there are chemical constituents present in the Charles River sediment adjacent to, upstream, and downstream of the AMTL installation, and that there are numerous potential current and historic sources of environmental contaminants to this urban riverine system.

The remainder of this Section describes the BERA, which was completed in 2005 in accordance with the U.S. EPA's eight-step process for Superfund Ecological Risk Assessment. Based on the numerous environmental investigations conducted before the BERA, it was known that AMTL had no "signature" compound (i.e., one that was solely attributable to AMTL).

For the purposes of the BERA, the portion of the Charles River that comprises OU 2 was been divided into four independent reaches identified as: Upstream, Adjacent, Back Channel and Downstream. The geographic and features of these reaches are discussed below and presented in Figure 3:

- Upstream – This reach is approximately 2,700 feet long and spans from just upstream of the Newton Yacht Club to just upstream of the Watertown Yacht Club;
- Adjacent – This reach is located in the main stem of the river and spans approximately 2,100 feet from just upstream of the Watertown Yacht Club to just below the North Beacon Street Bridge.
- Back Channel - This reach is approximately 1,500 feet long and is located in the portion of the river between Sunrise Island and the northern bank, including the Watertown Yacht Club.
- Downstream - This reach is located in the main stem of the river and spans approximately 3,600 feet from just below the North Beacon Street Bridge to the Arsenal Street Bridge.

The COPC used in the ecological risk assessment of each of these reaches are presented in Tables 3 through 6.

One of the key working hypotheses evaluated in the BERA is related to the proximity of the Back Channel sampling reach to the former AMTL facility. If the AMTL facility was a primary source of chemical stressors which may pose a potential risk to ecological receptors, the Back Channel sampling reach (immediately adjacent to the AMTL facility and the majority of its outfalls) would exhibit the greatest potential for ecological risks. Potential risks to ecological receptors associated with former AMTL operations would be expected to be relatively lower in the Adjacent and Downstream reaches (which also reflect numerous other potential sources of chemical stressors) and no AMTL-related risk would be expected in the Upstream reach (which also reflects numerous other potential sources of chemical stressors).

Due to the widespread presence of chemical constituents in this urban riverine system, and the lack of definitive chemical "signature" from the AMTL site the BERA relied on a comparison of "total site risks" (as defined in the weight of evidence (WOE) risk characterization) in each of the four sampling reaches evaluated to infer whether or not there is potential incremental risk attributable to AMTL. The WOE approach used for the evaluation concluded that the potential for ecological risks contributed by the former AMTL facility are indistinguishable from the anthropogenic urban background conditions that characterize the Lower Charles River Basin.

The following data sets were considered in the BERA report:

- Surficial Sediment Chemistry: Surficial sediment data were collected from a total of 47 discrete sediment sampling locations (Figure 5). All 47 surficial sediment samples were submitted for laboratory analysis of pesticides and PCB Aroclors, Target Analyte List (TAL) Metals, PAHs, organotins, grain size, total organic carbon (TOC), and simultaneously extracted metals and acid volatile sulfides (SEM and AVS). Sixteen of the 47 samples were analyzed for methylmercury; these stations were co-located with 16 stations from which biological and toxicological data were collected.
- Macroinvertebrate Toxicity Testing: Sixteen short and long term chronic laboratory toxicity test sampling stations were co-located with 16 of the 47 sediment analytical chemistry and with 16 macroinvertebrate sampling stations, allowing for a detailed evaluation of the co-occurring data in the ecological risk assessment. At each of these 16 stations, short term chronic (ten-day) midge (*Chironomus tentans*) survival and growth studies were conducted to provide an indication of the spatial distribution of potential invertebrate toxicity. At each of these 16 stations, long term (42-day) chronic sediment toxicity tests were conducted with the amphipod (*Hyalella azteca*) to further assess the toxicity of sediments to invertebrate organisms at the Charles River OU by evaluating reproductive endpoints, as well as survival and growth.

- Macroinvertebrate Community Sampling: Sixteen benthic macroinvertebrate sampling stations at the Charles River OU study area were co-located with 16 of the 47 sediment analytical chemistry and with the 16 toxicity test sampling stations, thereby allowing for detailed evaluation of the co-occurring data in the BERA.
- Macroinvertebrate Laboratory Bioaccumulation Testing: At 12 sampling locations, a laboratory bioaccumulation study with the oligochaete worm *Lumbriculus variegatus* was conducted to assess the bioavailability of chemical stressors in sediments to lower trophic level resident macroinvertebrate populations in the vicinity of the AMTL Site. This test provided tissue which was analyzed for PCBs, pesticides, and metals.
- Bivalve Tissue Residue Analysis: A site-specific bivalve (alewife floater (*Anodonta implicate*)) tissue sampling and analysis program was conducted to provide a direct measurement of PCB, pesticide, and metals exposure to resident bivalves.
- Fish Tissue Residue Analysis: Simplistic models were used to develop fish tissue residue values based on food chain multipliers and the available macroinvertebrate tissue residue data.
- Bathymetry and Sediment Thickness Surveys: Bathymetric and sediment thickness surveys of the Upstream, Adjacent, Downstream, and Back Channel reaches of the Charles River.
- Sediment Profile Imagery Surveys: A sediment profile imagery (SPI) reconnaissance survey was completed in July 2003, to complement other benthic surveys conducted at the Site.

Three major groups of ecological receptors were evaluated in the BERA:

- Benthic macroinvertebrates;
- Fin-fish; and
- Vertebrate wildlife consumers of fin-fish and benthic macroinvertebrates.

The ecological exposure pathways evaluated in the BERA included the following:

- Direct contact and ingestion of sediment by benthic invertebrates;
- Direct contact with sediment by aquatic vertebrates (i.e., fish); and
- Ingestion of sediment and contaminated prey items by selected vertebrate wildlife receptors (i.e., birds and mammals).

The assessment and measurement endpoints used in the ecological risk assessment are presented in Table 7. The Charles River OU BERA integrated a variety of methodologies to assess potential ecological risks. At project team meetings conducted in 2003 and 2004 and attended by the Army, U.S. EPA, MADEP, USFWS, and the NOAA, an overall Charles River WOE weighting factors matrix (Table 8) was developed and approved by all parties. This matrix includes six benthic macroinvertebrate measurement endpoints, three warmwater fish measurement endpoints, and one protection of vertebrate wildlife consumers measurement endpoint. Weighting factors associated with two of the three broad categories (strength of association, study design) were assigned. Data quality were considered as a "pass/fail" designation; if data quality for a particular measurement endpoint is inadequate, that measurement endpoint was not considered in the WOE evaluation.

The WOE data analysis approach employed in the Charles River OU BERA used both qualitative and semi-quantitative protocols to evaluate and interpret the results from the measurement endpoints for the various reaches within the Charles River study area. The WOE was derived from consideration of three characteristics of measurement endpoints: 1) the weight assigned to each measurement endpoint; 2) the magnitude of response observed in the measurement endpoint; and 3) the summation of the degree of concurrence (i.e., agreement/conflict) among the outcomes for multiple measurement endpoints. Individual measurement endpoint results were evaluated to determine whether or not they supported a finding of no significant risk for each assessment endpoint.

The WOE risk calculations were prepared independently for each of the four reaches of the Charles River evaluated in the BERA (i.e., separate WOE evaluations and potential for risk matrices were prepared for each of the four reaches, as depicted in Figures 6 through 9). In addition, as part of the BERA analysis, the levels and patterns of potential risk in the various reaches of the Charles River under investigation in the BERA have been compared and contrasted with one-another using WOE risk assessment methodologies.

Based on the WOE methodologies employed in the BERA, the following general conclusions were reached regarding the overall potential risk within each reach of the Charles River.

- Ecological receptors in all four reaches of the Charles River evaluated in the BERA are potentially at risk from exposure to chemical stressors in sediment. In many of the comparisons considered in the weight-of-evidence evaluation, the potential for ecological risks in the Back Channel (presumed in the CSM to be the most potentially affected by former AMTL operations), is actually slightly lower than the potential for ecological risks in the Adjacent, Downstream, and/or Upstream areas.
- The Back Channel area, which is most proximate to the AMTL Site, does not exhibit a higher potential for ecological risk relative to the other Charles River reaches evaluated in the BERA. In fact, the four sampling reaches (including the Upstream sampling reach), by

most measurement endpoints evaluated in the BERA, exhibit a similar potential for ecological risks.

- The majority of the risk assessment endpoints evaluated in the BERA fall within the lower portion of the matrices ("Indeterminate" to "No Potential for Ecological Risks").
- The primary populations of ecological receptors at risk in the Charles River are benthic invertebrate receptors.
- A relatively low potential for risk was identified for finfish.
- Little to no potential for risk was identified for vertebrate wildlife consumers of fish and invertebrates.

A key BERA finding is that the potential for ecological risks in the Back Channel reach (i.e., nearest the former AMTL site and the majority of its outfalls, and presumed to be the most affected by former AMTL operations) is generally lower than in other reaches of the Charles River. For instance, relative to benthic receptors, the potential for ecological risks in the Back Channel reach, immediately adjacent to the former AMTL facility, is virtually identical to the potential for ecological risks in the Upstream reach unimpacted by the AMTL facility, and is lower than the potential for risks in the Adjacent and Downstream reaches (both of which likely includes a number of other potential chemical stressor sources unrelated to the AMTL facility). Relative to fish receptors, the potential for ecological risks to fish receptors in the Back Channel reach is lower than the potential for ecological risks in the Adjacent and Upstream reaches.

In addition, the results of the various statistical and other quantitative analyses considered in the BERA suggest the following:

- Normalized sediment chemistry sampling results in the Upstream reach of the Charles River are statistically indistinguishable from the normalized sediment chemistry sampling results in the Back Channel and Adjacent reach. Consistent with U.S. EPA guidance, the bulk sediment data were normalized to TOC (organic constituents) and percent fines (inorganic constituents). Un-normalized (bulk sediment chemistry) data were also evaluated, although the results were less clear cut than the evaluation of the normalized data.
- When the pooled *C. tentans*, *H. azteca*, and *P. promelas* toxicity testing mortality and growth results from the Back Channel sampling reach were compared to the pooled sampling results from the Upstream reach. No statistical differences were observed in any of the endpoints evaluated. The pooled data toxicity test statistical evaluation indicates

that the observed toxicity in all reaches of the Charles River are statistically indistinguishable.

- In the chemical stressor/response analysis, growth and survival of *C. tentans* and *H. azteca* exhibited potential relationships with a wide variety of organic and inorganic constituents, whereas no significant correlations were found relative to the *P. promelas* toxicity testing. This suggests that a wide variety of chemical stressors may be playing a role in the observed toxicity in the Charles River system.
- The macroinvertebrate community survey suggested that an impaired community is present throughout the Charles River OU.
- Based on the analysis of the tissue levels in field-collected bivalves, little potential for ecological risks exists for these receptors. Concentrations in these bivalves were consistently low, and were generally consistent in all reaches of the river. For many constituents, the Back Channel data set had lower levels than the Upstream reach of the Charles River.
- Relative to the field-collected bivalves, slightly higher tissue residue levels were observed in the laboratory-reared oligochaetes. However, concentrations in these invertebrates were also generally low, and were generally consistent in all reaches of the river. For many constituents, the Back Channel data set had lower levels than the Upstream reach of the Charles River.
- Based on the SPI analyses, no apparent differences in visual sediment characteristics or benthic community health were noted between the Upstream, Adjacent, Back Channel, and Downstream reaches.

The results of the BERA indicate that: 1) there are elevated levels of many constituents present in the Charles River adjacent to, downstream, and upstream of the AMTL facility; 2) that the majority of these compounds are present at concentrations consistent with upstream reference conditions; and 3) there is a potential for ecological risk from exposure to these constituents upstream of, adjacent to, and downstream of the AMTL site. In general, the potential for ecological risk to benthic invertebrates was found to be low to moderate, with an even lower potential risk to finfish and vertebrate wildlife, respectively. The WOE results also suggest that the incremental risks contributed by the former AMTL facility are indistinguishable from the anthropogenic, urban background conditions that characterize the Lower Charles River basin. In many of the comparisons considered in the WOE evaluation, the potential for ecological risks in the Back Channel (presumed in the CSM to be the most potentially affected by former AMTL operations), is actually slightly lower than the potential for ecological risks in the Adjacent, Downstream, and/or Upstream reaches.

2.7.3 Basis for Response Decision

The baseline human health risk assessment revealed that people are not exposed to unacceptable human health risk. The baseline ecological risk assessment determined that the potential for ecological risks contributed by the former AMTL facility are indistinguishable from anthropogenic urban background conditions that characterize the Lower Charles River Basin. Therefore no response action is necessary at the Charles River OU.

2.8 Documentation of No Significant Changes

On April 29, 2005, the Army published a Proposed Plan for No Further Action at the Charles River OU to the public for review and comment. This plan presented the Army's rationale for selecting No Further Action for the Charles River OU, and provided the public with information regarding this decision. A public meeting and public hearing were held on May 16, 2005 to solicit public comments on the Proposed Plan. A 50-day public comment period (April 29 through June 20, 2005) was established for receipt of formal comments from the public. The Army reviewed all written and verbal comments submitted during the public comments period. Although the Army originally presented a Proposed Plan for No Further Action, during the regulatory review process for this ROD it was determined that a No Action decision was more appropriate since no removal actions or institutional controls had been enacted relative to the river. Because this change from a No Further Action to a No Action decision does not qualify as a significant change, it was determined that no significant changes to the decision, as originally identified in the Proposed Plan, were necessary. Therefore, the proposed remedy will be documented for the OU.

2.9 State Role

The MADEP has concurred with the remedy for the Charles River OU. Their acceptance of this remedy is documented in Appendix A.

Table 1 Summary of Operable Units

Operable Unit Designation	Site Description	Regulatory Status (as of June 2001)
1	Soil and Groundwater	RI, FS completed. PRAP issued. A ROD addressing contaminated soil outside of Area 1 (see OU 3 description below) was signed in September 1996. This ROD indicated that the groundwater beneath the site was not a medium of concern. This ROD also selected soil excavation, off site disposal, and institutional controls as the remediation action. Soil excavation on 36.5 acres of the facility has been completed, and a subsequent partial deletion of this parcel from the NPL was achieved in November 1999. Soil excavation within the remaining 11 acres of this OU (area known as Charles River Park) was completed in September 2001. Institutional controls were developed and implemented for the Charles River Park parcel prior to transfer of this parcel.
2	Charles River, in reaches adjacent to AMTL	RI completed. No FS necessary. PRAP recommended no further action, issued May 2005.
3	Area 1	RI, FS completed. PRAP issued. ROD signed in June 1996, which called for removal of contaminated soils and off site disposal. This action was completed in August 1996. This parcel was also deleted from the NPL in November 1999 (see OU 1 above).

FS - Feasibility Study
NPL - National Priorities List
OU - Operable Unit
PRAP - Proposed Remedial Action Plan
RI - Remedial Investigation (Phase I and II)
ROD - Record of Decision

Table 2 Summary of Potential Human Health Risks

Summary of Cancer Risk Values [1]				
Potentially Exposed Population	**Exposure Medium**	**Exposure Route**	**Risk Values**	
Excess Lifetime Carcinogenic Risk from Chemicals				
Resident Adult or Park Visitor	Surface Water	Ingestion	1×10^{-10}	
		Dermal	8×10^{-9}	
	Sediment	Ingestion	2×10^{-6}	
		Dermal	5×10^{-9}	
	Fish	Ingestion	5×10^{-8}	
Excess Lifetime Carcinogenic Risk from Radionuclides				
Resident Adult or Park Visitor	Surface Water	Ingestion	5×10^{-11}	
	Sediment	Ingestion	4×10^{-10}	
	Fish	Ingestion	8×10^{-10}	
Summary of Hazard Index Values [1]				
Potentially Exposed Population	**Exposure Medium**	**Exposure Route**	**Subchronic Hazard Index**	**Chronic Hazard Index**
Resident Child or Park Vsitor	Surface Water	Ingestion	0.000004	0.00003
		Dermal	0.0001	0.001
	Sediment	Ingestion	0.001	0.002
		Dermal	0.0009	0.01
	Fish	Ingestion	--	0.01

Summary table modified from Table 6-2 in *Supplemental Phase II Remedial Investigation, Charles River* (Plexus, 1998).

1 – Data originally evaluated in *Phase II Remedial Investigation Report, Army Materials Technology Laboratory* (Weston, 1994).

Table 3 Comparison of Sediment Data Against Low Effect Sediment Screening Benchmarks – Upstream

Analyte	Maximum Concentration	Low Effect Sediment Screening		Retained as COPC?
		Low Effect Benchmark	Source	
Inorganics (mg/kg)				
ALUMINUM	11000	25500	Other	No
ANTIMONY	**3.2**	2	ERL (NOAA)	Yes
ARSENIC	9.2	9.79	Consensus TEC	No
BARIUM	150	500	WDNR	No
BERYLLIUM	0.65	NV		Yes
CADMIUM	**12**	0.99	Consensus TEC	Yes
CHROMIUM	**88**	43.4	Consensus TEC	Yes
COBALT	**15**	10	Other	Yes
COPPER	**180**	31.6	Consensus TEC	Yes
IRON	20000	20000	LEL (OMOE)	No
LEAD	**610**	35.8	Consensus TEC	Yes
MANGANESE	**830**	460	LEL (OMOE)	Yes
MERCURY	**0.64**	0.18	Consensus TEC	Yes
NICKEL	**31**	22.7	Consensus TEC	Yes
SELENIUM	**3.5**	0.29	Other	Yes
SILVER	**2.5**	1	ERL (NOAA)	Yes
TIN	**24**	5	Other	Yes
VANADIUM	41	50	Other	No
ZINC	**670**	121	Consensus TEC	Yes
Organics				
TOTAL HMW PAHS	**130800**	1700	ERL (NOAA)	Yes
TOTAL LMW PAHS	**37970**	552	ERL (NOAA)	Yes
TOTAL PAHS	**168770**	1610	Consensus TEC	Yes
TOTAL PCBs	**1750**	59.8	Consensus TEC	Yes
ALPHA-CHLORDANE	**53**	3.24	Consensus TEC	Yes
DIELDRIN	**64**	1.9	Consensus TEC	Yes
ENDRIN	**3.9**	2.22	Consensus TEC	Yes
GAMMA-CHLORDANE	**77**	3.24	Consensus TEC	Yes
P,P'-DDD	**480**	8	LEL (OMOE)	Yes
P,P'-DDE	**140**	5	LEL (OMOE)	Yes
P,P'-DDT	**43**	7	LEL (OMOE)	Yes
Organo Tin (ug/kg)				
DIBUTYLTIN	7.4	186.4	Other	No
TRIBUTYLTIN	51	186.4	Other	No
Methyl Mercury (ng/g)				
METHYL MERCURY	**0.0033**	0.00001	Other	Yes

NOTES

Analytes with maximum concentrations exceeding benchmarks are retained as chemicals of potential concern (COPC).
Boldface indicates excedance of low effect benchmark
COPC - Chemical of Potential Concern
NV - No screening value identified

Table 4 Comparison of Sediment Data Against Low Effect Sediment Screening Benchmarks – Adjacent

Analyte	Maximum Concentration	Low Effect Sediment Screening		Retained as COPC?
		Low Effect Benchmark	Source	
Inorganics (mg/kg)				
ALUMINUM	11000	25500	Other	No
ANTIMONY	**3.0**	2	ERL (NOAA)	Yes
ARSENIC	**15**	9.79	Consensus TEC	Yes
BARIUM	210	500	WDNR	No
BERYLLIUM	0.74	NV		Yes
CADMIUM	**12**	0.99	Consensus TEC	Yes
CHROMIUM	**99**	43.4	Consensus TEC	Yes
COBALT	**13**	10	Other	Yes
COPPER	**300**	31.6	Consensus TEC	Yes
IRON	**28000**	20000	LEL (OMOE)	Yes
LEAD	**530**	35.8	Consensus TEC	Yes
MANGANESE	**630**	460	LEL (OMOE)	Yes
MERCURY	**0.92**	0.18	Consensus TEC	Yes
NICKEL	**34**	22.7	Consensus TEC	Yes
SELENIUM	**1.4**	0.29	Other	Yes
SILVER	**20**	1	ERL (NOAA)	Yes
TIN	**33**	5	Other	Yes
VANADIUM	**51**	50	Other	Yes
ZINC	**800**	121	Consensus TEC	Yes
Organics				
TOTAL HMW PAHS	**98500**	1700	ERL (NOAA)	Yes
TOTAL LMW PAHS	**17770**	552	ERL (NOAA)	Yes
TOTAL PAHS	**116270**	1610	Consensus TEC	Yes
TOTAL PCBs	**3055**	59.8	Consensus TEC	Yes
ALPHA-CHLORDANE	**64**	3.24	Consensus TEC	Yes
DIELDRIN	**160**	1.9	Consensus TEC	Yes
ENDRIN	**26**	2.22	Consensus TEC	Yes
GAMMA-CHLORDANE	**89**	3.24	Consensus TEC	Yes
P,P'-DDD	**390**	8	LEL (OMOE)	Yes
P,P'-DDE	**260**	5	LEL (OMOE)	Yes
P,P'-DDT	**34**	7	LEL (OMOE)	Yes
Organo Tin (ug/kg)				
DIBUTYLTIN	4.2	276.9	Other	No
TRIBUTYLTIN	7.3	276.9	Other	No
Methyl Mercury (ng/g)				
METHYL MERCURY	**0.00234**	0.00001	Other	Yes

NOTES

Analytes with maximum concentrations exceeding benchmarks are retained as chemicals of potential concern (COPC).
Boldface indicates excedance of low effect benchmark
COPC - Chemical of Potential Concern
NV - No screening value identified

Table 5 Comparison of Sediment Data Against Low Effect Sediment Screening Benchmarks – Back Channel

Analyte	Maximum Concentration	Low Effect Sediment Screening		Retained as COPC?
		Low Effect Benchmark	Source	
Inorganics (mg/kg)				
ALUMINUM	13000	25500	Other	No
ANTIMONY	1.9	2	ERL (NOAA)	No
ARSENIC	**12**	9.79	Consensus TEC	Yes
BARIUM	220	500	WDNR	No
BERYLLIUM	0.8	NV		Yes
CADMIUM	**28**	0.99	Consensus TEC	Yes
CHROMIUM	**180**	43.4	Consensus TEC	Yes
COBALT	**14**	10	Other	Yes
COPPER	**325**	31.6	Consensus TEC	Yes
IRON	**26000**	20000	LEL (OMOE)	Yes
LEAD	**635**	35.8	Consensus TEC	Yes
MANGANESE	**670**	460	LEL (OMOE)	Yes
MERCURY	**1.5**	0.18	Consensus TEC	Yes
NICKEL	**38**	22.7	Consensus TEC	Yes
SELENIUM	**1**	0.29	Other	Yes
SILVER	**4.6**	1	ERL (NOAA)	Yes
TIN	**31**	5	Other	Yes
VANADIUM	**72**	50	Other	Yes
ZINC	**740**	121	Consensus TEC	Yes
Organics				
TOTAL HMW PAHS	**134300**	1700	ERL (NOAA)	Yes
TOTAL LMW PAHS	**26150**	552	ERL (NOAA)	Yes
TOTAL PAHS	**160450**	1610	Consensus TEC	Yes
TOTAL PCBs	**4084**	59.8	Consensus TEC	Yes
ALPHA-CHLORDANE	**44**	3.24	Consensus TEC	Yes
DIELDRIN	**75**	1.9	Consensus TEC	Yes
ENDRIN	**7.8**	2.22	Consensus TEC	Yes
GAMMA-CHLORDANE	**49**	3.24	Consensus TEC	Yes
P,P'-DDD	**185**	8	LEL (OMOE)	Yes
P,P'-DDE	**165**	5	LEL (OMOE)	Yes
P,P'-DDT	**33**	7	LEL (OMOE)	Yes
Organo Tin (ug/kg)				
DIBUTYLTIN	13	296.8	Other	No
TRIBUTYLTIN	26	296.8	Other	No
Methyl Mercury (ng/g)				
METHYL MERCURY	**0.0021**	0.00001	Other	Yes

NOTES

Analytes with maximum concentrations exceeding benchmarks are retained as chemicals of potential concern (COPC).
Boldface indicates excedance of low effect benchmark
COPC - Chemical of Potential Concern
NV - No screening value identified

Table 6 Comparison of Sediment Data Against Low Effect Sediment Screening Benchmarks – Downstream

Analyte	Maximum Concentration	Low Effect Sediment Screening		
		Low Effect Benchmark	Source	Retained as COPC?
Inorganics (mg/kg)				
ALUMINUM	14000	25500	Other	No
ANTIMONY	**4.0**	2	ERL (NOAA)	Yes
ARSENIC	**22**	9.79	Consensus TEC	Yes
BARIUM	260	500	WDNR	No
BERYLLIUM	1.0	NV		Yes
CADMIUM	**54**	0.99	Consensus TEC	Yes
CHROMIUM	**230**	43.4	Consensus TEC	Yes
COBALT	**16**	10	Other	Yes
COPPER	**350**	31.6	Consensus TEC	Yes
IRON	**34000**	20000	LEL (OMOE)	Yes
LEAD	**1100**	35.8	Consensus TEC	Yes
MANGANESE	**720**	460	LEL (OMOE)	Yes
MERCURY	**11**	0.18	Consensus TEC	Yes
NICKEL	**46**	22.7	Consensus TEC	Yes
SELENIUM	**1.9**	0.29	Other	Yes
SILVER	**23**	1	ERL (NOAA)	Yes
TIN	**59**	5	Other	Yes
VANADIUM	**87**	50	Other	Yes
ZINC	**740**	121	Consensus TEC	Yes
Organics				
TOTAL HMW PAHS	**168700**	1700	ERL (NOAA)	Yes
TOTAL LMW PAHS	**46970**	552	ERL (NOAA)	Yes
TOTAL PAHS	**215670**	1610	Consensus TEC	Yes
TOTAL PCBs	**5296**	59.8	Consensus TEC	Yes
ALPHA-CHLORDANE	**120**	3.24	Consensus TEC	Yes
GAMMA-CHLORDANE	**230**	3.24	Consensus TEC	Yes
DIELDRIN	**190**	1.9	Consensus TEC	Yes
ENDRIN	**25**	2.22	Consensus TEC	Yes
ENDRIN ALDEHYDE	**15**	2.22	Consensus TEC	Yes
ENDRIN KETONE	**7.7**	2.22	Consensus TEC	Yes
P,P'-DDD	**650**	8	LEL (OMOE)	Yes
P,P'-DDE	**260**	5	LEL (OMOE)	Yes
P,P'-DDT	**110**	7	LEL (OMOE)	Yes
Organo Tin (ug/kg)				
TRIBUTYLTIN	5.3	204.5	Other	No
Methyl Mercury (ng/g)				
METHYL MERCURY	**0.0017**	0.00001	Other	Yes

NOTES

Analytes with maximum concentrations exceeding benchmarks are retained as chemicals of potential concern (COPC).
Boldface indicates excedance of low effect benchmark
COPC - Chemical of Potential Concern
NV - No screening value identified

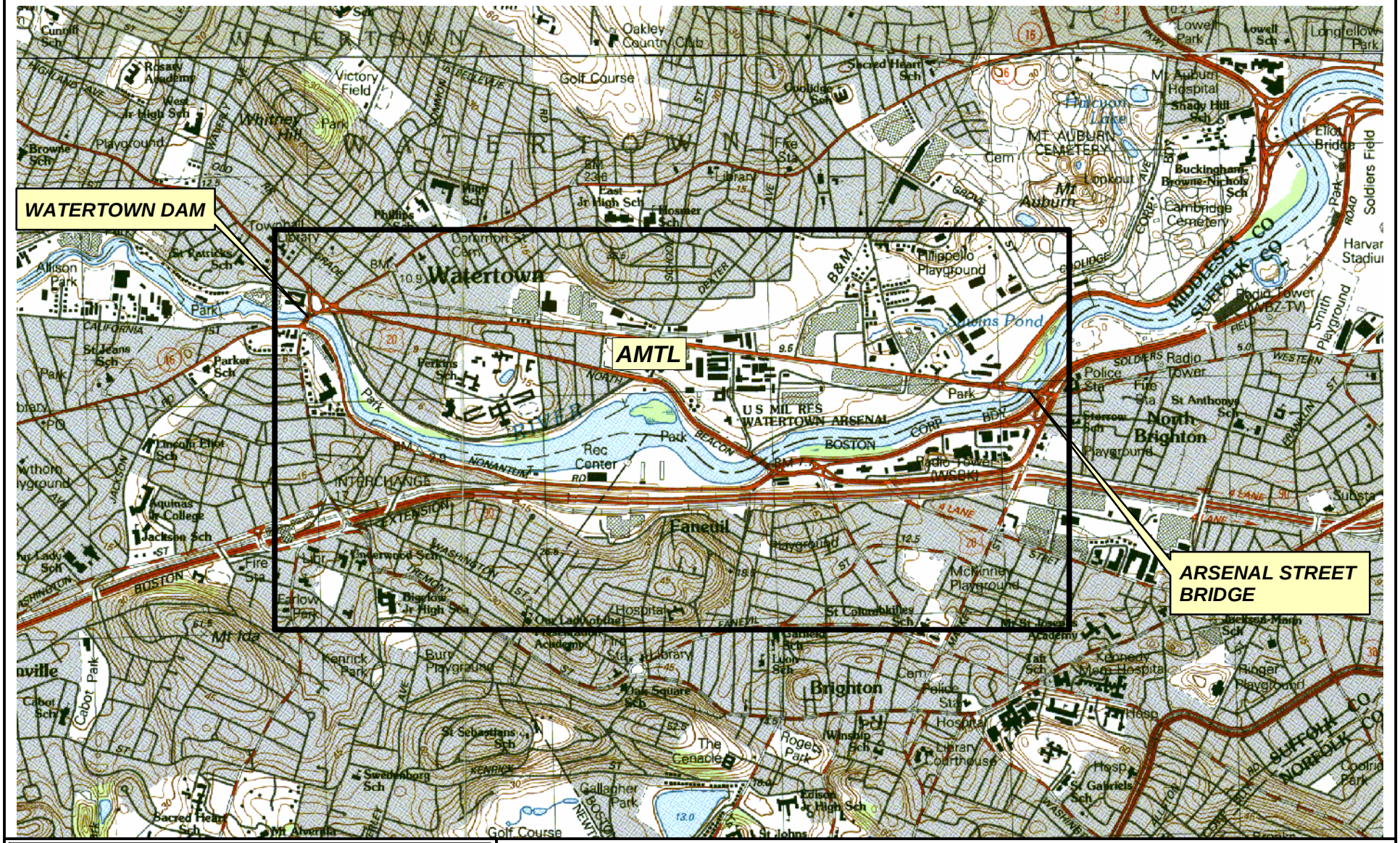
Table 7 Measurement and Assessment Endpoints

Assessment Endpoint / Measurement Endpoint		
1	***Sustainability of a benthic macroinvertebrate community in the adjacent Charles River OU reach comparable to communities in the urbanized, upstream background reach and/or downstream reach of the Charles River.***	
	1-1	Comparison of bulk sediment analytical chemistry results to sediment quality benchmarks. Concentrations in excess of sediment quality benchmarks will be considered indicative of a potential for ecological risks. For certain inorganic constituents, the SEM, AVS, and TOC data in sediments will also be considered. The SEM, AVS, and TOC data will be used to provide an indicator of the potential bioavailability of these inorganic constituents in sediments.
	1-2	Results of laboratory bulk sediment short term toxicity tests using the benthic macroinvertebrate *C. tentans* to evaluate potential lethal and sub-lethal effects associated with exposure to adjacent/downstream sediment relative to background (upstream) sediment. Laboratory toxicity testing using standardized protocols helps evaluate potential toxicity associated with exposure to field-collected sediment.
	1- 3	Results of laboratory bulk sediment long term toxicity tests using the benthic macroinvertebrate *H. azteca* to evaluate potential lethal and sub-lethal effects associated with exposure to adjacent/downstream sediment relative to background (upstream) sediment. Laboratory toxicity testing using standardized protocols helps evaluate potential toxicity associated with exposure to field-collected sediment.
	1- 4	Quantitative assessment of the benthic macroinvertebrate community in the Charles River, adjacent to, upstream of, and downstream of the AMTL. Various benthic macroinvertebrate community abundance and diversity metrics will be used to help evaluate the potential impact on benthic ecological receptors due to sediment exposure
	1- 5	Results of tissues obtained from field-collected bivalves will be used to evaluate the potential uptake of PCBs, pesticides and metals into invertebrate tissue. Measured bivalve tissue concentrations will be compared to literature-derived critical body residues (CBRs) to evaluate potential impacts from exposure to COPC in sediments
	1- 6	Results of tissues obtained from laboratory bulk sediment bioaccumulation studies with benthic invertebrate species will be used to evaluate the potential uptake of PCBs, pesticides and metals into invertebrate tissue. Measured oligochaete tissue concentrations will be compared to literature-derived critical body residues (CBRs) to evaluate potential impacts from exposure to COPC in sediments
2	***Sustainability of a residential warmwater and anadromous fish community in the adjacent Charles River OU reach comparable to communities in the urbanized, upstream background reach and/or downstream reach of the Charles River.***	
	2- 1	Comparison of bulk sediment analytical chemistry results to sediment quality benchmarks. Concentrations in excess of sediment quality benchmarks will be considered indicative of a potential for ecological risks. For certain inorganic constituents, the SEM, AVS, and TOC data in sediments will also be considered. The SEM, AVS, and TOC data will be used to provide an indicator of the potential bioavailability of these inorganic constituents in sediments.
	2- 2	Results of bulk sediment laboratory short term chronic toxicity tests using appropriate fish species (*P. promelas*) to evaluate potential lethal and sub-lethal effects associated with exposure to adjacent/downstream sediment relative to upstream sediment.
	2- 3	Laboratory-exposed oligochaete data will be used to model fish tissue concentrations. Modeled fish tissue concentrations will be compared to literature-derived CBRs to evaluate potential impacts from exposure to COPC
3	***Sustainability of a vertebrate wildlife community in the floodplain of the adjacent Charles River OU reach comparable to communities in the urbanized, upstream background reach and/or downstream reach of the Charles River.***	
	3- 1	Evaluation of potential risks to a representative avian and mammalian receptor from exposure to sediments and ingestion of PBT-containing prey items. Selected PBT concentrations in prey items will be evaluated based on the tissue concentrations for PCBs, pesticides, and metals analyzed in Measurement Endpoints 1-5, 1-6, and 2-3.

Table 8 Weight of Evidence Weighting Factors Matrix

Assessment Endpoint	Measurement Endpoint	High/Medium/Low					Pass/Fail
		Study Design [1]	Strength of Association [1]	Study Execution (Pass/Fail)	Relative Weight [1]	Magnitude of Effect/Non-Effect [3]	Data Quality
1	***Sustainability of a benthic macroinvertebrate community in the adjacent Charles River OU reach comparable to communities in the urbanized, upstream background reach and/or downstream reach of the Charles River.***						
1-1	Comparison of bulk sediment analytical chemistry results to sediment quality benchmarks. Concentrations in excess of sediment quality benchmarks will be considered indicative of a potential for ecological risks. For certain inorganic constituents, the SEM, AVS, and TOC data in sediments will also be considered. The SEM, AVS, and TOC data will be used to provide an indicator of the potential bioavailability of these inorganic constituents in sediments.	High	Medium	Pass	Medium	Sampling station and reach-specific	Pass
1-2	Results of laboratory bulk sediment short term toxicity tests using the benthic macroinvertebrate *C. tentans* to evaluate potential lethal and sub-lethal effects associated with exposure to adjacent/downstream sediment relative to background (upstream) sediment. Laboratory toxicity testing using standardized protocols helps evaluate potential toxicity associated with exposure to field-collected sediment.	Medium/High	Medium	Pass	Medium	Sampling station and reach-specific	Pass
1-3	Results of laboratory bulk sediment long term toxicity tests using the benthic macroinvertebrate *H. azteca* to evaluate potential lethal and sub-lethal effects associated with exposure to adjacent/downstream sediment relative to background (upstream) sediment. Laboratory toxicity testing using standardized protocols helps evaluate potential toxicity associated with exposure to field-collected sediment.	Medium/High	High	Pass	High	Sampling station and reach-specific	Pass
1-4	Quantitative assessment of the benthic macroinvertebrate community in the Charles River, adjacent to, upstream of, and downstream of the AMTL. Various benthic macroinvertebrate community abundance and diversity metrics will be used to help evaluate the potential impact on benthic ecological receptors due to sediment exposure	Medium	Medium/High	Pass [2]	Medium	Sampling station and reach-specific	Pass (b)
1-5	Results of tissues obtained from field-collected bivalves will be used to evaluate the potential uptake of PCBs, pesticides and metals into invertebrate tissue. Measured bivalve tissue concentrations will be compared to literature-derived critical body residues (CBRs) to evaluate potential impacts from exposure to COPC in sediments	Medium/High	Medium	Pass	Medium	Sampling station and reach-specific	Pass
1-6	Results of tissues obtained from laboratory bulk sediment bioaccumulation studies with benthic invertebrate species will be used to evaluate the potential uptake of PCBs, pesticides and metals into invertebrate tissue. Measured oligochaete tissue concentrations will be compared to literature-derived critical body residues (CBRs) to evaluate potential impacts from exposure to COPC in sediments	Medium/High	Medium/Low	Pass	Medium/Low	Sampling station and reach-specific	Pass
2	***Sustainability of a residential warmwater and anadromous fish community in the adjacent Charles River OU reach comparable to communities in the urbanized, upstream background reach and/or downstream reach of the Charles River.***						
2-1	Comparison of bulk sediment analytical chemistry results to sediment quality benchmarks. Concentrations in excess of sediment quality benchmarks will be considered indicative of a potential for ecological risks. For certain inorganic constituents, the SEM, AVS, and TOC data in sediments will also be considered. The SEM, AVS, and TOC data will be used to provide an indicator of the potential bioavailability of these inorganic constituents in sediments.	High	Low	Pass	Low	Sampling station and reach-specific	Pass
2-2	Results of bulk sediment laboratory short term chronic toxicity tests using appropriate fish species (*P. promelas*) to evaluate potential lethal and sub-lethal effects associated with exposure to adjacent/downstream sediment relative to upstream sediment.	Medium/High	Medium	Pass	Medium	Sampling station and reach-specific	Pass
2-3	Laboratory-exposed oligochaete data will be used to model fish tissue concentrations. Modeled fish tissue concentrations will be compared to literature-derived CBRs to evaluate potential impacts from exposure to COPC in sediments.	Medium/Low	Low	Pass	Medium/Low	Sampling station and reach-specific	Pass
3	***Sustainability of a vertebrate wildlife community in the floodplain of the adjacent Charles River OU reach comparable to communities in the urbanized, upstream background reach and/or downstream reach of the Charles River.***						
3-1	Evaluation of potential risks to a representative avian and mammalian receptor from exposure to sediments and ingestion of PBT-containing prey items. Selected PBT concentrations in prey items will be evaluated based on the tissue concentrations for PCBs, pesticides, and metals analyzed in Measurement Endpoints 1-5, 1-6, and 2-3.	Medium	Medium	Pass	Medium	Sampling Station and reach-specific	Pass

[1] - The following five categories have been assigned for evaluating the study design and relative weight of endpoints: (A) High; (B) Medium/High; (C) Medium; (D) Medium/Low; and (E) Low.
[2] - Although the macroinvertebrate study was successfully executed, 100-organism sub-samples were not obtained from all stations.
[3] - This value differs on a reach-by-reach basis, and is presented in subsequent reach-specific tables.



0 500 1,000 2,000 3,000 4,000 Feet

0 250 500 1,000 Meters

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Charles River Operable Unit Site Locus Map

AMTL, U. S. Army Corps of Engineers
Watertown, Massachusetts

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RSE	JAB	06/05	09000-273

Figure Number

1

N W E S

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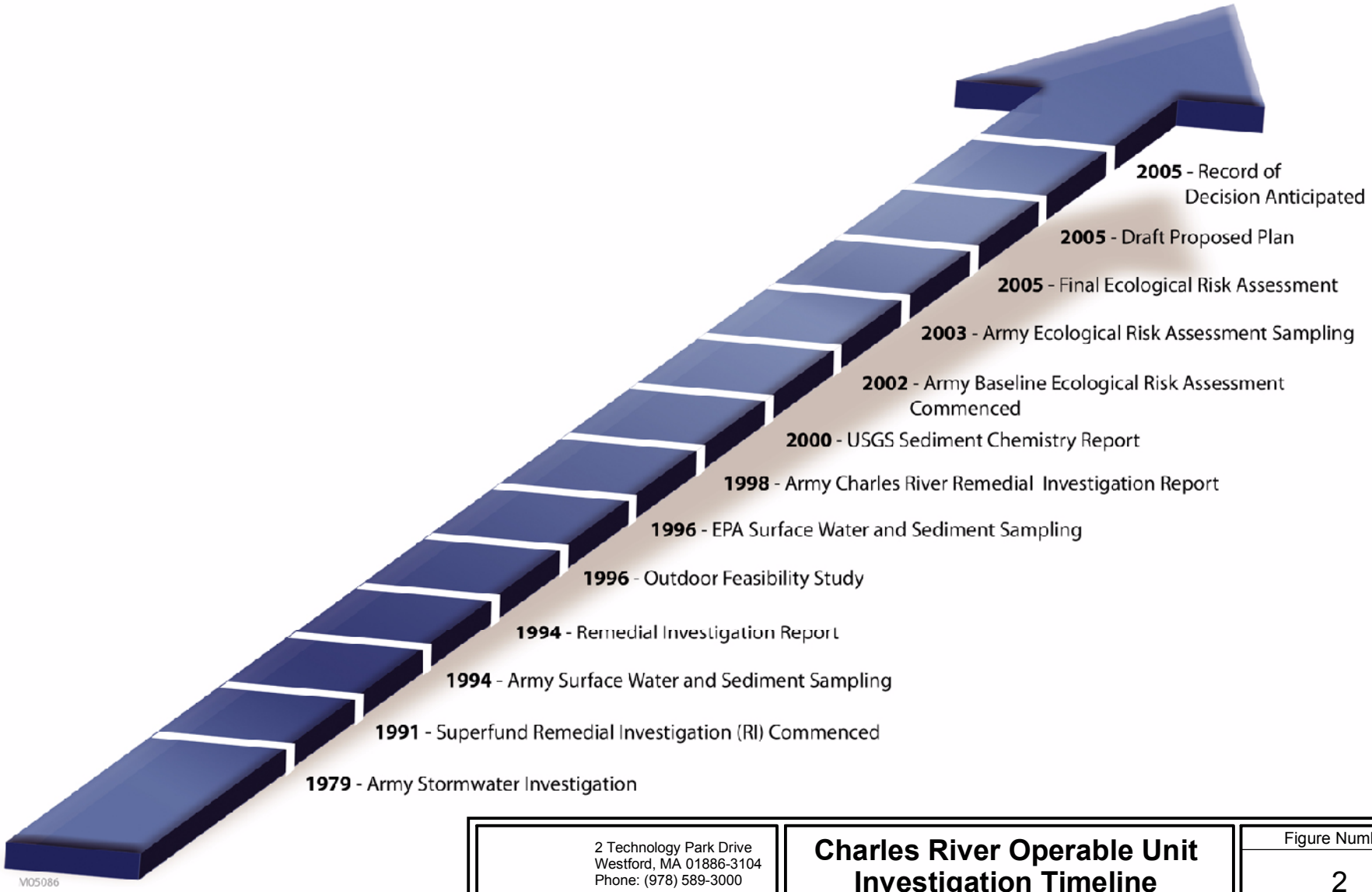

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Charles River Operable Unit Investigation Timeline

AMTL, U. S. Army Corps of Engineers
Watertown, Massachusetts

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Figure Number

2

N W E S

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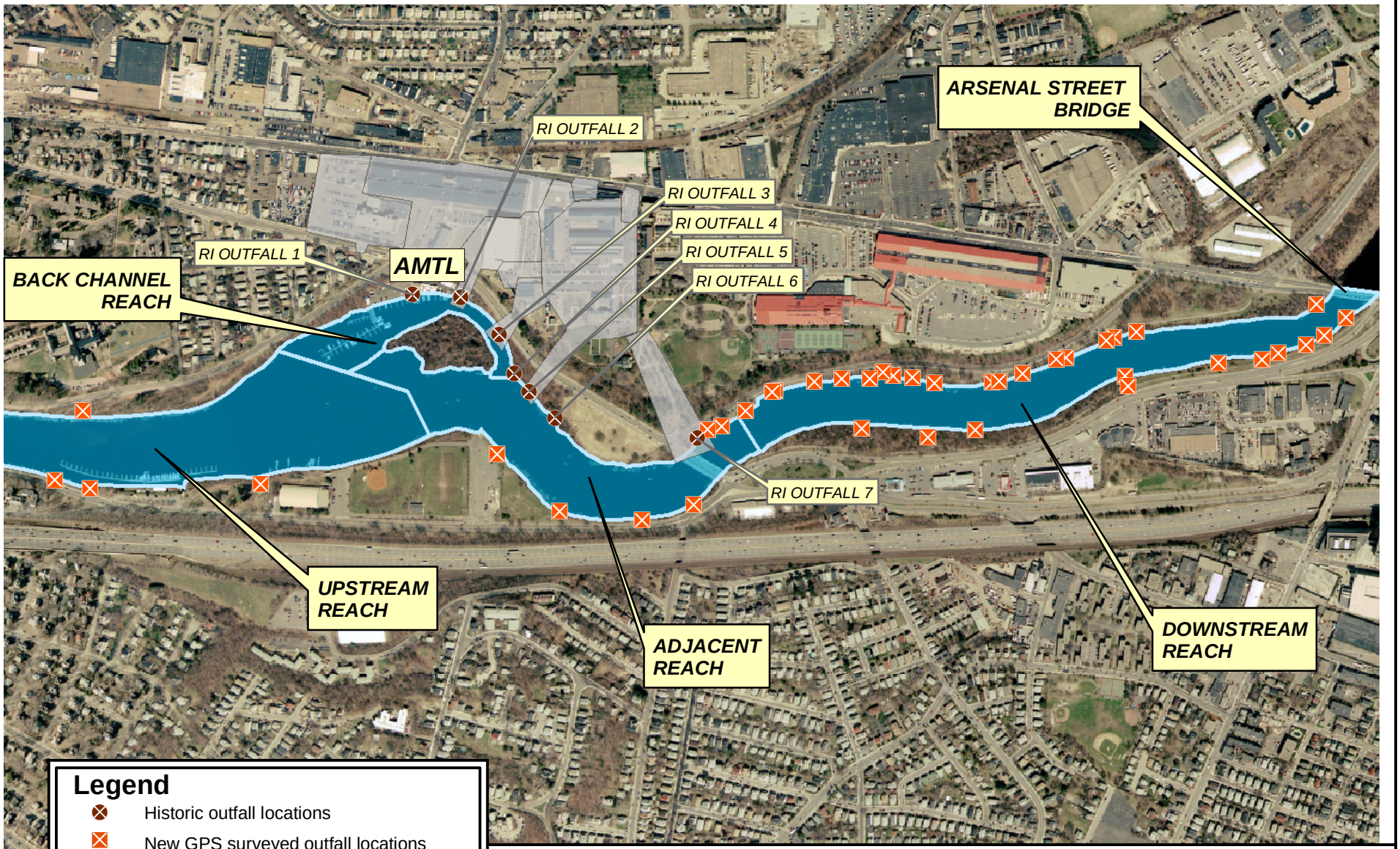

Legend

- Historic outfall locations
- New GPS surveyed outfall locations
- Study Reach Boundaries
- Drainage areas assciated with historic outfall locations

0 200 400 800 1,200 1,600 Feet

0 50 100 200 300 400 500 600 Meters

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Charles River Operable Unit Stormwater Outfall Locations

AMTL, U. S. Army Corps of Engineers
Watertown, Massachusetts

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Figure Number

3

N W E S

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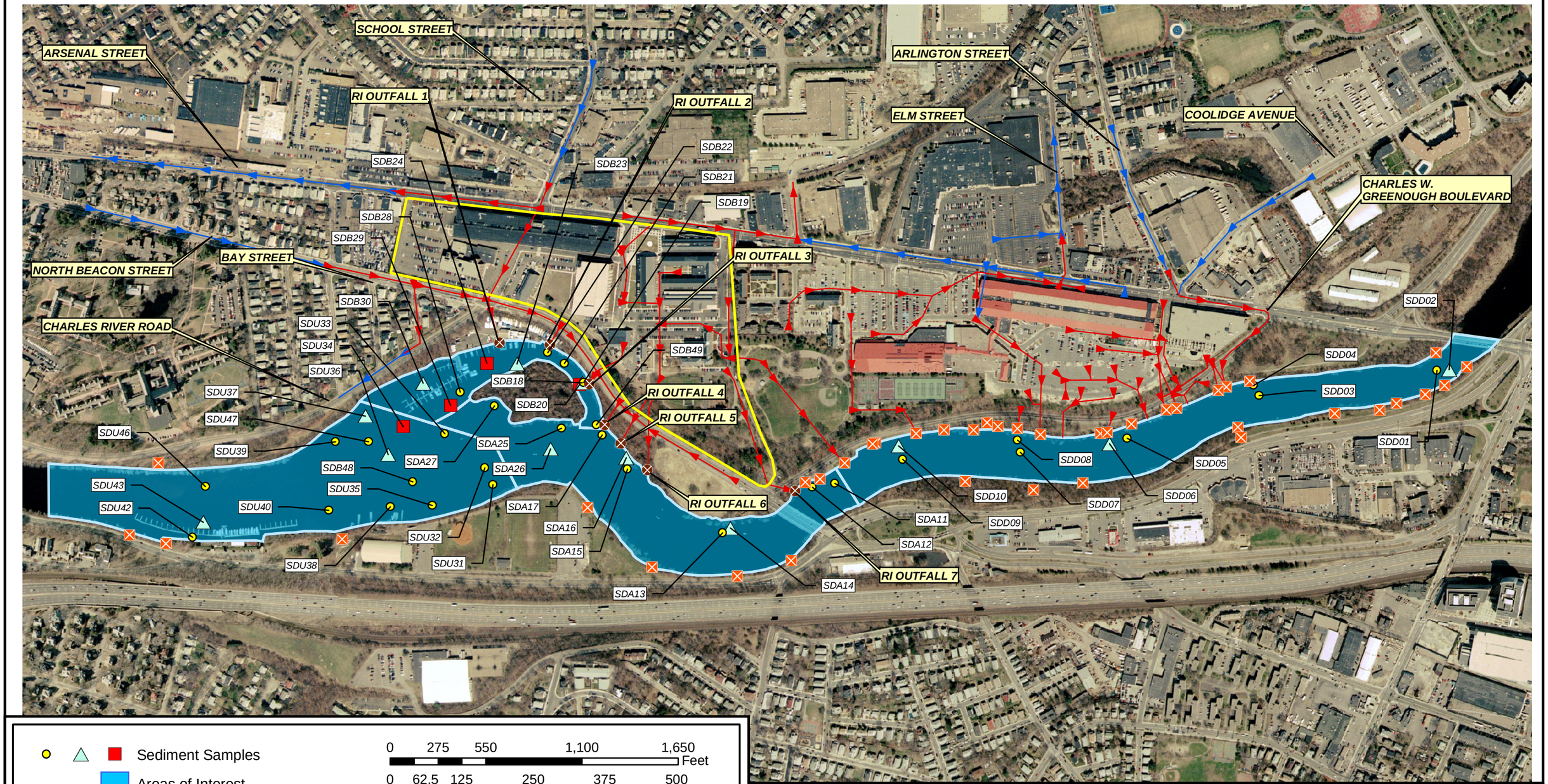

Sediment Samples

Areas of Interest

Assumed Storm Sewers

Existing Storm Sewers

AMTL Site Boundary

Historic Outfall Locations

Outfalls Located During Recent Field Investigation

0 275 550 1,100 1,650 Feet

0 62.5 125 250 375 500 Meters

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Stormwater Sewers that may Affect the Charles River in the Vicinity of the AMTL Site

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Figure Number

4

N W E S

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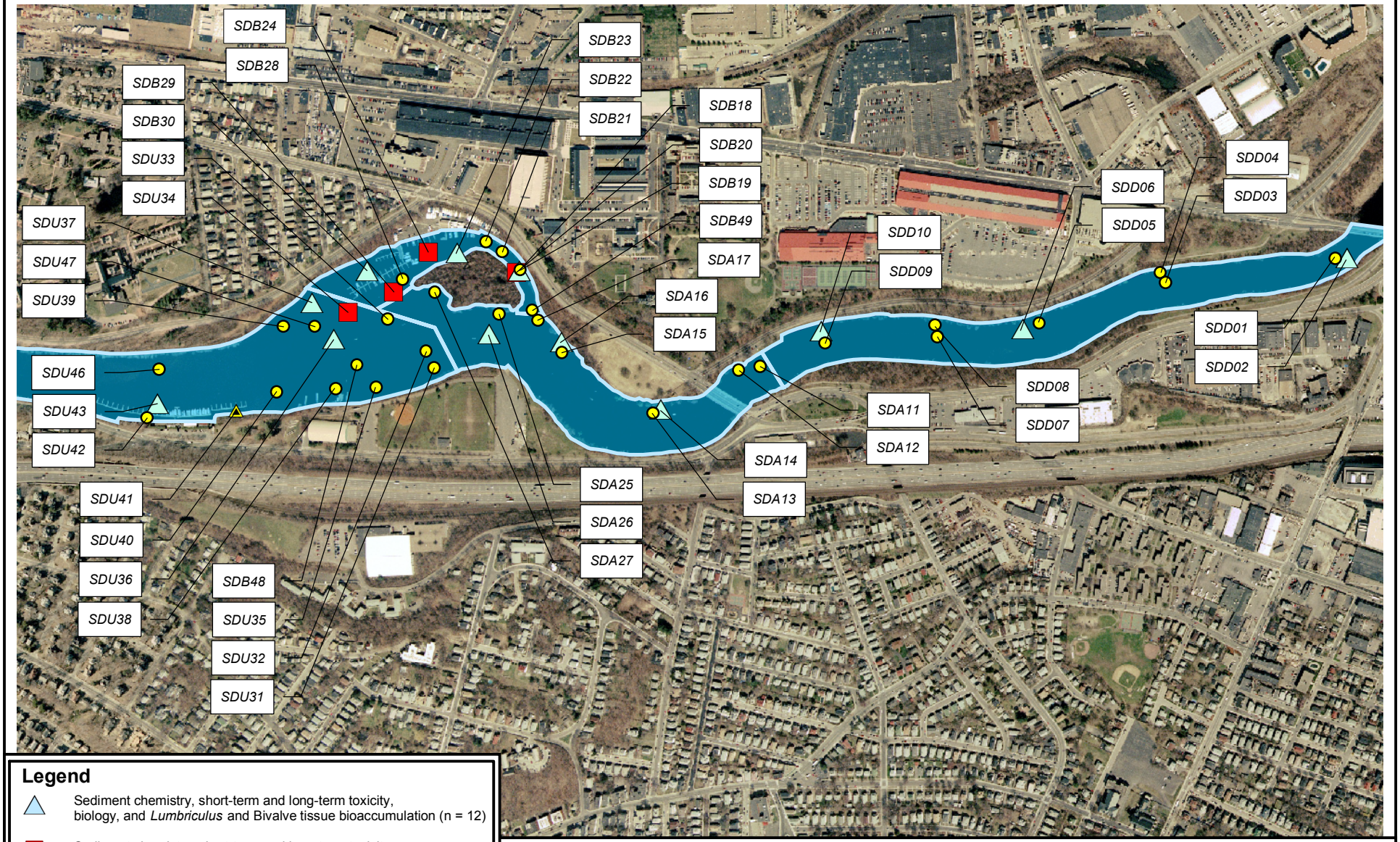

Legend

- Sediment chemistry, short-term and long-term toxicity, biology, and *Lumbriculus* and Bivalve tissue bioaccumulation (n = 12)
- Sediment chemistry, short-term and long-term toxicity, and biology (n = 4)
- Sediment chemistry (n = 30)
- Sediment chemistry and Bivalve tissue bioaccumulation (n = 1)
- Study Reach Boundaries

0 200 400 800 1,200 1,600 Feet

0 50 100 200 300 400 500 600 Meters

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Charles River Operable Unit Sampling Locations

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Figure Number

5

N W E S

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Figure 6 Upstream WOE Matrix

UPSTREAM

INCREASING RELATIVE WEIGHT ←

INCREASING POTENTIAL FOR RISK ↑

Evidence of Risk / Magnitude	High	Medium/High	Medium	Medium/Low	Low
Yes / High Potential for Risk			1.1		2.1
Yes / Low Potential for Risk			2.2b		
Indeterminate Potential for Risk			1.2a, 1.2b, 1.4, 2.2a, 3.1	1.6, 2.3	
No Potential for Risk	1.3a, 1.3b, 1.3c		1.5		

Measurement Endpoints

1.1 Comparison of bulk sediment chemistry to SQB's
1.2a Bulk sediment toxicity test results with *C. tentans* (mortality)
1.2b Bulk sediment toxicity test results with *C. tentans* (growth)
1.3a Bulk sediment toxicity test results with *H. azteca* (mortality)
1.3b Bulk sediment toxicity test results with *H. azteca* (growth)
1.3b Bulk sediment toxicity test results with *H. azteca* (reproduction)
1.4 Qualitative assessment of benthic macroinvertebrate community indices
1.5 Comparison of field-collected bivalve tissue with CBRs
1.6 Comparison of lab-reared oligochaete tissue with CBR's

2.1 Comparison of bulk sediment chemistry to SQB's
2.2a Bulk sediment toxicity test results using *P. promelas* (mortality)
2.2b Bulk sediment toxicity test results using *P. promelas* (growth)
2.3 Comparison of modeled fish tissue (based on lab-reared oligochaetes) to CBR's
3.1 Evaluation of potential risks to avian and mammalian receptors due to sediments and prey-ingestion

Figure 7 Adjacent WOE Matrix

ADJACENT

INCREASING RELATIVE WEIGHT ←

INCREASING POTENTIAL FOR RISK ↑

Evidence of Risk / Magnitude	High	Medium/High	Medium	Medium/Low	Low
Yes / High Potential for Risk	1.3a		1.1		2.1
Yes / Low Potential for Risk			1.2a, 1.2b		
Indeterminate Potential for Risk	1.3c		1.4, 2.2a, 2.2b, 3.1	1.6, 2.3	
No Potential for Risk	1.3b		1.5		

Measurement Endpoints

1.1 Comparison of bulk sediment chemistry to SQB's
1.2a Bulk sediment toxicity test results with *C. tentans* (mortality)
1.2b Bulk sediment toxicity test results with *C. tentans* (growth)
1.3a Bulk sediment toxicity test results with *H. azteca* (mortality)
1.3b Bulk sediment toxicity test results with *H. azteca* (growth)
1.3b Bulk sediment toxicity test results with *H. azteca* (reproduction)
1.4 Qualitative assessment of benthic macroinvertebrate community indices
1.5 Comparison of field-collected bivalve tissue with CBRs
1.6 Comparison of lab-reared oligochaete tissue with CBR's

2.1 Comparison of bulk sediment chemistry to SQB's
2.2a Bulk sediment toxicity test results using *P. promelas* (mortality)
2.2b Bulk sediment toxicity test results using *P. promelas* (growth)
2.3 Comparison of modeled fish tissue (based on lab-reared oligochaetes) to CBR's
3.1 Evaluation of potential risks to avian and mammalian receptors due to sediments and prey-ingestion

Figure 8 Back Channel WOE Matrix

BACK CHANNEL

INCREASING RELATIVE WEIGHT ←

INCREASING POTENTIAL FOR RISK ↑

Evidence of Risk / Magnitude	High	Medium/High	Medium	Medium/Low	Low
Yes / High Potential for Risk			1.1		2.1
Yes / Low Potential for Risk			1.2b		
Indeterminate Potential for Risk	1.3a, 1.3c		1.2a, 1.4, 2.2a, 2.2b, 3.1	1.6, 2.3	
No Potential for Risk	1.3b		1.5		

Measurement Endpoints

1.1 Comparison of bulk sediment chemistry to SQB's
1.2a Bulk sediment toxicity test results with *C. tentans* (mortality)
1.2b Bulk sediment toxicity test results with *C. tentans* (growth)
1.3a Bulk sediment toxicity test results with *H. azteca* (mortality)
1.3b Bulk sediment toxicity test results with *H. azteca* (growth)
1.3b Bulk sediment toxicity test results with *H. azteca* (reproduction)
1.4 Qualitative assessment of benthic macroinvertebrate community indices
1.5 Comparison of field-collected bivalve tissue with CBRs
1.6 Comparison of lab-reared oligochaete tissue with CBR's

2.1 Comparison of bulk sediment chemistry to SQB's
2.2a Bulk sediment toxicity test results using *P. promelas* (mortality)
2.2b Bulk sediment toxicity test results using *P. promelas* (growth)
2.3 Comparison of modeled fish tissue (based on lab-reared oligochaetes) to CBR's
3.1 Evaluation of potential risks to avian and mammalian receptors due to sediments and prey-ingestion

Figure 9 Downstream WOE Risk Matrix

DOWNSTREAM

INCREASING RELATIVE WEIGHT ←

INCREASING POTENTIAL FOR RISK ↑

Evidence of Risk / Magnitude	High	Medium/High	Medium	Medium/Low	Low
Yes / High Potential for Risk	1.3a		1.1		2.1
Yes / Low Potential for Risk			1.2a, 1.2b		
Indeterminate Potential for Risk	1.3c		1.4, 3.1	1.6, 2.3	
No Potential for Risk	1.3b		1.5, 2.2a, 2.2b		

Measurement Endpoints

1.1 Comparison of bulk sediment chemistry to SQB's
1.2a Bulk sediment toxicity test results with *C. tentans* (mortality)
1.2b Bulk sediment toxicity test results with *C. tentans* (growth)
1.3a Bulk sediment toxicity test results with *H. azteca* (mortality)
1.3b Bulk sediment toxicity test results with *H. azteca* (growth)
1.3b Bulk sediment toxicity test results with *H. azteca* (reproduction)
1.4 Qualitative assessment of benthic macroinvertebrate community indices
1.5 Comparison of field-collected bivalve tissue with CBRs
1.6 Comparison of lab-reared oligochaete tissue with CBR's

2.1 Comparison of bulk sediment chemistry to SQB's
2.2a Bulk sediment toxicity test results using *P. promelas* (mortality)
2.2b Bulk sediment toxicity test results using *P. promelas* (growth)
2.3 Comparison of modeled fish tissue (based on lab-reared oligochaetes) to CBR's
3.1 Evaluation of potential risks to avian and mammalian receptors due to sediments and prey-ingestion

3.0 THE RESPONSIVENESS SUMMARY

The purpose of this Responsiveness Summary is to document the Army's responses to the questions and comments raised during the public comment period. The Army considered all of the comments summarized in this document before selecting a final remedial alternative to address contamination at the Charles River OU. All of the original comments submitted during the comment period are included in the Administrative Record and in Appendix E1 of this ROD. Appendix E2 of this ROD contains a copy of the transcript from the public hearing held on May 16, 2005 at the Town Hall in Watertown, Massachusetts.

This Responsiveness Summary addresses comments pertaining to the Proposed Plan that were received by the Army during the 50-day public comment period (April 29 to June 20, 2005). During the public comment period, the Army received written comments from the following three individuals/organizations

- Ms. Susan Falkoff (on behalf of the Watertown Arsenal Restoration Advisory Board);
- Ms. Renata von Tscharner (on behalf of the Charles River Conservancy), and
- Mr. Richard F. Corsi (on behalf of the Massachusetts Department of Conservation and Recreation)

In addition, two of these individuals (Ms. Falkoff and Ms. von Tscharner), as well as four other individuals, also spoke at the May 16, 2005 public hearing.

This Responsiveness Summary addresses all written and oral comments received during the public comment period.

3.1 Stakeholder Issues and Army Responses

Several comments were received during the public comment period and at the public hearing on the Proposed Plan for the Charles River OU. The Army has reviewed all comments received from the public. Comprehensive responses to each of the oral and written comments submitted by the public are summarized by subject area and are presented below.

Issue 1- The Proposed Plan states that the Human Health Risk Assessment conducted by the Army indicated that there are no risks to humans due to fish consumption from the Charles River. However, given that there is a fish advisory in effect for the Charles River, how can the

Army conclude that there is not a potential risk associated with Charles River fish consumption?

Army Response: The human health risk assessment (Weston, 1994) indicated that the AMTL has not contributed to conditions in the Charles River causing a cancer risk above 1 in 100,000 or acute or chronic adverse health effects. As part of this risk assessment, the consumption of fish by sport anglers and families was considered. It was assumed that the fishing was recreational, not subsistence, and the angler brought home 10 meals per year (adult serving was 8 oz, child's serving was 4 oz). This evaluation only considered the potential contribution of the AMTL to the fish tissue concentrations. Contributions of other upstream, urban sources were not evaluated in the human health risk assessment since the focus was on the potential impacts due to the AMTL facility. Based on this evaluation, the potential contributions from AMTL did not indicate risk to humans from recreational consumption of fish. The human health risk assessment was finalized in 1994, and approved by the state and federal agencies.

As indicated in the public hearing, a Public Health Fish Consumption Advisory issued by the MDPH currently does exist within the Charles River (see Table 9). This advisory is not associated with any specific source, but instead covers two large reaches of the Charles River. The advisory was issued by MDPH on May 3, 1996, for the lower Charles River between Hemlock Gorge Dam in Needham/Newton and the Charles River Dam located at the Museum of Science in Boston/Cambridge. The MDPH advised that PCBs were detected in carp from this area at levels below the FDA action level of 2.0 mg/kg, but at a level that may pose health concerns for some individuals (Krueger, 1996). An FDA action level is an enforceable regulatory limit for residues in or on a food. When residues are detected at or above this action level, the FDA can, at the agency's discretion, take legal action to remove the adulterated food from the market. It is legally nonbinding in that FDA's enforcement action is discretionary.

As indicated in Table 9, the current advisory for the portion of the Charles River adjacent to the AMTL facility (identified as the reach between the South Natick Dam in Natick and the Museum of Science Dam in Boston/Cambridge) advises limiting the consumption of carp and largemouth bass due to PCBs and pesticides. An additional advisory for mercury in largemouth bass is also in effect from the South Natick Dam to the Medway Dam in Medway. Lastly, the Charles River is also included in a statewide fish consumption advisory for mercury, which was issued by MDPH In 2001. Additional information regarding the 2001 MDPH statewide advisory can be found online at: http://www.mass.gov/dph/media/2001/pr0724.htm).

A 1997 Public Health Assessment conducted by the Agency for Toxic Substances and Disease Registry (ATSDR) concluded that there was no apparent harm to public health if the fish advisory was followed. According to this Public Health Assessment, recreational uses of the river, such as boating,

wading, swimming and catch-and-release fishing, did not pose an unacceptable risk to public health concern. People are not likely to contact contaminants in surface water and sediment through such activities. Even if individuals are exposed, their intermittent, short-term contact with contaminants is not expected to cause illness. However, frequently eating fish caught in urban sections of the Charles River poses a potential health threat. The MADEP addressed this issue by coordinating fish sampling in the Watertown area, and, as indicated above and in Table 9, the MDPH evaluated the fish tissue data and issued a fish consumption advisory for the Lower Charles River. The ATSDR report also indicated that the source of the PCBs under consideration in the fish advisory were likely from a variety of sources, potentially including the AMTL facility and other “sources of industrial and urban discharge” (ATSDR, 1997).

A 1999 U.S. EPA fish tissue study indicated elevated levels of PCBs in carp, largemouth bass, yellow perch, and calico bass, some in excess of the FDA action level of 2.0 mg/kg. Mercury and pesticides, like DDT and dieldrin, were also detected in fish tissues in the 1999 study, but at levels below the FDA action levels (U.S. EPA, 2001).

In summary, the existing lower Charles River fish consumption advisories consider fish tissue concentrations contaminated by unidentified sources in the Lower Charles River, while the human health risk assessment for the AMTL CERCLA site focused on the potential risks due to the incremental increase in chemical contributions due to the AMTL facility. The CERCLA process resulted in a finding that there are no potential risks to human health due to consumption of fish impacted by the AMTL facility. However, there may be risks due to multiple sources of contamination within the watershed, as indicated by the fish advisory. In addition, the Charles River is also included in a statewide fish consumption advisory for mercury, which was issued by MDPH in 2001.

Table 9 Fish Consumption Advisories For The Charles River

River Reach	Towns	Hazard	Advisory	Fish Type
Charles River (Between South Natick Dam in Natick and Medway Dam in Franklin and Medway)	Dover, Franklin, Medfield, Medway, Millis, Natick, Norfolk, Sherborn	Mercury	P1 Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any Largemouth Bass fish from this water body.	Largemouth Bass
			P3 The general public should limit consumption of Largemouth Bass fish to two meals per month.	Largemouth Bass
Charles River (Between South Natick Dam in Natick and Museum of Science Dam in Boston/ Cambridge)	Boston, Cambridge, Dedham, Dover, Natick, Needham, Newton, Watertown, Wellesley, Weston, Waltham	PCBs (polychlorinated biphenyls) and pesticides	P1 Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any Carp or Largemouth Bass fish from this water body.	Carp
				Largemouth Bass
			P2 The general public should not consume Carp from this water body.	Carp
			P3 The general public should limit consumption of Largemouth Bass fish to two meals per month.	Largemouth Bass

Information obtained from the following website:
http://db.state.ma.us/dph/fishadvisory/
The Charles River is also included in a statewide fish consumption advisory for mercury, which was issued by MDPH In 2001.

Issue 2 - A commenter at the public meeting indicated that the Army's information repository for the AMTL documents is currently under construction.

Army Response: During the public meeting, the Army was informed that construction activities are occurring at the Information Repository for this project (Watertown Free Public Library, 123 Main Street, Watertown, MA). Due to these construction activities, the AMTL Charles River Operable Unit documents are available for review at the temporary location of the Main Library (30 Common Street, Watertown, MA). In order to ensure public access to the appropriate Information Repository, the formal comment period for the Proposed Plan was extended from May 1, 2005 through June 20, 2005. A public notice was published by the Army in the May 20, 2005 Watertown TAB papers to communicate the extended public comment period and the temporary location of the information repository to the public. In addition, a press release prepared by the Army was provided to numerous media outlets to communicate the extension of the formal comment period.

Issue 3- Aren't the restoration activities proposed for the stream bank already required as part of the OU 1 five-year review? Are there any additional benefits to the proposed work beyond what is already required?

Army Response: Stakeholders questioned whether the proposed river bank restoration project at the Charles River Park (also known as Squibnocket Park) is a mitigation project that is already required under the OU 1 ROD and five-year review process. However, the Army believes that the restoration efforts under consideration go well beyond those that may be necessary under the OU 1 ROD.

A June 7, 2005 OU 1 site visit was conducted as part of the accelerated five-year review. During this visit, evidence of soil erosion along the Charles River was observed. To address this condition under the OU 1 ROD, an investigative effort to evaluate soil erosion over time would likely be required. A bank stabilization effort would likely only be required following completion of such a study, and only if the study indicated that bank mitigation would help limit erosional potential. In addition, a bank stabilization effort could consist of the addition of sandbags or large rocks, or expansion of the existing willow bank stabilization with more willows. These efforts would likely reduce the erosion potential and address the OU 1 review requirements, but would not necessarily improve the shoreline habitat.

Instead, the Army is proposing a shoreline enhancement project consisting of substantial ecological restoration components that would go well beyond the response required to address the bank stability and erosion conditions. The bank enhancement program was presented during a stakeholder meeting at U.S. EPA's regional headquarters on January 21, 2005 and at RAB meetings (February 9, 2005 and June 29, 2005) and was well received by the public. The project will include actions to limit erosion, but will also improve the shoreline habitat by increasing the diversity of shoreline plants, which will have both aesthetic and wildlife value.

Issue 4 - Stakeholders are concerned about the potential impact of AMTL-related contamination in sub-surface sediments in the Charles River and whether these sub-surface sediments have ever been evaluated.

Army Response: The BERA demonstrated that there is no AMTL-related unacceptable potential for ecological risks from exposure to surficial sediments in the vicinity of the Charles River OU; however, it is possible that sediment instability may result in transport of potentially contaminated sub-surficial sediment to the surface. That is, although there is no current unacceptable potential for ecological risks adjacent to the AMTL site, it is possible, due to sediment instability processes, that the potential for future ecological risks will differ from current conditions.

Although there are some uncertainties associated with the available sub-surficial sediment data, the Army reviewed these data relative to the public concerns regarding re-contamination of surficial

sediment from materials that are currently encapsulated at depth. A number of sediment core samples were collected from the project area during the 1995 Army investigation of the Charles River OU (Plexus, 1998); these data were evaluated in the Screening Level Ecological Risk Assessment (ENSR, 2002). Three transects (transects 03, 08, and 14) correspond roughly to the Upstream, Back Channel, and Downstream reaches, respectively, evaluated by the Army in the recently completed BERA (Figure 10). At each of these transects, sediment chemistry data were collected from at least three sediment layers, allowing a limited evaluation of chemical concentrations at multiple depths from within a core. Figures 11 through 14 present the concentrations of selected inorganic compounds, pesticides, PAHs, and PCBs within the cores at the three transects, as well as in the surface samples collected from the Charles River during the 2003 BERA sampling effort.

A review of this limited group of sub-surface samples indicates that, in general, the concentrations of constituents decrease with increasing depth at two of the three sampling locations (i.e., concentrations of constituents at transects 03 and 08 were generally higher in the surficial horizons). However, at transect 14, concentrations of PAHs, selected metals, and some pesticides were slightly higher in the deeper strata than in the more shallow samples. However, this finding needs to be interpreted carefully, since TOC and hence sediment binding capacity was also highest in the deeper sediments at this location. Based on a comparison with the surface sediment data collected in 2003 from the AMTL area, it does not appear that the sub-surface sediments collected historically are substantially more (or less) contaminated than the surface sediments. That is, even the slightly higher concentration samples collected at depth in the 1995 sampling effort were generally consistent with the surficial data collected more recently. Therefore, even if the sub-surficial sediments were to become mobilized and transported to the surface, the resulting potential for human health and ecological risks would be expected to be similar to those documented in the CERCLA process.

Although it appears that the sub-surface sediments in certain areas (e.g., transects 03 and 08) may have lower concentrations than the surface sediments, it is possible that pockets of slightly more contaminated sediments exist in the sub-surface. It is also possible that sediment instability could result in transport of contaminated sub-surficial sediment to the surface. In order to evaluate the potential for sediment instability concerns in the Charles River in the vicinity of the AMTL site, a qualitative review of several of the major processes affecting sediment stability is presented below. According to the U.S. EPA (2002), a number of natural and anthropogenic factors may affect sediment stability. Natural factors include tides, floods, seiches, hurricanes, ice thaw and ice dam induced scour, and bioturbation from micro- and macro-fauna. Anthropogenic factors include boat propeller wash and ship's wakes, ship grounding and anchor dragging, navigational dredging and channel maintenance, in-water construction of structures such as bridge supports, and intentional removal or breaching of hydraulic structures such as dams.

A review of the BERA data, as well as earlier data collected by others, indicates that the Charles River sediment deposits are generally cohesive, muddy sediments with varying amounts of silt, sand, and clay (as opposed to non-cohesive sediments dominated by sand and gravel). The available Charles River OU data indicate that both hydrophobic organic constituents, as well as inorganic compounds, tend to preferentially occur in finer sediment particles with high organic carbon.

Bottom shear stress (i.e., the force applied to the sediment bed due to frictional hydrodynamic processes) is a dominant potential mechanism contributing to cohesive sediment instability; typically, current velocity and wave action generate bottom shear stress. However, given the relatively flat hydrograph and low energy environment of the Lower Charles River, where flows are artificially controlled by the New Charles River dam, currents are unlikely to result in bottom shear stress which could result in significant movement, erosion, and resuspension of sediment in the river. Likewise, open water fetch lengths are usually not long enough to generate waves that are large enough to significantly affect sediment movement.

As observed during the 2003 BERA field effort, one of the likely factors affecting sediment stability in the Charles River is boat traffic, particularly propeller wash and boaters disregarding the “No Wake” signs. During the field effort, it was observed that the level of boat traffic was high and the size of some of the vessels was disproportionately large relative to the Charles River. This level of boat traffic is typical for the Charles River in the vicinity of the AMTL Site and has been occurring for decades. Boats drawing 3 to 4 feet of water in areas with only 3 to 5 feet of water column were commonly seen in the river. The keels of these boats and their propeller wash have the potential to substantially alter and re-work the bottom sediment in localized areas of the Charles River with shallow water conditions. The boat traffic over the last several decades may have disrupted the sediments on the river bottom and may impact benthic populations and community structure. Although this anthropogenic factor clearly has the potential to re-work cohesive bedded sediment on a localized basis the system appears to be at a steady state. That is, the conditions encountered during the BERA investigation are likely to be representative of future conditions. In fact, given the low velocity of this depositional system (USGS, 2000) it is likely that sediment suspended by boat traffic re-deposits relatively quickly, ultimately resulting in a mixed surficial sediment layer in shallow well-trafficked areas, with little net downstream sediment movement.

A review of the sediment coring data collected as part of the BERA Work Plan reconnaissance effort (Table 10) (ENSR, 2003) supports the conceptual model that the Charles River is a low velocity river characterized by deposition of fine particulate sediment in quiescent waters, there is little potential for current or wave-driven erosional sheer stress, little potential for sediment movement via bioturbation, and the river surficial sediment reflects regional impacts from boat traffic. A piston coring program conducted throughout the sampling area indicated that intact, organized sediment strata typically do exist in the BERA study region, although, it appeared that boat traffic has homogenized the strata in portions of the Back Channel area and perhaps in the vicinity of the Upstream Newton Yacht Club. In

general, the cores were found to consist of dark blackish brown silty sediment atop a gray clay/silt. At several sampling locations, a fine to medium grained sand layer was observed in the surficial horizons. The majority of intact cores exhibited intact stratigraphy in the sub-surface, and root fibers were observed at depth in a number of core samples. The silt in portions of the Back Channel area appeared "fluffier" than elsewhere. No intact stratigraphy, redox layer, or root fibers were observed in the back channel area. It is possible that the draft and/or propeller wash from these large boats stirs up the sediment in this region. A similar phenomenon was observed in the vicinity of the Upstream Newton Yacht Club, which was considered as a reference area for the Watertown Yacht Club. Although it is possible that propeller action could indeed mix deep and surficial sediments, this action has been going on for many decades, including a number of years following the time period after any potential contaminant release could have occurred from AMTL. It is likely, therefore, that any deep, more highly contaminated sediments that could have been raised to the surface, have already been raised to the surface. Conversely, given the heavy boat traffic in the area, it is unlikely that a reserve of sub-surface contamination with the potential to be transported to the surface remains in those areas that are heavily trafficked by watercraft.

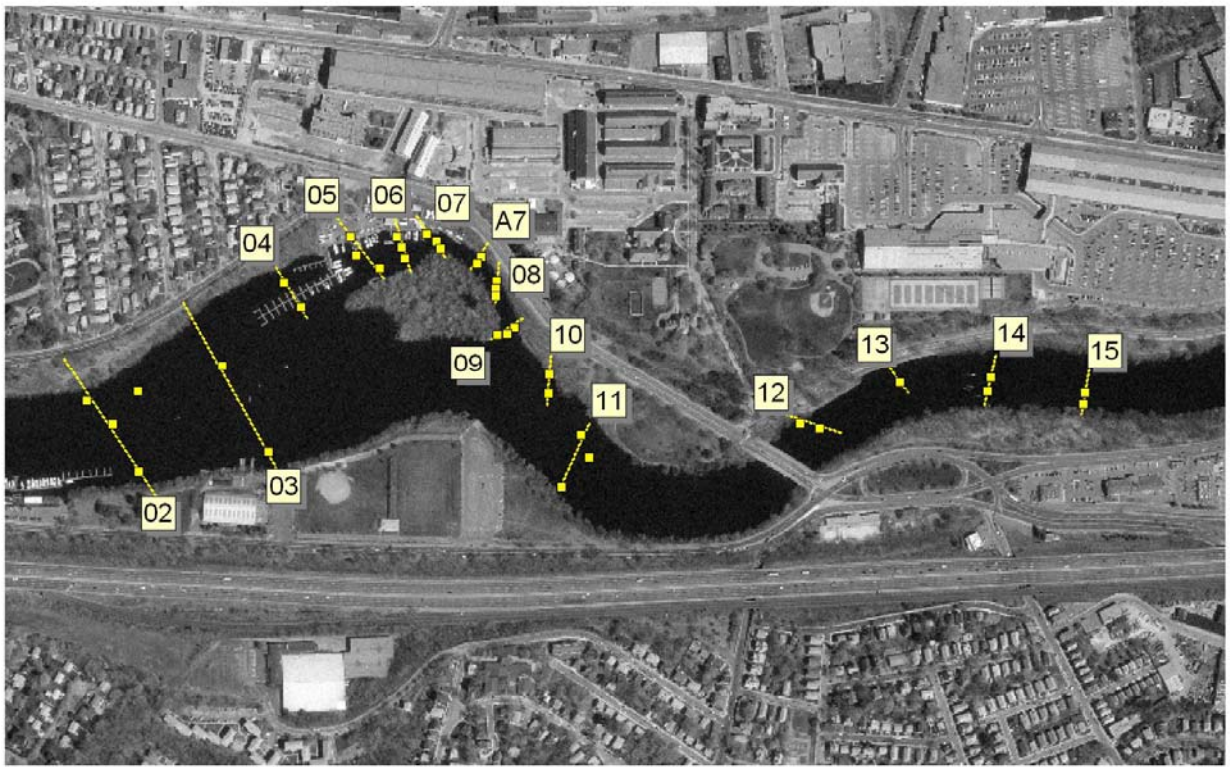
Finally, it is important to consider the hydraulic conditions that have occurred in the study area over the last several decades relative to what may occur in the reasonably foreseeable future. If, as is evident from the BERA data, surface sediment conditions have been established consistently across the four study regions during the last several decades, is it likely that hydraulic conditions will change significantly during the next several decades? If conditions are not expected to change, concerns regarding potential exposure of buried sediment should be lessened. As noted above, there are five major factors that might affect sediment stability: bioturbation, tidal flows, boating traffic, flood flows, and wind driven events. There is little potential that first three of these factors will change significantly in the coming years. It also appears likely that flood- and wind-driven events are unlikely to differ significantly in the coming years. In addition, the Army anticipates that the Massachusetts Department of Conservation and Recreation (DCR) will continue to regulate the river in response to these actions. During the last 20 years, the Charles River watershed has been impacted by two hurricanes (Gloria and Bob) as well as several severe rain events. As shown in Figure 15, the peak annual runoff at the USGS gauge of the Charles River at Dover, MA suggests that the last 30 years has been similar to the period of record. There is little reason to expect that these trends will differ in the future. Therefore, there is no reason to expect that the hydraulic regime present at the site will change significantly in the future or that the sediment instability will increase significantly.

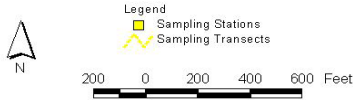
In summary, although no formal sediment stability analysis of the Lower Charles River has been conducted, a conceptual review of the available data suggests that there is clearly a net deposition of sediment in this low energy environment, that hydrodynamic processes are likely insufficient to lead to any bottom shear stress movement of sediment, that bioturbation and boat traffic are unlikely to affect stability, and that ultimately hydraulic transport (i.e., advection and dispersion) of cleaner sediment is likely to lead to the burial of more contaminated sediment in this low energy, depositional environment.

Finally, there is no reason to expect that the hydraulic conditions at the site will change significantly in the future.

In addition, if either an environmental or navigational dredging program was to be initiated in the future, Massachusetts, U.S. EPA, and Army Corps of Engineers permitting requirements would have to be met by the dredging project proponent. These permitting requirements, including water quality certification, would likely include evaluations of contaminant properties by the project proponent before dredging activities are approved. Such dredging project evaluations are generally conducted in a tiered manner and may include sediment characterization (chemical and physical parameters), evaluations of water column and benthic effects through computer modeling or toxicity testing, and laboratory bioaccumulation testing. Potential contamination within the deeper sediments would be identified early in this process and arrangements would be made to minimize impacts during dredging (i.e., silt curtains, limitations on dredge activities) and dispose of the excavated sediments properly (i.e., upland or off shore disposal as appropriate).

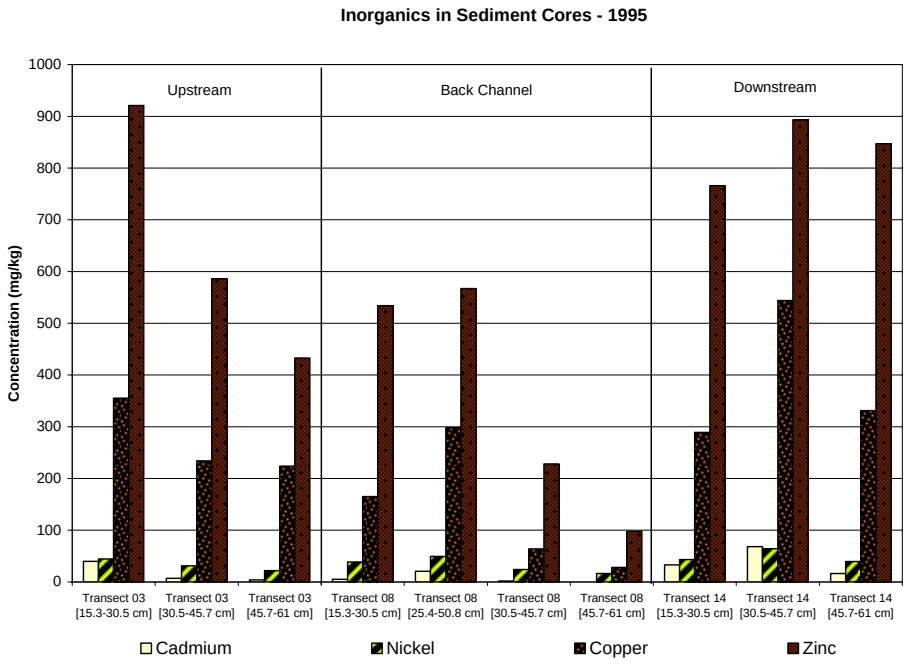
Figure 10 Phase II Remedial Investigation Transect Locations – 1995 Sampling

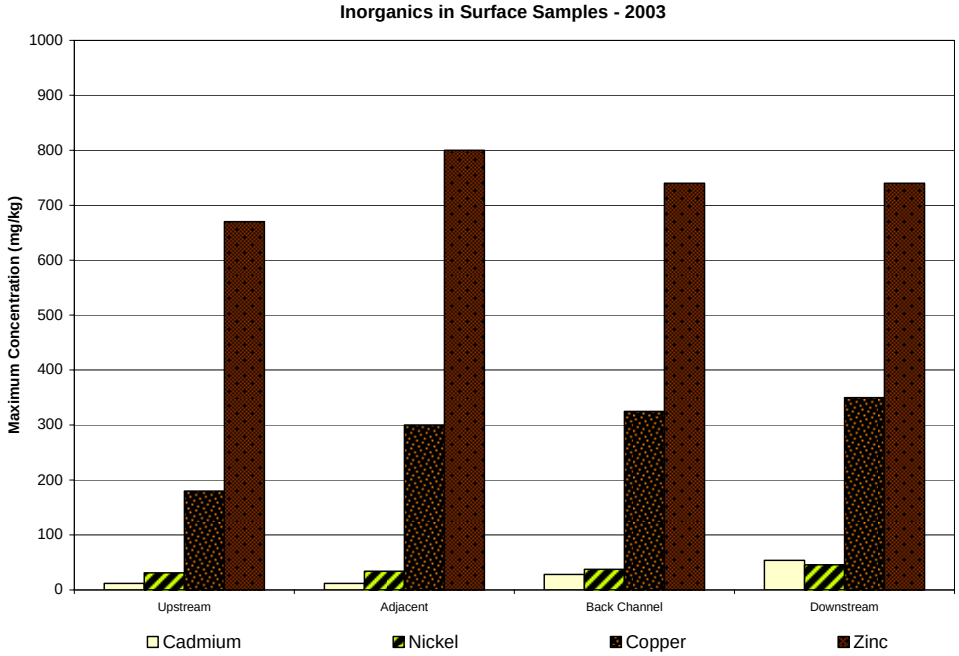




Transects 03, 08, and 14 had sediment samples collected at multiple depths.

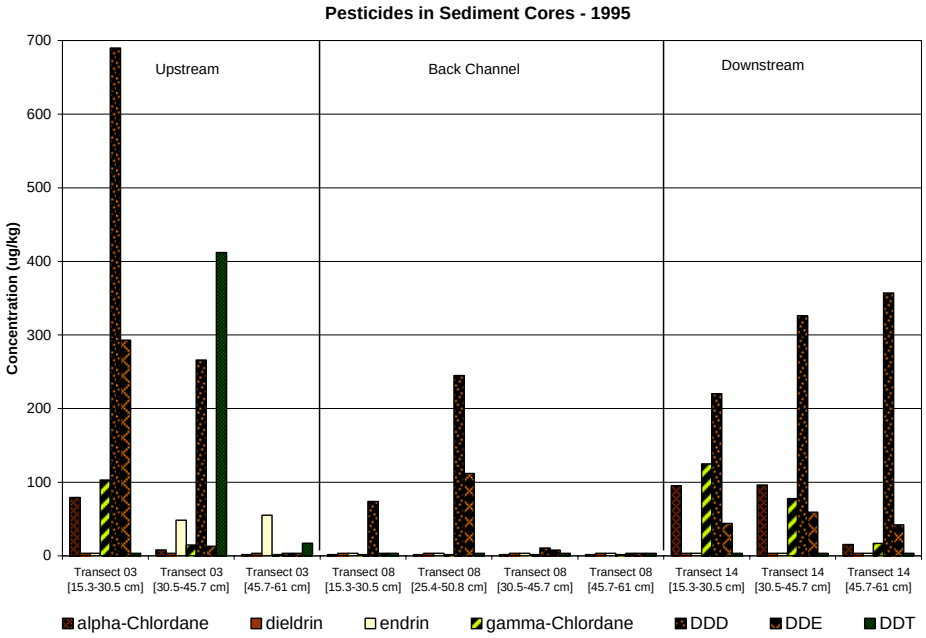
Figure 11 Selected Inorganic Concentrations in Core and Surface Sediment Samples

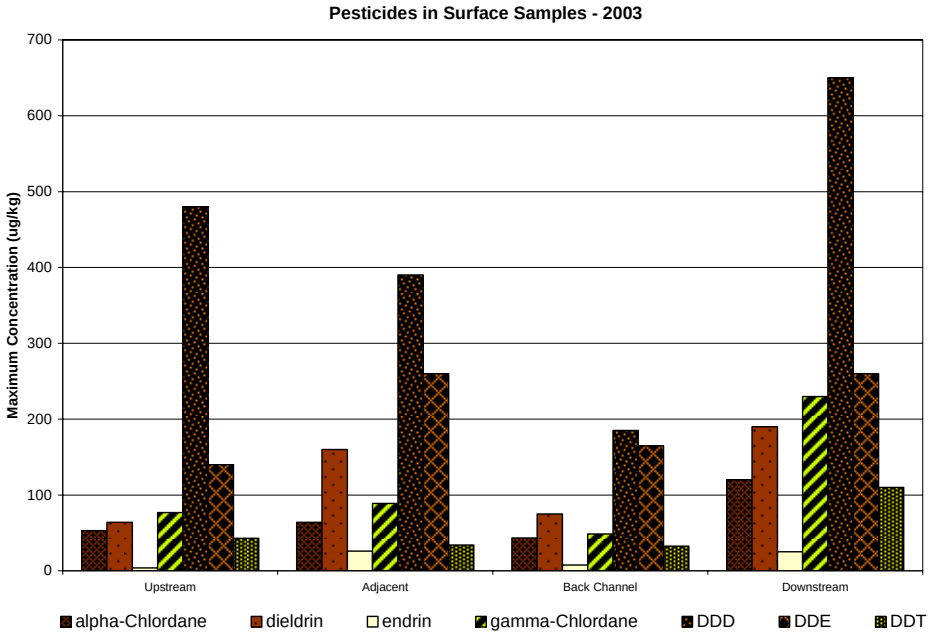




Concentrations of inorganic compounds in sediment cores from transects 03 and 08 generally decreased with depth. Concentrations of some inorganics in the downstream sample (transect 14) increased in the mid-depth and deeper strata. Maximum concentrations of inorganics in the surface sediments were similar across the four reaches, and were similar to concentrations observed at depth in the 1995 sampling effort.

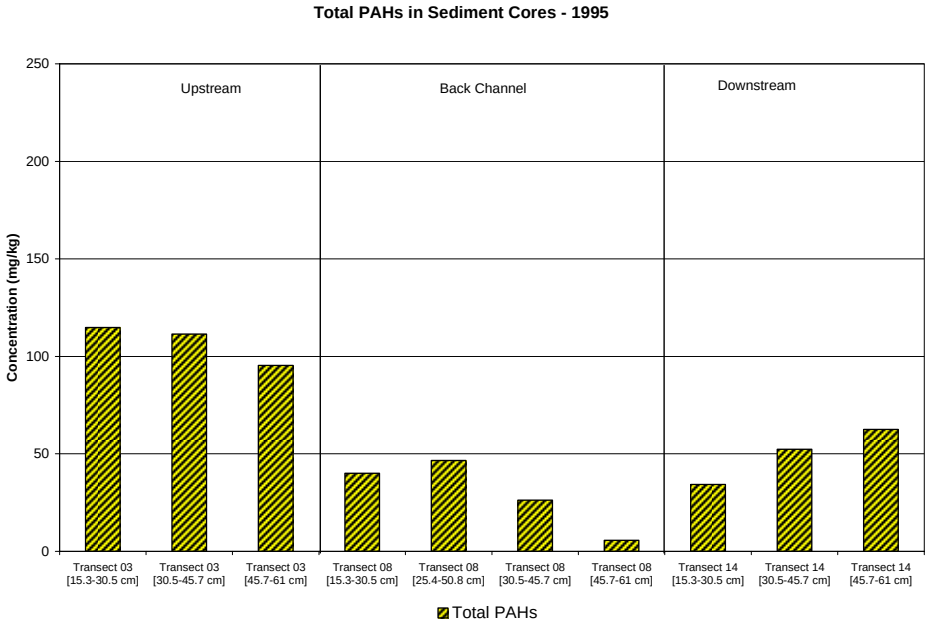
Figure 12 Selected Pesticide Concentrations in Core and Surface Sediment Samples

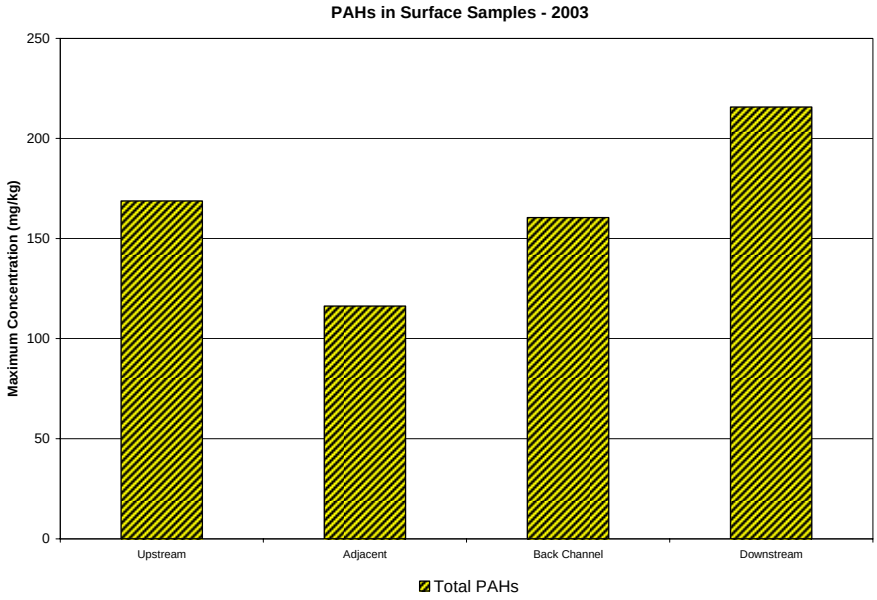




Concentrations of most pesticides in sediment cores from transects 03 and 08 decreased with depth. Concentrations of DDD in the downstream sample (transect 14) increased in the mid-depth and deeper strata and concentrations of DDD and DDE were highest in the mid-depth strata at transect 08. Maximum concentrations of pesticides in the surface sediments were similar across the four reaches with the lowest concentrations observed in the Back Channel reach and were generally similar to concentrations observed at depth in the 1995 sampling effort.

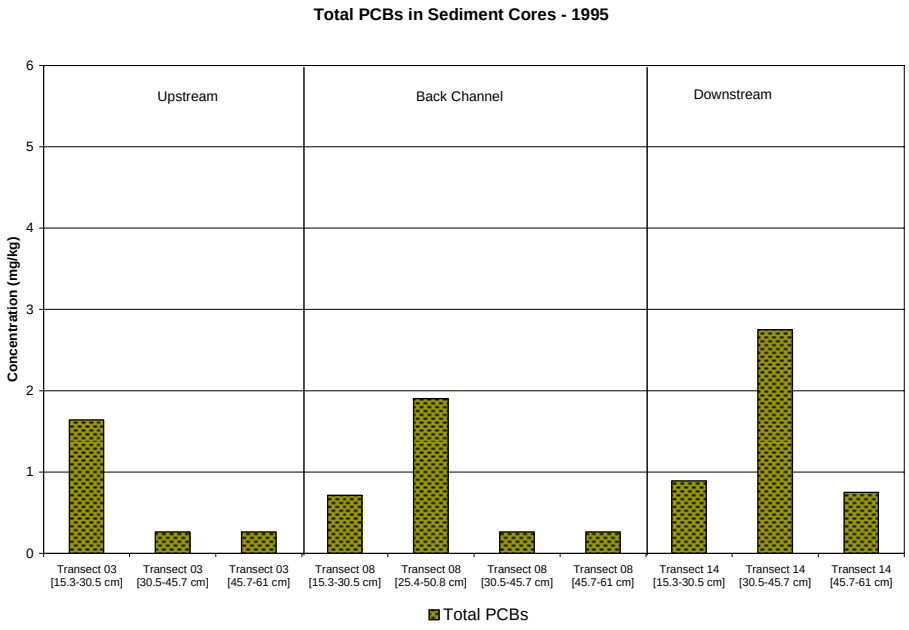
Figure 13 PAH Concentrations in Core and Surface Sediment Samples

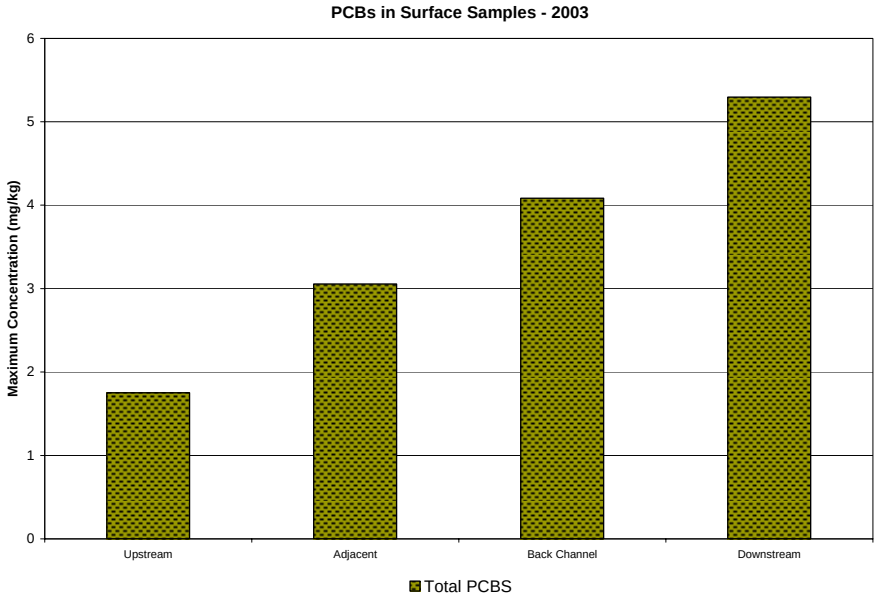




Concentrations of PAHs in sediment cores from transects 03 and 08 generally decreased with depth. However, PAH concentrations in the downstream sample (transect 14) increased with depth. Maximum concentrations of PAHs in the surface sediments were similar across the four reaches with slightly higher concentrations in the Upstream reach than in the Adjacent and Back Channel reaches. Concentrations in the surface samples from 2003 were consistently higher than the concentrations in the cores collected in 1995.

Figure 14 PCB Concentrations in Core and Surface Sediment Samples





Concentrations of PCBs in sediment cores from transects 03 and 08 generally decreased with depth. However, PCB concentrations in the mid-depth samples in transects 08 and 14 were higher than at other depths. Maximum concentrations of PCBs in the surface sediments increased from Upstream to Downstream (when normalized to organic carbon, the data sets are statistically identical). Concentrations in the surface samples from 2003 were somewhat higher than the concentrations in the cores collected in 1995.

Figure 15 Annual Peak Discharge of the Charles River at Dover, MA

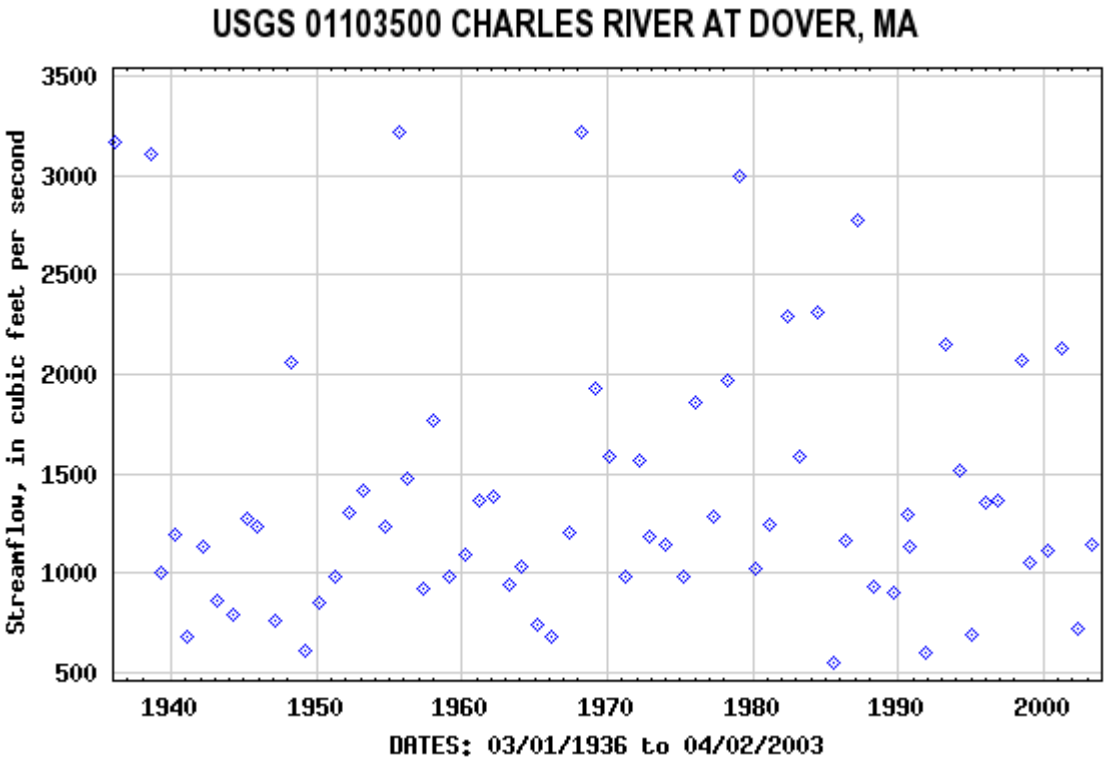


Table 10 Sediment Characteristics Observed During BERA Field Reconnaissance

Sampling Area	Date	Stratigraphy Depth (inches)	Description	Notes
Sunrise Island Back Channel				
SDA23	9/19/2002	0-20.5	grey/brown silt	homogenous upper core; Ekman collected for composite observation of macroinverts
		20.5-29.5	gray silty-clay	
SDA28	9/19/2002	0-12	black organic silt	sheen, odor; Ekman collected for composite observation of macroinverts
		13-28	gray silty-clay	
SDA30	9/19/2002	0-24	black organic silt muck	Ekman collected for composite observation of macroinverts; sheen/odor
Midway between SDA16 and SDA17	9/26/2002	0-2	brown silt	Unionoid mussel shell in dredge; sheen/odor
		2-4	silty-clay (strong petrolem odor)	
		4-13	grey/brown silty-clay; root fibers; odor	
SDA23	10/3/2002	0-4		
		4-18	black silt (odor)	
		18-24	black silt / sheen (organic fibers)	
		24-34	gray / silty-clay	
SDA30	10/3/2002	0-11	soft loose, brown silt	
		11-14	black silt, odor and sheen	
		14-23	olive black silt, root fibers, odor and sheen	
		23-26	olive/brown sandy silt	
SDA23S	10/3/2002	0-8	brown silt, fibrous	
		8-32	dark-black silt, oil sheen	
		32-36	brown silt, fibrous	
SDA23N	10/3/2002	0-6	brown silt, trace of sand, organic fibers	metal foil fragments observed
		6-11	black silt, oily, detritus	
		11-26	olive brown silty clay	
Adjacent Reach				
SDA26	9/19/2002	0-3	black organic silt	wood fibers in lower grey silt-clay
		3-14	grey silty-clay / mottles at 6"	
midway between SDA26 and SDA27	9/19/2002	0-4	organic silt	refusal
		4-6	grey silty-clay	
SDA16	9/19/2002	0-1	black organic silt	Ekman collected for composite observation of macroinverts (4 grabs)
		1-3	dark grey silt	
		3-14	grey silty-clay	
SDA15	9/19/2002	0-31	fine blackish brown silt with organic fibers	Ekman collected for composite observation of macroinverts
SDA13	9/26/2002	0-2	grey/black silty-sand	sheen/odor; Ekman collected for composite observation of macroinverts; root fibers at depth
		2-8	black organic silt	
		8-15	grey silty-clay	
SDA11	9/26/2002	0-2	fine to medium sand (some gravel)	outfalls adjacent; extension rod needed
		2-6	tan/olive silty-clay; root fibers	
SDA12	9/26/2002	0-6	blackish/brown fibrous organic silt (no sheen)	outfalls adjacent; Ekman collected for composite observation of macroinverts; odor/sheen
		6-18	black organic-silt	
		18-24	black organic rich silty-clay; some	
SDA14	10/3/2002	0-4	soft loose brown silt, unconsolidated	
		4-24	olive green, organic rich silt	
SDA18	10/3/2002	0-3	brownish/black orgainc silt, some glass	
		3-13	oily black silt	
		13-23	olive silt, stiff	
		23-25	olive-brown silt, wood fibers	
SDA26	10/3/2002	0-10	black silt, organic fibers, oil	oily soil layer
		10-23	olive/green silty-clay	

Table 10 Sediment Characteristics Observed During BERA Field Reconnaissance (cont'd)

Sampling Area	Date	Stratigraphy Depth (inches)	Description	Notes
Upstream Reach				
SDU40	9/19/2002	0-4	medium sand	sheen; Unionoid mussel shell; refusal
		4-7	silty-clay	
South of SDU39	9/19/2002	0-4	medium brown sand with detritus atop	road runoff contributes sand?
		4-22	black organic silt	
SDU39	9/19/2002	0-1	coarse detritus	live Unionoid mussel observed and released; Ekman collected for composite observation of macroinverts odors/sheen at depth
		1-6	medium coarse sand	
		6-27	black silty-sand (some odor)	
SDU38	9/19/2002	0-5	fine brown sandy silt	root fibers throughout; refusal
		5-21	organic silt with peat layer at core bottom	
Midway between SDU32 and SDU36	9/19/2002	0-8	dark brown silty-sand	Ekman collected for composite observation of macroinverts (4 grabs); odor/sheen
		8-31	black organic silt with detritus/leaves	
Midway between SDU32 and SDU33	9/19/2002	0-3	black silty-sand (fine to medium sand), with	Ekman collected for composite observation of macroinverts
		3-33.5	black organic silt with root fibers	
SDU39N	10/3/2002	0-3	sandy-silt	depositional layers visible as alternating bands of olive and black
		3-20	black organic silt	
SDU32	10/3/2002	0-4	brown organic silt; fibrous	oily sheen, strong odor
		4-28	silt	
SDU39S	10/3/2002	0-4	medium to coarse sand	
		4-11	olive/green to black silt	
		11-16	black oily material (sheen)	
		16-24	olive silt, no odor	
SDU38	10/3/2002	0-7	silty-sand, detritus	oily sheen, strong odor
		7-20	olive/black silt, fibrous, oily, sheen	
		20-22	brown silt, fibrous	
SDU40N	10/3/2002	0-5	tan, medium sand	petroleum odor present, sand from road runoff
		5-19	olive to black organic silt	
SDU40S	10/3/2002	0-3	medium sand	road runoff contributes sand?
		3-8	silty, some organic fibers	
		8-11	grey, coarse sand, some silt	
Downstream Reach				
SDD02	9/26/2002		NA, but appears to be up to 6 inches org silt	extension rod needed
SDD04	9/26/2002	0-12	black/brown silt	Ekman collected for composite observation of macroinverts; odor/sheen at depth
		12-17	black brown silt with detritus	
		17-19	blackish sandy silt with trace gravel	
		19-32	black silt; no odor; gravel; twigs	
Immediately downstream of Arsenal St Bridge	9/26/2002	0-2	grey silt; trace organic	root fibers, near Phragmites/Typha emergent marsh; Ekman collected for composite observation of macroinverts
		2-9	silty-clay	
SDD02	10/3/2002	0-3	coarse sand and gravel	odor and sheen observed in 6-20" layer
		3-6	silty-sand	
		6-20	black organic-silt	
SDD10	10/3/2002	0-5	sandy-silt, coarse fibers, coal fragments	
		5-10	organic brown silt, some coarse sand	
		10-24	olive/green silt, trace of clay, coal fragments	
SDD06	10/3/2002	0-2	fine black, organic silt	
		2-9	finer olive/black silt, odor and sheen	
		9-19	stiff, olive/brown silt, fibrous	

Issue 5 - A slide presented during the public meeting on May 16, 2005 indicated that pesticides detected in the sediment were 'likely not related to AMTL operations.' The commenter disagreed with this statement, and indicated that pesticides were remediated on the upland portion of the AMTL facility (OU 1).

***Army Response**:* The remedial activities for OU 1 included excavation and off-site disposal of soils from river bank areas M, P, and Q (portions of Charles River Park). The remedial action for that parcel included removal of soils above ROD cleanup levels for PAHs, pesticides, and metals. Post-excavation samples collected from the bottom and sidewalls of the excavated portions along the riverbank were below the pesticide soil cleanup criteria established for DDE (170 ug/kg), DDT (170 ug/kg), and chlordane (1400 ug/kg). This indicates that the removal action addressed any on-site pesticides in the soil and eliminated the potential for pesticides to enter the Charles River via erosion or overland flow. Therefore this pathway would not be expected to continue to contribute to unacceptable risks to the Charles River.

In addition, the discussion of surface and sub-surface data presented in the response to Issue 4 indicates that in general, the sub-surface sediments collected in 1995 are not substantially more (or less) contaminated than the surface sediments collected in 2003. Figure 12 indicates that concentrations of most pesticides in sediment cores from transects 03 and 08 decreased with depth and the lowest pesticide levels were observed in the Back Channel (transect 08). Concentrations of DDD at transect 14 (in the Downstream reach) did increase in the mid-depth and deeper strata and concentrations of DDD and DDE at transect 08 were higher in the mid-depth strata than the other layers. However, even if the sub-surficial sediments were to become mobilized and transported to the surface, the resulting potential for risks would be expected to be similar to those documented in the CERCLA process since levels are similar to those observed in the surface sediments.

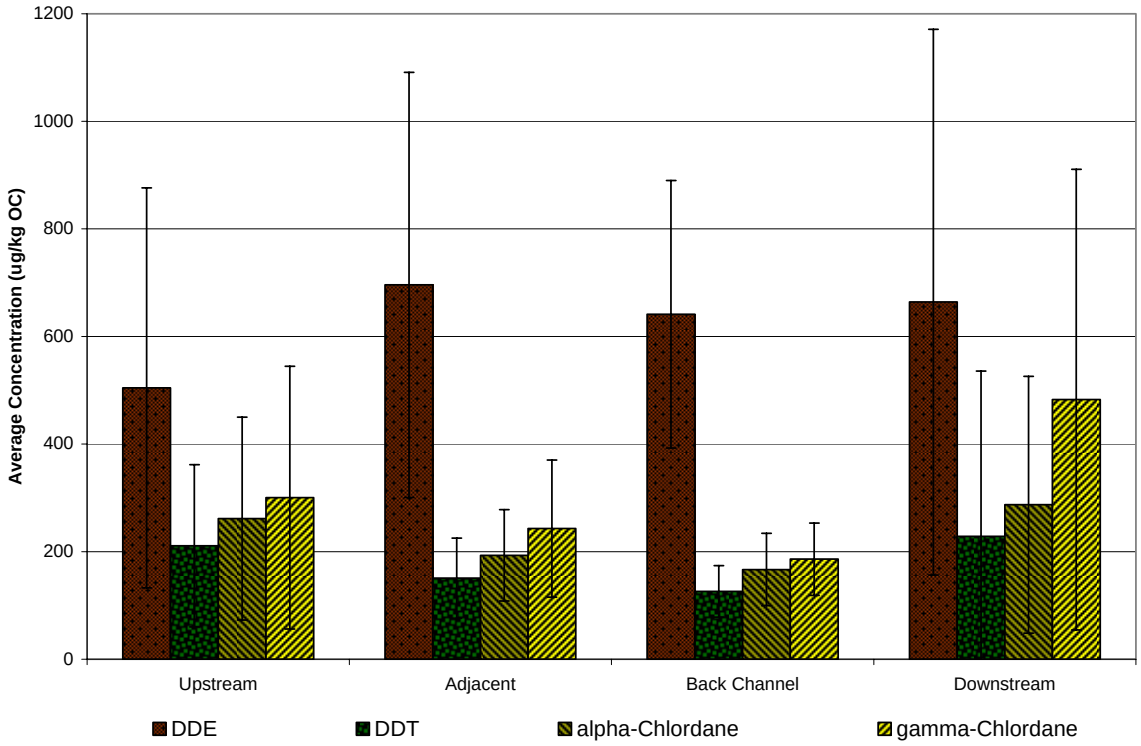
Figure 16 shows that the pesticide levels of DDE, DDT, and alpha- and gamma-chlordane, normalized to TOC in the sediment, are essentially consistent from the Upstream reach to the Adjacent reach (in the main stem of the River), to the Back Channel reach (directly adjacent to the AMTL facility), and the Downstream reach. Organic chemicals, like pesticides, tend to adsorb to any organic carbon present in the system, therefore sediments with higher TOC concentrations have a greater capacity to bind organic constituents. Normalization of organic compounds to TOC reduces the bias due to depositional environment (i.e., concentrations of organic chemicals may be biased high in depositional areas due to adsorption and other chemical and physical properties), is fairly well accepted, and serves as the basis for the U.S. EPA equilibrium sediment guidelines (e.g., U.S. EPA, 2002). The statistical evaluation of the normalized data presented in the BERA (ENSR, 2005) concluded that the normalized sediment chemistry sampling results in the Upstream reach of the Charles River are statistically indistinguishable from the normalized sediment chemistry sampling results in the Back Channel and Adjacent sampling reaches. The levels of pesticides potentially contributed by the former AMTL facility are

indistinguishable from those associated with the anthropogenic, urban background conditions that characterize the Lower Charles River Basin.

Figures 17 though 20 present the surface sediment concentrations of DDE, DDT, alpha-chlordane, and gamma-chlordane in each sample collected during the 2003 field effort. If the OU 1 area was currently contributing pesticides to the sediment, it would be expected that stations 13 and 14, directly adjacent to the Charles River Park, would have the highest levels of pesticides. As indicated in the four figures, this is not the case and several Upstream stations (i.e., stations 47, 46, 40) have similar or higher levels of pesticides than these adjacent stations, especially when concentrations are normalized for organic carbon.

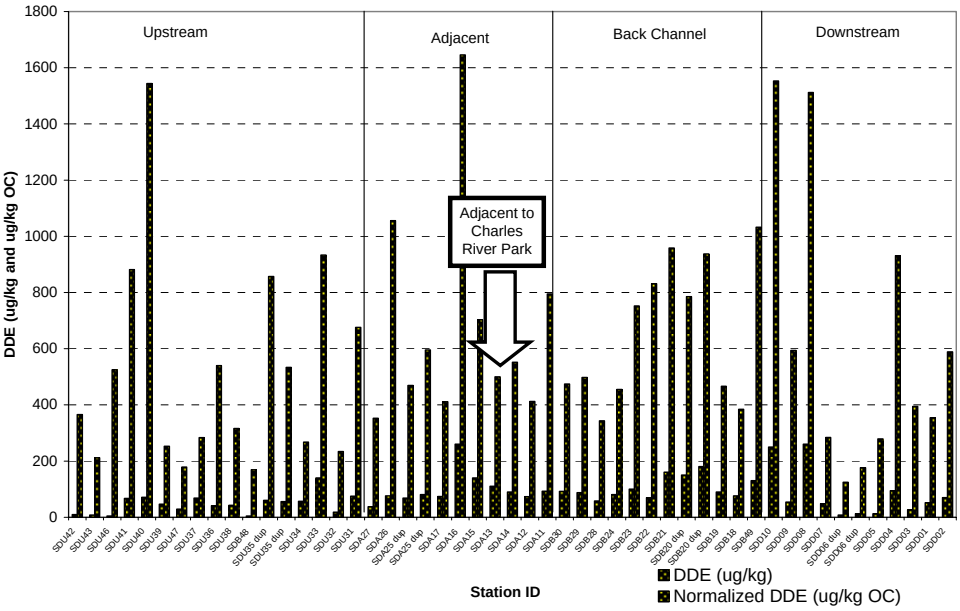
Regardless of the historic response actions on the bank and other terrestrial portions of the former AMTL facility, the pesticide concentrations in sediments collected during the BERA in the Back Channel stations (closest to AMTL) and those adjacent to the Charles River Park were generally similar to or below the concentrations found in the Upstream stations. If the AMTL facility was a primary source of pesticides, the Back Channel sampling reach (immediately adjacent to the AMTL facility and its outfalls) and stations 13 and 14 would be likely to have the highest concentrations of these chemical stressors. As indicated above, this is not the case and the levels of pesticides potentially contributed by the former AMTL facility are indistinguishable from those associated with the anthropogenic, urban background conditions that characterize the Lower Charles River Basin.

Figure 16 Pesticides Detected in the Surface Sediment (+/- 1 SD) – 2003



The statistical evaluation presented in the BERA (ENSR, 2005) concluded that the normalized sediment chemistry sampling results in the Upstream reach of the Charles River are statistically indistinguishable from the normalized sediment chemistry sampling results in the Back Channel and Adjacent sampling reaches. This figure indicates the similarities in the pesticide concentrations within the four reaches.

Figure 17 DDE in Surface Sediment – 2003



If the OU 1 area was currently contributing pesticides to the sediment, it would be expected that stations 13 and 14, directly adjacent to the Charles River Park, would have the highest levels of pesticides, however Figure 17 indicates this is not the case for DDE.

Figure 18 DDT in Surface Sediment – 2003

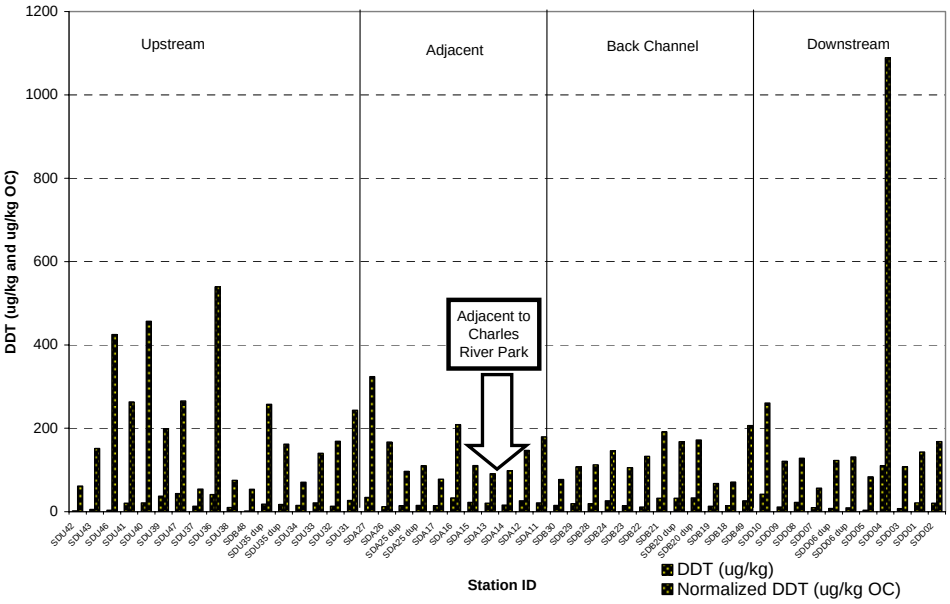


Figure 18 indicates that stations 13 and 14, directly adjacent to the Charles River Park, have DDT concentrations that are consistent with and below Upstream concentrations.

Figure 19 alpha-Chlordane in Surface Sediment – 2003

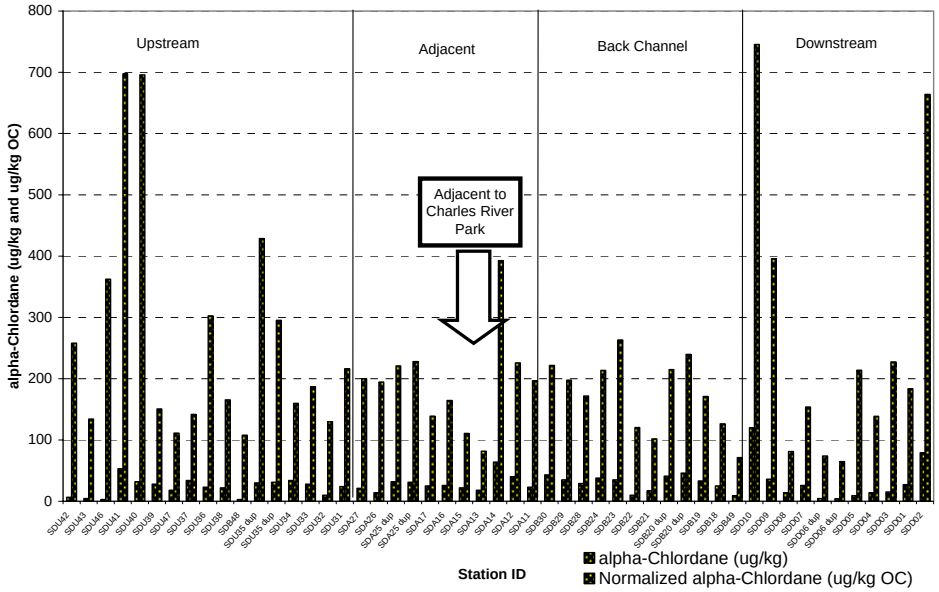


Figure 19 indicates that stations 13 and 14, directly adjacent to the Charles River Park, have alpha-chlordane concentrations that are consistent with Upstream concentrations.

Figure 20 gamma-Chlordane in Surface Sediment – 2003

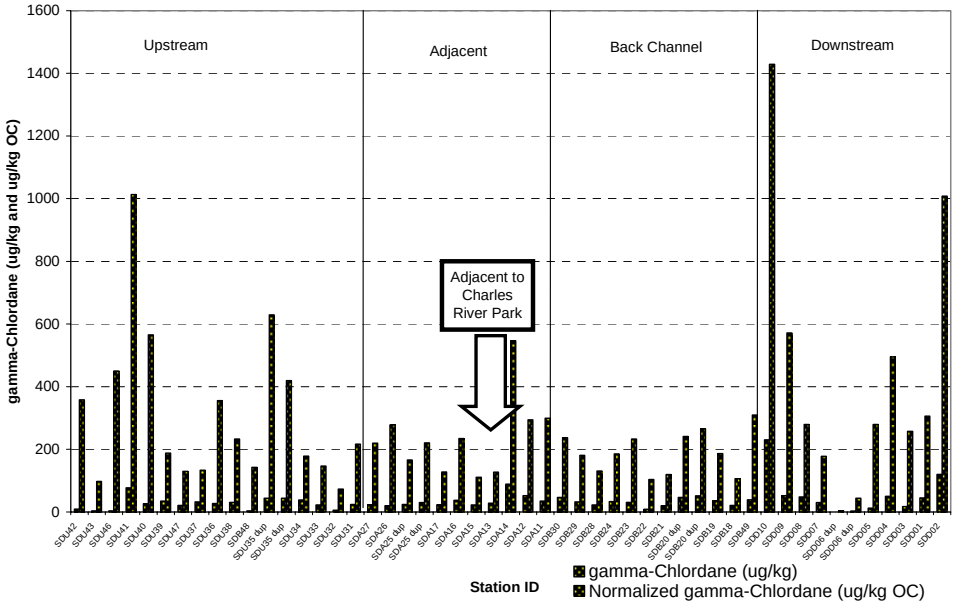


Figure 20 indicates that stations 13 and 14, directly adjacent to the Charles River Park, have gamma-chlordane concentrations that are consistent with Upstream concentrations.

Issue 6 - Several stakeholders expressed a concern regarding the potential for ecological risks at specific contaminated surface sediment stations

Army Response: The Army agrees that selected discrete sampling locations may exhibit slightly higher potential impacts than other sampling stations and recognizes that other reviewers may interpret these results differently. Given the spatial heterogeneity of the sediment, it is not surprising that sampling results from individual single sediment sampling stations vary within and among reaches of the river. In fact, as demonstrated in the BERA, the contamination is not uniformly distributed in a well defined spatial pattern for each study area. For this reason, in the risk assessment, each study area (i.e., each sampling reach) was represented by a set of sampling results (data points), rather than by any individual sampling result. The results from the various sampling reaches were compared and contrasted with one-another in a weight of evidence (WOE) evaluation, and this comparison suggested that the potential ecological risks from exposure to contaminants at AMTL are indistinguishable from potential risks posed by exposure to anthropogenic, urban background conditions in the river.

At the public meeting, stakeholders specifically mentioned BERA sampling stations 2, 10, 16, 20, and 26 as potentially being adversely affected. Because a consensus WOE approach for evaluating the risk data on a reach-by-reach basis was agreed to by all parties in the Work Plan (which was approved by state and federal agencies before conducting the BERA), the Army does not agree that evaluation of individual sampling stations is warranted at the Charles River OU. In addition, given the inherent variability of environmental data, it is not always useful to look at results from individual sampling stations without considering broader, area-wide trends. None-the-less, as presented below, the Army does not agree that the data indicate that these stations are adversely impacted due to AMTL operations:

- Station 2 is the furthest downstream station under consideration. This station is on the opposite side of the river from the AMTL facility and is located in the vicinity of several outfalls located on both banks of the river. Based solely on its location, it is hard to envision that this sampling location reflects an AMTL contribution any more than it reflects ambient conditions in the river. Concentrations in the sediment at station 2 exceeded low effect screening values for most constituents and severe effect screening values for selected metals, pesticides, PAHs, and PCBs. Adverse impacts were observed in the toxicity testing with the midge and the amphipod. Although negative effects were observed at this station, it is impossible to attribute these impacts to the AMTL facility 6,000 feet upstream, and not another source within the Charles River watershed (i.e., possibly discharges from the outfalls located adjacent to the station on the southern bank of the river).
- Station 10 is also located within the Downstream reach of the river, in an area with several stormwater outfalls (unrelated to AMTL) that were identified during the 2003 field work. Concentrations in the sediment at this station exceeded low effect screening values for

most constituents and severe effect screening values for selected metals, pesticides, PAHs, and PCBs. Adverse lethal and sub-lethal impacts were observed in the toxicity testing with the midge and the amphipod. Although the station is downstream of outfalls which historically drained the AMTL facility, a number of the outfalls upstream and adjacent to station 10 also drained substantial Watertown storm sewers, making attribution of contaminants difficult. In addition, station 9 located immediately adjacent to station 10, generally had lower sediment concentrations of metals, PCBs, and pesticides, indicating the heterogeneous nature of the sediments. Lastly, station 6, located between stations 10 and 2, had fewer benchmark exceedances, fewer fish critical body residue (CBR) exceedances, and less toxicity in the laboratory tests. This implies that potential ecological impacts within the Downstream reach are extremely varied, and that assigning any attribution to AMTL is not possible.

- A similar situation is observed for stations 16 and 20, where samples are located near outfalls which historically drained both AMTL and Watertown storm sewers and nearby stations do not show the same pattern of chemical concentrations:

  - Station 16 is located within the Adjacent reach, just downstream of RI outfalls 4 and 5. These outfalls drained portions of the AMTL facility and were also connected to the Watertown stormwater system. Concentrations in the sediment at station 16 exceeded low effect screening values for most constituents and severe effect screening values for selected metals, pesticides, PAHs, and PCBs. Adverse lethal and sub-lethal impacts were observed in the toxicity testing with the midge and the amphipod. Although negative effects were observed at this station, it is impossible to attribute these impacts completely to the AMTL facility since the adjacent outfalls contained discharge from other sources (i.e., municipal stormwater) as well. In addition, station 15, located immediately adjacent to station 16, had much lower concentrations of PAHs, PCBs, and pesticides than station 16 indicating the heterogeneous nature of the sediments, even close to a potential contaminant source (i.e., RI outfall 5).

  - Station 20 is located within the Back Channel reach, near RI outfall 3. Station 20, along with stations 18 and 19, form a transect across the back channel in the vicinity of this former outfall. These stations are located within several meters of one-another. Concentrations in the sediment at station 20 exceeded low effect screening values for most constituents and severe effect screening values for selected metals, pesticides, PAHs, and PCBs. Adverse sub-lethal impacts also observed in the toxicity testing with the midge, but not the amphipod. Stations 18 and 19 generally had lower levels of some metals and pesticides and PCBs, but higher levels of PAHs than station 20. In addition, several of the Back Channel sampling stations in the immediate vicinity of station 20 had similar chemical burdens as station 20. These

results indicate how much variation can occur even within the same area of the river (i.e., the Back Channel).

- Station 26 is located within the Adjacent reach on the far side of Sunrise Island from the AMTL facility. Concentrations in the sediment at station 26 exceeded low effect screening values for most constituents and severe effect screening values for two metals (cadmium and lead), one pesticide (gamma-chlordane), PAHs, and PCBs. Adverse lethal and sub-lethal impacts were also observed in the toxicity testing with the midge and the amphipod. Although negative effects were observed, this station is unlikely to have been impacted by AMTL operations. Based on its location in the river, it is far more likely that this station is an upstream depositional area representing upstream contaminant contributions and not near-site conditions.

- There are four stations within the Upstream reach with bulk sediment data and either tissue or toxicity data that may also be relevant to this discussion. All four stations (stations 34, 36, 37, and 43) had sediment concentrations that exceeded low effect screening values for most constituents and severe effect screening values for selected metals, pesticides, PAHs, and PCBs; however, toxicity testing with the midge and amphipod were also conducted at these four stations, with minimal adverse impacts. Survival in the midge test was greater than 72% and greater than 70% in the amphipod tests at these stations. However, survival within toxicity tests conducted with the Back Channels stations was similar to these upstream locations not impacted by the AMTL facility. These results indicate that concentrations of many constituents are elevated upstream of the AMTL facility and that the survival in several Back Channel toxicity tests was consistent with results in stations not impacted by the AMTL facility.

- Lastly, it is important to recognize that none of the upstream sampling locations were collected near municipal storm drain outfalls. However, a number of the adjacent and back channel stations were collected in the vicinity of these drains. It s entirely possible that toxicity would have been more significant in the upstream reach if near shore sampling locations associated with storm drains were considered in the Upstream sampling reach.

3.2 Technical and Legal Issues

No legal or technical issues pertaining to the ROD for the Charles River OU have been identified.

3.3 Comment Responses

Section 3.3.1 presents the verbal comments recorded at the Public Hearing on May 16, 2005, with Army responses. Section 3.3.2 presents written comments received between April 29, 2005 and June 20, 2005, with Army responses.

The majority of these comments echoed the same themes, which have been addressed in detail in Section 3.1 (above). Whenever appropriate, cross references to the Army's Section 3.1 responses have been included below.

3.3.1 Verbal Comments and Responses

Note that the following comments are paraphrased. Refer to the Public Hearing Transcript for a complete set of verbal comments recorded at the public hearing on May 16, 2005.

1. **Comment from Susan Falkoff, co-chair of the RAB:** Ms. Falkoff disagreed with the slide in the presentation that indicated that pesticides in the sediment were not related to AMTL operations since pesticides were cleaned up in the Charles River Park area. Ms. Falkoff also indicated that the main library is closed so AMTL documents are not available. Ms. Falkoff then read a statement that was also submitted as a written comment.

   Army Response: *Please see the Army's responses to issues 2 and 5 presented in Section 3.1 regarding the status of the information repository and the pesticides remediated at OU 1. Ms. Falkoff's written comments are presented and addressed in Section 3.3.2.*

2. **Comment from Stephen Steadman, Watertown resident:** Mr. Steadman was concerned that sediment has been deposited over the last 10 to 30 years that has covered up the original contamination from the AMTL facility. The fact that the contamination is now covered doesn't mean it is not there and the Army should not be absolved from any damage that was done.

   Army Response: *Please see the Army's responses to issue 4 presented in Section 3.1.This response indicates that, while the data available for review are limited, the deeper sediments do not appear to be any more contaminated than the surface sediments evaluated by the Army in the risk assessment.*

3. **Comment from Renata von Tscharner, Charles River Conservancy:** Ms. Tscharner read a statement that was also submitted as a written comment.

   Army Response: *Ms. Tscharner's written comments are presented in Section 3.3.2 and addressed by the Army's response to issue 3 regarding the proposed restoration effort.*

4. **Comment from Charles Deering, Watertown resident:** Mr. Deering was concerned that the human health risk assessment indicated no risk to human health from fish consumption, but there is a fish advisory on the river. Mr. Deering also objected to the Army's conclusion that "if you can't solve the whole problem, and there are other people who are responsible for the problem, as well

as you, that the correct result it to do nothing." Mr. Deering also objected to the MADEP and U.S. EPA endorsing that conclusion.

Army Response: *Please see the Army's responses to issue 1 presented in Section 3.1 regarding the human health risk assessment and the fish advisory. As indicated in that response, the human health risk assessment was done before the fish advisory was issued by the MDPH. This risk assessment concluded that any potential AMTL contribution to contaminant concentrations in fish tissue does not result in a risk of harm to humans. With regard to Mr. Deering's assertion that nothing is being done, the Army has conducted an extensive investigation which concluded that the sediments associated with the AMTL facility are consistent with upstream conditions. The Army is also proposing a comprehensive shoreline restoration project for the Charles River Park area to enhance that habitat beyond what would be required by the OU 1 ROD.*

5. **Comment from Charley Hoffman, commodore of the Watertown Yacht Club:** Mr. Hoffman supported the idea of a dredging activity to remove sediments that have been depositing into the river from runoff for decades. Mr. Hoffman observed that there are three drains near the yacht club in the Back Channel that flow continuously after a hard rain bringing in sediments and other "stuff" that are filling in the channel.

   Army Response: *The Army appreciates Mr. Hoffman's comments and observations regarding the continued contributions to the Back Channel from various outfalls. However, a navigational dredging activity is not currently planned within the Back Channel.*

6. **Comment from Allison MacFarlane, Watertown resident and RAB member:** Ms. MacFarlane wanted to echo some of Ms. Falkoff's comments and drew attention to the 5 stations mentioned by Ms. Falkoff as she read her written statement (i.e., 2, 10, 16, 20, and 26). Ms. MacFarlane also indicated that to find the Army's impact one would need to look in the deeper sediments, not the surface sediments considered in the ecological risk assessment. The BERA report did not clear the Army of adverse impact and Ms. MacFarlane encouraged the Army to present to the public for approval exactly what the plans for restoration are and where the funding would come from.

   Army Response: *Please see the Army's responses to issues 4 and 6 presented in Section 3.1 regarding the sub-surface sediments and the sampling locations with adverse impacts. The Army presented details of the proposed shoreline restoration project to the RAB at the June 29, 2005 public meeting.*

3.3.2 Written Comments and Responses

The following section presents the written comments received during the public comment period (April 29, 2005 through June 20, 2005) and the Army's responses to those comments. Refer to the attached comments package (Appendix E1) for a copy of the written comments received during the public comment period.

1. **Comment from Susan Falkoff, Watertown Arsenal RAB:** Thank you for the opportunity to review the Proposed Plan for the Charles River Operable Unit of the Watertown Arsenal Superfund Project. Our comments are as follows.

   We are very concerned that the Proposed Plan does not mention the Army's assurances that they will carry out a restoration project to compensate in some way for the damage that has been done to the river. Although the BERA study did not result in clear definition of what the Army's impact was, the Army has in the past admitted to being a contributor to the contamination of the river. The fact that we are in an urban environment with an industrial past, making it more difficult to define the impact of the AMTL, should not penalize us or prevent us from receiving compensatory action for what was done.

   Indeed, we believe the BERA did not clear the AMTL of adverse impact. If the data are evaluated on a reach-specific basis, statistically significant differences are not apparent. However, if the data are evaluated on a sample-specific basis, adverse effects are clear. Stations 2, 10, 16, 20, & 26 exhibited increased chemistry, increased toxicity, or both.

   While further study may be able to identify attribution, we think the Army's resources would be better spent on a restoration project. This was discussed at several RAB meetings and received public support. However, the draft Proposed Plan does not state clearly that a restoration project will be done, what the restoration project entails, or if sufficient funding for it has been acquired. Are the specific actions that have been discussed (i.e., bank stabilization) still the Army's plans for the Charles River Park area?

   There has been discussion of a potential bank stabilization project for the Charles River Park area. But during the April 14,2005 site walk of the Charles River Park it was not entirely clear what was being proposed as part of the restoration project and what was required as part of maintenance of the park to prevent contaminant migration. It seems that most of the effort discussed as part of the restoration project is something that is already required. Please clarify what is being done under each category, and explain the Army's commitment.

We believe that the Proposed Plan should be rewritten to include the Army's commitment to conduct the restoration project. We strongly believe that the Army should compensate the public for damages to Charles River resources as evidenced by the Army's data discussed above, and look forward to discussing the design of the project with you in greater detail.

Army Response: *Please see the Army's responses to issues 3 and 6 presented in Section 3.1 regarding the restoration activities and the sampling locations with adverse impacts.*

2. **Comment from Renata von Tscharner, Charles River Conservancy:** I am in receipt of April 2005 document entitled "Proposed Plan- No further Action Necessary to Address Sediment Contamination in the Charles River.

As a member of the RAB, who has attended several meetings where a restoration project in Squibnocket Park funded by the Army was discussed, I was surprised not to find any reference to that in the above mentioned booklet. When your RAB members and many others visited the site, we looked at shoreline restoration. Since the shoreline is crumbling in many places, the toxins that were on this site and were then buried with new soil, could well be leaking out into the river.

I therefore recommend that this restoration effort be explicitly included in the Army's next steps and that this restoration effort also addresses the remediation of possible contamination from the eroding soil at Squibnocket Park.

Army Response*: Please see the Army's responses to issue 3 presented in Section 3.1 regarding the proposed shoreline restoration activities. In addition, the soils on the upland portion of the Charles River Park were addressed as part of the OU 1 remedial activities. Soils above the cleanup levels were removed and post-excavation sampling indicated that the remaining soils were below the applicable cleanup levels. This indicates that there is no active migration of contamination from the park to the river since only 'clean' soils were left behind after the remediation.*

3. **Comment from Richard Corsi, Regional Planner, Department of Conservation and Recreation:** Thank you for the opportunity to comment on the above-referenced report.

The proposed plan for the Charles River OU is "No further action", yet the ACOE has stated on numerous occasions that it will design and construct a shoreline restoration project at Squibnocket (Charles River) Park. What assurance does the Department of Conservation and Recreation have to be certain this occurs? While the ACOE proposes to "accelerate the Five-Year Review from March 2007 to March 2006 to examine the remedial action and its effectiveness for the Charles River Park soils", is this not considered routine maintenance? Won't the ACOE be responsible for

preventing contamination migrating into the river anyway? Other than the one-year jump-start, how does this proposal benefit the properties?

Was the depth of the riverbed sediment samples for all reaches adequate to ensure the samples would include the period the Arsenal was in operation? This would provide a clear snapshot of the effects AMTL operations had on the riverbed.

The Army Corps of Engineers is to be commended for the public process this project followed. The April 2005 booklet outlines the process and the proposed plan in an easily-accessible manner. The Department of Conservation and Recreation has worked well with over the years with the Army Corps of Engineers. We look forward to continuing our working relationship in the future.

Army Response: *Please see the Army's responses to issue 3 presented in Section 3.1 regarding the proposed shoreline restoration activities. The Army has publicly proposed (June 29, 2005 RAB meeting) design plans for a shoreline enhancement project that goes beyond the routine maintenance required for OU 1 Charles River Park parcel. The purpose of the BERA was to evaluate the sediments that are currently available to ecological receptors, and not necessarily to reflect the entire history of AMTL operations. As indicated in Figures 11 through 14 referenced in the response to issue 4, it appears as though the surface sediments considered in the BERA generally contained similar or higher levels of contaminants than the sub-surface sediments. However, the sub-surface database is limited to samples collected from only three locations.*

APPENDIX A

Massachusetts Department of Environmental Protection Concurrence Letter

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

STEPHEN R. PRITCHARD
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

September 26, 2005

Ms. Susan Studlien
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region 1
One Congress Street, Suite 1100
Boston, MA 02114-2023

Re: State Concurrence Regarding Record of Decision
Former Army Materials Technology Laboratory Superfund Site
Charles River Operable Unit - Operable Unit 2
Watertown, Massachusetts

Dear Ms. Studlien:

The Department of Environmental Protection (the Department) has reviewed the Record of Decision (ROD) and the selected remedy recommended by the U.S. Army (Army) and the U.S. Environmental Protection Agency (EPA) for the Charles River Operable Unit (OU) of the Former Army Materials Technology Laboratory (AMTL). For the reasons described below, the Department concurs with the Army's determination to take No CERCLA Remedial Action in its role as lead agency at the AMTL Site.

Based on human health and ecological risk assessments the ROD concludes that (a) people are not exposed to an unacceptable human health risk in the Charles River OU, (b) the majority of compounds present in the Charles River OU posing ecological risk are present at concentrations consistent with upstream reference conditions and (c) the incremental ecological risks contributed by the former AMTL facility are indistinguishable from the anthropogenic, urban background conditions that characterize the lower Charles River basin. The Department agrees with these conclusions. Therefore, DEP concurs with the Army's determination to take No CERCLA Remedial Action in its role as lead agency at the AMTL Site.

The Army will be performing riverbank stabilization and maintenance activities at the adjacent Charles River Park (Soils and Groundwater Operable Unit – OU1) portion of the site in order to ensure protectiveness of the OU1 remedy. These activities will reduce the potential for migration of soils from the park into the Charles River that could increase the potential risks

This information is available in alternate format. Call Donald M. Gomes, ADA Coordinator at 617-556-1057. TDD Service - 1-800-298-2207.

DEP on the World Wide Web: http://www.mass.gov/dep
Printed on Recycled Paper

associated with sediment in the Charles River OU. The Department anticipates that the Army will continue to involve the community in these activities in order to achieve a result satisfactory to the Commonwealth.

If you have any questions regarding this letter, please contact Mr. Craig Durrett, Project Manager at (617) 348-4039 or Ms. Anne Malewicz, Federal Facilities Section Chief at (617) 292-5659.

Very truly yours,

Robert W. Golledge, Jr.
Commissioner
Department of Environmental Protection

Copies to:

File RTN 3-0455
Anne Malewicz, MADEP
Kymberlee Keckler, USEPA
Bryan Olson, USEPA
Mark Brodowicz,, Calibre

APPENDIX B

References

Agency for Toxic Substances and Disease Registry (ATSDR), 1997. Public Health Assessment. U.S. Army Materials Technology Laboratory. February 21.

ENSR, 2002. Screening Level Ecological Risk Assessment. Charles River Operable Unit, AMTL, Watertown, MA. April 2002.

ENSR, 2003. Final Baseline Ecological Risk Assessment Work Plan Package. Charles River Operable Unit, AMTL, Watertown, MA. April 2003.

ENSR, 2005. Final Baseline Ecological Risk Assessment. Charles River Operable Unit, AMTL, Watertown, MA. February 2005.

Jemal, A., A. Thomas, T. Murray and M. Thun, 2002. Cancer Statistics, 2002. CA Cancer J. Clin. 52:23-47 (www.cancer.org).

Krueger, E.T. 1996. Chief, Environmental Toxicology Program, Commonwealth of Massachusetts, Department of Public Health, letter to Steven Ward Director, Watertown Board of Health. Subject: Public Health Fish Consumption Advisory. May 3.

Life Systems, Inc. 1993. Baseline Risk Assessment-Environmental Evaluation, Army Materials Technology Laboratory RI/FS. USATHAMA Contract Number DAAA15-90-D-0009. December 27.

Massachusetts Department of Environmental Protection (MADEP), 1991. 1990 Charles River Bacteria Study.

Massachusetts Department of Environmental Quality (MDEQ) 1988. Charles River Basin 1987: Water Quality Management Plan. Division of Water Pollution Control.

Massachusetts Natural Heritage and Endangered Species Program (MNHESP). 2003. Massachusetts Natural Heritage Atlas 11th edition . July 2003.

Massachusetts Water Resources Authority (MWRA) 2001. Combined Sewer Overflow – Control Plan Annual Progress Report 2000, February 2001. MWRA, Boston, MA.

National Oceanic and Atmospheric Administration (NOAA), 1994. Coastal Hazardous Waste Site Review: U.S. Army Materials Technology Laboratory. November 1994.

Plexus (Plexus Scientific, Inc.) 1998. Supplemental Phase II Remedial Investigation Charles River. March 1998.

U.S. EPA, 2001. Charles River Fish Contaminant Survey. Prepared by Hilary Snook. U.S. EPA New England Regional Laboratory. April 2001.

U.S. EPA, 2002. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, OSWER 9355.0-85

USGS, 2000. Distribution and Potential for Adverse Biological Effects on Inorganic Elements and Organic Compounds in Bottom Sediment, Lower Charles River, Massachusetts.

Weston (Roy F. Weston, Inc.), 1994. Phase II Remedial Investigation Report, Army Materials Technology Laboratory. Prepared for the U.S. Army Environmental Center. Aberdeen Proving Ground, Maryland.

Weston (Roy F. Weston, Inc.), 1996. Outdoor Feasibility Study, Army Materials Technology Laboratory. Final, January 1996.

APPENDIX C

Acronyms

LIST OF COMMONLY USED ACRONYMS

AMTL	Army Materials Technology Laboratory
AR	Administrative Record
ATSDR	Agency for Toxic Substances and Disease Registry
AVS	Acid Volatile Sulfides
AWQC	Ambient Water Quality Criteria
BCT	BRAC Cleanup Team
BERA	Baseline Ecological Risk Assessment
BOD	Biological Oxygen Demand
BRAC	Base Realignment and Closure Act
CBR	Critical Body Residue
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COPC	Chemical of Potential Concern
CSM	Conceptual Site Model
CSO	Combined Sewer Overflow
DO	Dissolved Oxygen
ERL	Effects Range Low
FDA	Food and Drug Administration
FFA	Federal Facility Agreement
FS	Feasibility Study
GPS	Global Positioning System
GSA	General Services Administration
HI	Hazard Index
HQ	Hazard Quotient
LEL	Lowest Effects Level
MADEP	Massachusetts Department of Environmental Protection
MDC	Metropolitan District Commission
MDEQ	Massachusetts Department of Environmental Quality
MDPH	Massachusetts Department of Public Health
MNHESP	Massachusetts Natural Heritage and Endangered Species Program
MWRA	Massachusetts Water Resources Authority
NA	Not Applicable
NCP	National Contingency Plan
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPL	National Priorities List
OMOE	Ontario Ministry of the Environment
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbons

PCB	Polychlorinated Biphenyl
PRAP	Proposed Remedial Action Plan (Proposed Plan)
RAB	Restoration Advisory Board
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
SEM	Simultaneously Extracted Metals
SERA	Screening Ecological Risk Assessment
SPI	Sediment Profile Imagery
TAG	Technical Advisory Grant
TAL	Target Analyte List
TAPP	Technical Assistance for Public Participation
TEC	Threshold Effect Concentration
TOC	Total Organic Carbon
U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
WCES	Watertown Citizen's for Environmental Safety
WDNR	Wisconsin Department of Natural Resources
WOE	Weight of Evidence

APPENDIX D

Administrative Record Index

Watertown Files for National Archives, Waltham, MA

General Environmental Quality Correspondence Files (200)

001 BRAC Transfer Guidelines
001-a Guide for Environmental Management
001-b Guide for Environmental Compliance
001-c Environmental Restoration 4/96
001-d Transfer Guidelines
001-e Army Clean-up Strategy

002- BRAC Resource Management
002-a Annual Work Plans
002-b BRAC Management Plans
002-c Funding Requirements

003- Cost to Complete
003-a CTC Audit

004- DSMOA
004-a DSMOA Reports

005- Presentations
005-a 1993 Overview
005-b 1993 BRAC Update
005-c 1994 AMTL Background
005-d 1997 BRAC Program
005-e 1999 AMTL Update
005-f 1999 LUCs
005-g 2000 AMTL Review
005-h 2001 AMTL Exit Effort
005-i 2003 AMTL Close-out Schedule
005-j 2004 BRAC Update

006- WADC Newsletters (98)

Environmental Pollution Abatement Files (200-1a)

001 AMTL Parcel – 1998 Transfer (BRAC)
001-a1 DOD Hazardous Waste Disposal Policy
001-a2 EPA/State Hazardous IDs
001-a3 Total HM Spills Generated 1998
001-a4 EPA Hazardous Waste Report

001-a5 Fire Fighting Support Plan 1997
001-b1 Hazardous Waste Removal Report (77)
001-b2 Hazardous Waste Removal Report (98)
001-c1 Transformer (PCB) Retro-fill (93-C-4019)
001-c2 Transformer Removal Analyses (98)
001-c3 PCB Oil Analysis (98)
001-d1 Laboratory Chemical Analyses
001-d2 RCRA Chemical Lab Analyses
001-e Fume Hood Contamination (98)
001-f1 General Chemical Duct Work (98)
001-f2 Gen. Chem. Duct Manifests (98)
001-g Asbestos Removal (98)
001-h1 Gen. Chem. Manifests (PCB) (98)
001-h2 Gen. Chem. Manifests (various) (98)
001-h3 Gen. Chem. Manifests (ACM) (98)
001-h4 Gen. Chem. Manifests (PCB) (98)
001-h5 Gen. Chem. Manifests (LBP) (98)
001-h6 Gen. Chem. Manifests (Payments) (98)
001-h7 Gen. Chem. Manifests (Payments) (98)
001-h8 Gen. Chem. Manifests (Payments) (98)
001-i Gen. Chem. Contract (97-C-0167)
001-j Gen. Chem. Certificates (98)
001-k O'Neill Hazardous Waste Control (98)

002 Mall Parcel – 1968 Transfer (FUDS)
002-a1 Radiological Survey, Building 421 (80)
002-a2 Decommissioning Correspondence
002-a3 License SUB-238 Termination (03)
002-b Preliminary Assessment/draft 2/93
002-c Preliminary Assessment 10/93
002-d Chemical Acquisition Plan 9/94
002-e Draft Phase I Initial Site Investigation 3/95
002-f Site Safety & Health Plan 4/96
002-g Community Communication Plan 5/96
002-h Sampling and Analysis Plan 6/96
002-i Radiological Risk Evaluation 9/96
002-j Final Phase II Site Assessment 7/98
002-k Arsenal Park RAO Statement 9/00
002-l Arsenal Mall RAO Statement 9/00
002-m Draft Final Supplemental Phase II 2/01
002-n Arsenal Mall RAO Statement 9/03

003 GSA Parcel -1968 Transfer (FUDS)

003-a1 Decommissioning Correspondence (92-00)
003-a2 Decommissioning Correspondence (00-04)
003-a3 License SUB-238 Termination (03)
003-b Site Safety & Health Plan 12/94
003-c Draft Historic Site Assessment 10/00
003-d Chemical Data Plan – Sediment Sampling 10/00
003-e Draft Final Phase II Site Assessment 2/01
003-f1 Final Derived Concentration Guide-Vol.1 9/01
003-f2 Final Derived Concentration Guide-Vol.2 9/01
003-g Draft Work Plan & Addendum 4/02
003-h Uranium Tailings Work Plan 6/02
003-i Site Safety & Health Plan Addendum 8/02
003-j Uranium Tailings Investigation 12/02
003-kSupplemental Phase II Site Assessment 3/03
003-l Final Radiological Status 4/03
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004 – Environmental Permits
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004-b Clean Air Permits (98)
004-c Sewer Discharge Permits (98)
004-d Backflow Permits (98)
004-e Pest Management Report (98)
004-f A-1 Pest Exterminators Reports (98)
004-g Tank Closure Reports
004-h Lead Based Paint Report
004-i NRC Permit Policies

005 – Abatement Reports
005-a 1996 Abatement Report
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005-c 1998 Abatement Report
005-d 1998 Tracking Report

Environmental Restoration Remedial Assessment Files (200-1d)

001 MDC Park Parcel

Army Environmental Restoration Administrative Record (200-1e)

001-Environmental Impact Statements (NEPA)
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001-a1 NEPA Process
001-a2 AMTL BRAC EIS Review
001-a3 AMTL Reuse EA Impact
001-a4 Charles River Park EA
001-b BRAC Commission Report- BRAC 88 12/88
001-c Congressional Response BRAC 88 4/90
001-d BRAC III Detailed Analysis 4/91
001-e EIS BRAC III Implementation 11/92
001-f DOPAA/BRAC 88 – AMTL 10/94
001-g AMTL Disposal EIS 9/95
001-h DOPPA-Charles River Park Parcel 10/97
001-i EA Park Disposal (Draft) 3/98
001-j EA Park Disposal (Final) 10/98

002- BRAC/LRA Support Documents
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002-a1 WADC/DA EDC Negotiated Sale
002-a2 WADC EDC MEPA Process
002-a3 EDC/PBC FOSTs – WADC
002-a4 Transfers – Local Newsletters
002-b Reuse Plan & Feasibility Study 11/93
002-c BRAC Transition Plan 1/94
002-d Financial & Fiscal Plan 4/95
002-e Community Response Report (CERFA) 4/94
002-f Community Relations Plan 5/95
002-g Road Map for Communities (95)
002-h Reuse of Federal Facilities (96)
002-i Reuse Plan Update 10/96
002-j EDC Application for AMTL 2/97
002-k Technical Review of EDC Application 5/97
002-l Draft EA Arsenal Reuse 6/97

003- BRAC Reports & Plans
003-a BRAC Annual Report to Congress
003-b1 BRAC Clean-up Plan-Version 2 (95)
003-b2 Annual Clean-up Plan Abstracts
003-c Environmental Remediation Audit (97)
003- d AMTL Work Sites

004- Public Health Assessment
004-a Assessment Guideline - DOD & ATSDR (95)
004-b Health Consultation 3/96
004-c Public Health Assessment for AMTL 2/97

004-d
004-e Health Consultation 1/00
004-f Health Consultation (6/02)
004-g ATSDR Correspondence

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005-a2 RI/FS Files
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005-a5 Indoor Risk and Inspection Reports
005-a6 Explanation of Significant Difference 1/98
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005-a9 ROD Actions (Soils)
005-b Preliminary Assessment/Site Inspection – 3/88
005-c Remedial Investigation Presentation 11/87
005-d Closure Project Management Plan – Draft 8/91
005-e Chemical Data Plan-Bldg 60/227 9/94
005-f Federal Facilities Agreement 7/95
005-g Terrestrial Risk Assessment 8/95
005-g2 Terrestrial RA Correspondence
005-h Indoor Health Evaluation-Final 10/95
005-i Outdoor Feasibility Study-Final 1/96
005-j Outdoor Proposed Plan-Final 4/96
005-k1 EBS Building 131 Correspondence
005-k2 EBS Building 131 - Draft 10/96
005-l Outdoor Soil Remediation – Final 11/96
005-m Outdoor Health & Safety Plan 11/96
005-n Partial RAO Building 131 1/97
005-o Abatement Management Plan 4/97
005-o2 Abatement Plan Correspondence
005-p Outdoor Remedial Action-Final 3/98
005-q Asbestos Abatement 7/98
005-r Phase II Report-Bldg 60/227-Final 7/98
005-s Remedial Action-Bldg 60/227- Final 8/98
005-t Remedial Action – Draft 1/99
005-u Remedial Action – Final 3/99

006- AMTL BRAC Clean-up Records
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007 NRC Licenses
007-a AMTL Site/Reactor Decommissioning
007-b AMTL License Terminations
007-c NRC/NMSS Data Base Closure
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008-a 1998 BCT Meeting Notes
008-b 1999 BCT Meeting Notes
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009-a1 RAB Attendance Sheets
009-a2 Membership Support Documents
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009-f5 August 2002 Transcript
009-f6 September 2002 Transcript
009-g 2003 Meeting Notes
009-g1 January 2003 Transcript
009-g2 March 2003 Transcript
009-g3 April 2003 Transcript
009-g4 June 2003 Transcript
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009-g6 November 2003 Transcript
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009-g9 Arsenal Alumni & Reparations
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010-b Environmental Baseline Study 7/98
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010-e Real Estate Transfer Document 9/98
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010-g National Priority List Deletion 11/99

011 Land Use Controls
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011-b Transfer of LUCs –Harvard
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011-e Conditional Exceptions
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012 Institutional/Land Use Controls (Lots 1&2)
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012-e Amendment Release #1 6/99
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012-h Grant Amendment 3
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016 Five Year Reports
016-a Reference Files
016-b 2001 5-year Report
016-b1 5-year Review Report-Draft 7/01
016-b2 5-year Review Report-Draft Final 10/01
016-b3 5-year Review Report-Final 11/01
016-b4 5-year Review report Revised 1/02
016-c 2006 5-year Report

020 Charles River Park Transfer (11 acres)
020-a Park Parcel History
020-b Park Transfer Correspondence
020-c National Park Service Correspondence
020-d MDC-PBC Application
020-e Watertown Sanitary System
020-f WMRA Pipeline Rights of Way

021 Charles River Park Studies
021-a EBS/FOST 9/93
021-b ESD 5/01
021-c FS Addendum Correspondence
021-d FS Addendum 12/99
021-e FS Addendum-Draft Final 2/00
021-f
021-g
021-h EBS/FOST Correspondence
021-i EBS/FOST – Draft 2/02
021-j EBS/FOST-Draft Final 7/03

022 Park Restoration Documents
021-a Work Permits
022-b Park Remediation

022-c North Beacon Street RA
022-d Outdoor Soil Remediation-Draft 5/99
022-e Soil Remediation Correspondence
022-f Terraced Wetland 8/01
022-g Implementation Plan – Final 8/00
022-h Revised Implementation Plan – Draft 3/01
022-h/2 Final Implementation Plan 4/01
022-i Remedial Action Report – Draft 12/01
022-j Remedial Action Report-Final 3/02
022-k Park Maintenance Plan 3/02
022-l Transfer Support Documents
022-m Real Estate Transfer Package

025 WYC Underground Oil Spill
025-a WYC Correspondence
025-b MDC/WYC Permits
025-c Underground Tank Leak
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025-e RAM Plan 9/99
025-f RAM Status Report #2 7/00
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030 Charles River Operable Unit
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030-b MDC Master Plan
030-c Charles River Watershed Association
030-d EPA-Clean Water Initiative 2005
030-e Bio-availability Concept
030-f Natural Resources Injury Information
030-g River Remedial Alternatives
030-g/2 River Sampling Results
030-h River Scoping Process
030-i RI Supplemental Phase II
030-j Draft Health & Safety Plan
030-k Screening Level Assessment
030-l Problem Formulation
030-m Work Plan
030-n Weight of Evidence
030-o BERA Process
030-p Work Schedules

031 River Restoration Documents
031-a Sediment Sampling-Vol.1 2/96
031-b Sediment Sampling-Vol.2 2/96
031-c Final Supplemental Phase 2 RI 3/98
031-d Draft Feasibility Study 4/00
031-e Draft SLERA 6/01
031-f Draft Problem Formulation 2/02
031-g Final SLERA 4/02
031-h Draft Work Plan 6/02
031-i Final Problem Formulation 7/02
031-j Draft Final Work Plan 10/02
031-k Draft Field Sampling Plan 10/02
031-l Final Work Plan 4/03
031-m Draft BERA Correspondence
031-n Draft BERA Vol. I 5/04
031-n/2 Draft BERA Vol. II 5/04
031-o1 Draft BERA Reviews
031-o2 Draft BERA Vol. I 6/04
031-o3 Draft BERA Vol. II 6/04

Environmental Restoration Project Files (200-lf)

001 Historic/Archeological Files
001-a Archeological Overview 8/84
001-b Archeological Survey 9/95
001-c Collections Summary AMTL (NAGPRA) 2/96
001-d Archeological Site Examination 12/96

002 Historic Preservation Files
002-a1 Arsenal Historic Artifacts
002-a2 SHPO/DA Preservation MOA
002-a3 Arsenal Operation Articles
002-a4 Related News Articles
002-b Historic Preservation (TM 5-801) 11/75
002-c Historical Preservation (TM 5-801 2/77
002-d Arsenal History 1816-1967
002-e Watertown Arsenal-Gun Carriage Complex 7/82
002-f Phase II Installation Master Plan (Prelim.) 6/85
002-g Phase II Master Plan (Preservation) 2/86
002-h Phase II Installation Master Plan (Final) 5/89
002-i BRAC Historic Property Guideline & MOA 4/90

002-j AMTL Historic Site MOA 3/91
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003 Environmental Assessments (Pre-BRAC)
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APPENDIX E

E1. Public Comments on the Proposed Plan for the AMTL

E2. Transcript of Public Hearing on the Proposed Plan for the AMTL

E1. Public Comments on the Proposed Plan for the AMTL

May 16, 2005

Dear Mr. Brodowicz,

Thank you for the opportunity to review the Proposed Plan for the Charles River Operable Unit of the Watertown Arsenal Superfund Project. Our comments are as follows.

We are very concerned that the Proposed Plan does not mention the Army's assurances that they will carry out a restoration project to compensate in some way for the damage that has been done to the river. Although the BERA study did not result in clear definition of what the Army's impact was, the Army has in the past admitted to being a contributor to the contamination of the river. The fact that we are in an urban environment with an industrial past, making it more difficult to define the impact of the AMTL, should not penalize us or prevent us from receiving compensatory action for what was done.

Indeed, we believe the BERA did not clear the AMTL of adverse impact. If the data are evaluated on a reach-specific basis, statistically significant differences are not apparent. However, if the data are evaluated on a sample-specific basis, adverse effects are clear. Stations 2, 10, 16, 20, & 26 exhibited increased chemistry, increased toxicity, or both.

While further study may be able to identify attribution, we think the Army's resources would be better spent on a restoration project. This was discussed at several RAB meetings and received public support. However, the draft Proposed Plan does not state clearly that a restoration project will be done, what the restoration project entails, or if sufficient funding for it has been acquired. Are the specific actions that have been discussed (i.e., bank stabilization) still the Army's plans for the Charles River Park area?

There has been discussion of a potential bank stabilization project for the Charles River Park area. But during the April 14, 2005 site walk of the Charles River Park it was not entirely clear what was being proposed as part of the restoration project and what was required as part of maintenance of the park to prevent contaminant migration. It seems that most of the effort discussed as part of the restoration project is something that is already required. Please clarify what is being done under each category, and explain the Army's commitment.

We believe that the Proposed Plan should be rewritten to include the Army's commitment to conduct the restoration project. We strongly believe that the Army should compensate the public for damages to Charles River resources as evidenced by the Army's data discussed above, and look forward to discussing the design of the project with you in greater detail.

Sincerely,
Susan Falkoff
for the Watertown Arsenal RAB

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May 16, 2005

Mr Robert Davis
US Army Corps of Engineers
696 Virginia Road
Concord MA 01742

Dear Mr. Davis,

I am in receipt of April 2005 document entitled "Proposed Plan- No further Action Necessary to Address Sediment Contamination in the Charles River".

As a member of the RAB, who has attended several meetings where a restoration project in Squibnocket Park funded by the Army was discussed, I was surprised not to find any reference to that in the above mentioned booklet. When your, RAB members and many others visited the site, we looked at shoreline restoration. Since the shoreline is crumbling in many places, the toxins that were on this site and were then buried with new soil, could well be leaking out into the river.

I therefore recommend that this restoration effort be explicitly included in the Army's next steps and that this restoration effort also addresses the remediation of possible contamination from the eroding soil at Squibnocket Park.

Sincerely,

Renata von Tscharner

Renata von Tscharner
President

department of
Conservation and Recreation

dcr

May 31, 2005

Robert W. Davis, Army Technical Manager
US Army Corps of Engineers – New England District
Engineering/Planning Division
696 Virginia Road
Concord, MA 01742-2751

RE: Comments on the Proposed Plan for the Charles River Operable Unit

Dear Mr. Davis:

Thank you for the opportunity to comment on the above-referenced report.

The proposed plan for the Charles River OU is "No further action", yet the ACOE has stated on numerous occasions that it will design and construct a shoreline restoration project at Squibnocket (Charles River) Park. What assurance does the Department of Conservation and Recreation have to be certain this occurs? While the ACOE proposes to "accelerate the Five-Year Review from March 2007 to March 2006 to examine the remedial action and its effectiveness for the Charles River Park soils", is this not considered routine maintenance? Won't the ACOE be responsible for preventing contamination migrating into the river anyway? Other than the one-year jump-start, how does this proposal benefit the properties?

Was the depth of the riverbed sediment samples for all reaches adequate to ensure the samples would include the period the Arsenal was in operation? This would provide a clear snapshot of the effects AMTL operations had on the riverbed.

The Army Corps of Engineers is to be commended for the public process this project followed. The April 2005 booklet outlines the process and the proposed plan in an easily-accessible manner. The Department of Conservation and Recreation has worked well with over the years with the Army Corps of Engineers. We look forward to continuing our working relationship in the future.

Sincerely,

Richard F. Corsi
Regional Planner
cc: Samantha Overton Bussell, DCR

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Secretary

STEPHEN R. PRITCHARD
Acting Commissioner

E2. Transcript of Public Hearing on the Proposed Plan for the AMTL

UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY

RESTORATION ADVISORY BOARD

PUBLIC HEARING RE:

PROPOSED PLAN
CHARLES RIVER OPERABLE UNIT
ARMY MATERIALS TECHNOLOGY LABORATORY
WATERTOWN, MASSACHUSETTS

Council Chambers
Town Hall
Watertown, Massachusetts

Monday
May 16, 2005

The above entitled matter came on for hearing, pursuant to Notice at 7:11 p.m.

BEFORE: MARK BRODOWICZ

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P R O C E E D I N G S

(7:11 p.m.)

MR. BRODOWICZ: Thanks so much for coming to the meeting here for the proposed plan for the Charles River operable unit. Tonight we've got a host of people I want to introduce so everybody knows who they are. Before I do that, I would like to lay out the format tonight.

The first hour, as you can see from the agenda, we're primarily, for 45 minutes, we are going to go over a brief summary of the baseline ecological risk assessment which was done on the river. I'm going to be very informal because John Bleiler will essentially be giving the presentation, but we thought it would be much easier if you have a question on any of the presentation, just raise your hand.

Be aware that these questions here are for information purposes. At the public hearing, if you have a question registered in as an official comment, an official response will be sent by the Army in writing. Leave that question again for the reporter. I'll be making that statement again in case you forget that.

For this first portion, like I said, if you have any questions, just raise your hand. We'll go around the room here.

MR. DAVIS: Yes, Mark. Plus, also, you know, if

you don't want to actually -- you can give us a written comment. We have forms there, and you can go on the record or afterward you can e-mail me or fax me, whatever, your comments because the public comment period, I believe, is open until June 1st, John?

MR. BLEILER: I think so.

MR. DAVIS: All right. So, even after the meeting, you know, we'd love to get your comments tonight, but there is still time afterwards to send e-mail comments, written comments or fax them to us.

MR. BRODOWICZ: Thanks. All right. Well, we will go around the room here and I'll let you introduce everyone. We have Kymberlee Keckler from the US EPA; we have Craig Durrett from the Massachusetts Department of Environmental Protection; back here in the corner is our court reporter, Eric. He will be recording everything here so that we will have it for some of the members that weren't able to make it tonight.

Coming around the room, we've got Betsy Ruffle from ENSR. She is the human health and risk assessment specialist for this contract; Robert Davis from the Corps of Engineers; and John Bleiler, he's the project manager that was responsible for this investigation going forward.

Going out into the audience, we've got a few other people, I'd like to mention. We have the RAB co-chair,

Susan Falkoff, she's here as part of our RAB members. We've got Bryan Olson from EPA, as well as Rob Mills from headquarters in the Army, and I'm Mark Brodowicz, I'm a contractor in the technical systems, in case you're wondering who I am. Oh, we also have Jim Okun, he's a representative of the public TAG member, which is the--

MR. DAVIS: Technical Assistant Grant.

MR. BRODOWICZ: Technical Assistant Grant. The Army has an grant program that would fund individuals of the public to support the public in their transition. And, oh, Rick, there you are, I'm sorry. Rick Corsi from--

MR. CORSI: DCR.

MR. BRODOWICZ: DCR--

MR. CORSI: Formerly the MDC.

MR. BRODOWICZ: Conservation Recreational --

MR. GODFREY: Randy Godfrey with the Corps too. Thank you.

MR. BRODOWICZ: He pays the bills so we --

MR. GODFREY: Right.

MR. BRODOWICZ: Very important guy.

What I'll do now is, I'll take a minute here and just explain that we are doing. This is a public meeting for the proposed plan for the Charles River. What we are asking for, to recommend to EPA would be a no further action ROD or record of decision.

And EPA has agreed to this no further action record of decision documentation, contingent upon the Army reviewing the remedial solution at the Charles River Park, for the human health and environmental protection portion of it.

Because it is publicly sensitive both to the RAB members and the public, we're moving the five year review up from 2007 up to 2006 so that we can look at the Charles River Park, and this will begin probably sometime in the summer and this is to help make the process -- what is the word I'm using here -- make it palatable for the EPA/DEP for justification of doing this no further action ROD.

So, once they feel it is sufficient and they are comfortable with this draft portion of the five year review, then they are going to bless the no further action ROD. Okay?

With that said, I'll turn this over to Kymberlee here.

MS. KECKLER: Sure. Thank you. I guess I would say, you know, from EPA's perspective, it's the no further action ROD/restoration project combination that we really think is the best environmental outcome for the Charles River adjacent to the former AMTL.

You know there were some differences in how we interpreted the data. I mean, you know, we could have asked

the Army to prepare more studies. And we just, you know, we'd just end up basically where we are right now and may be faced with doing no further action and not having the opportunity to the project because we've already spent the money on studies.

So, we thought this was the best compromise, and I'm pleased to be here.

MR. BRODOWICZ: Craig Durrett.

MR. DURRETT: The department is, throughout the whole process, heavily involved in reviewing this assessment and our eco-evaluation of the river, including our of office of research and standards. And we, the outcome of the eco risk assessment is in line with what our thinking was and how we reviewed it, we agree with the results show.

And we had extensive discussions on this internally on this, too, just to strictly from DEP as well as with EPA and Army, and this outcome and with the Army offering to do an additional project, it would be the best option at this time.

MR. BRODOWICZ: With that, we'll get started with the public presentation. John Bleiler, of ENSR, will make that presentation.

MR. BLEILER: Hi. Again, I'm John Bleiler with ENSR, a biologist who managed quite a bit of the discussion and investigation work we had here in the last three or four

1 years.
2 Just before I get going, a couple of quite
3 housekeeping things. We've got copies of the overheads
4 here. I noticed some people came in late. And also copies
5 of the proposed plan, if you want to grab a copy now or
6 later, feel free.
7 There are one or two overheads that show the maps
8 that we have on the side of the room that, in the format in
9 your booklet are a little hard to see. So, the very last
10 page of your booklet is a blown-up map of the Charles River
11 that might be helpful for your review as well.
12 So tonight we are here to present the proposed
13 clean-up approach for the Charles River. Again, and
14 Kymberlee and Craig indicated, they've taken a look at the
15 proposed plan document that, hopefully, everyone's had a
16 chance to review either prior to the meeting or tonight.
17 It's been through a response cycle and is integrated through
18 the thought of EPA and DEP and they've had an opportunity to
19 concur with it, hopefully.
20 It was prepared after a number of years of study
21 before its plan. The Army, if you look at the time line
22 that occurred, -- The Army's been out there for, I think,
23 that time line starts in 1979, but for, at least, the last
24 ten years, there have been studies of one sort or another on
25 the Charles River adjacent to the AMTL property, sediment

1 studies, surface water studies, some of which I'll go over
2 tonight.
3 And the sole purpose of tonight's presentation,
4 about half the people in the room have heard much of this
5 before, but the sole purpose tonight is for, you know, to
6 get the public's review and comment on the proposed plan and
7 provide an opportunity for, you know, anyone who has
8 thoughts on the remedy selection process or on the work that
9 has been done to date or the work going forward to speak up.
10 And, again, if you feel uncomfortable speaking up
11 in this forum, there are sheets and you can fill it out.
12 There's an e-mail address available in the proposed plan,
13 itself, with a perforated sheet that you can, you know, feel
14 free to rip it out and prepare any comments you would like
15 so we can get them to the Army.
16 So, the Charles River operable unit is one of the
17 three OUs, or operable units, at the AMTL property. It was,
18 my understanding is, the reason that AMTL was named a
19 Superfund site was actually the Charles River, so it was
20 perceived as a potentially significant operable unit at the
21 site.
22 The genesis of it was several storm drains on the
23 former AMTL property. At least seven storm drains drained
24 into the Charles River and could potentially carry all kinds
25 of material.

The facility was operational, I believe, in 1816 for small arms storage, manufacturing. It's got a long industrial history. You name it, it was done out there, sort of, military operations, training operations. I believe there was a manufactured gas plant at one point, there was a small nuclear facility at one point. It has a long industrial history.

Most of them have been closed. What's left is the Charles River operative unit, the other two operable units have been closed. This is the final OU or operable unit being looked at.

This just gives you a sense on what we're looking at when we go out and we talk about the Charles River operable unit. There are a couple lines dividing, in a sort of upstream reach over here or up gradient reach. There's the Newton Yacht Club, the Watertown Yacht Club, Sunrise Island.

You'll hear me tonight refer to the back channel. That's this little sampling reach, the adjacent sampling reach, and going down here is the Beacon Street Bridge, just to help orient you. Then we have what we call the downstream sampling reach.

Again, as depicted in the time line, there's been quite a bit of spending out here. It's not as exhaustive as some of the huge supervised sites, the Hudson River,

Housatonic River, but it's fairly extensive studies of surface water study, biology, toxicology, some of which I'll get into tonight.

Historically, under the other operable units, ground water exposed. Since ground water discharged into the river, is the subject of what we are talking about tonight. That was put to rest some years ago, probably in 1999.

MR. DAVIS: Yes, so it would be '96 to '99 time frame.

MR. BLEILER: So five to eight years ago. And surface water, as well, we looked at the surface water, the water quality, the upstream reach, the adjacent reaches downstream, it's all pretty much the same. That was not really the subject of any recent studies.

So, what I've looked at for the last three or four years is sediment, the river bottom, mostly sort of an organic muck in the vicinity of the site, sandier, gravelier, upstream does have some relevance. The river bottom, no doubt, is what I've been looking at for the last three years.

Again, there are numerous potential sources of contamination, there are seven storm drains that not only service the former AMTL, but about half of them service a huge part of downtown Watertown. So we've really got a

1 point source discharges too. We've including discharges
2 from AMTL as well as other sites.
3 And from that, we know, and historically, we know
4 pretty well what's present in the site. I've got two slides
5 here that, sort of, walk through the types chemicals we
6 looked at in the sediment. Most of the decisions, in terms
7 of what you are going to look at, were made three to four
8 years ago based on just a wealth of historic data, some
9 collected by the EPA, some by the Army, some by USGS.
10 So, I'll walk through the various classes of
11 compounds of what we look at as far as the recent work, what
12 we've been doing the last three years. The first class, the
13 volatile organic compounds, that's things usually found in
14 gasolines, degreasers, really not much of an issue.
15 Honestly, we typically don't find volatile in surfacial
16 sediment on these waste sites, unless there's an active
17 discharge. So, it's no great surprise that these volatile
18 are not a big deal.
19 On the other hand, the semi-volatile organic
20 compounds, the second bullet here, particularly, the PAHs,
21 the polynuclear aromatic hydrocarbons, these are compounds
22 that are formed in a number of ways, including incomplete
23 combustion.
24 There are quite a few PAHs in the sediment in the
25 Charles River. Some of them, may be applicable to the site,

1 some of the may be attributable to the burning of fossil
2 fuels, wood, road run-off, a lot of potential sources.
3 Certainly one of the compounds we focused on,
4 pesticides, really very low levels as far as we're
5 concerned, not a major concern in our study. Here there
6 were low levels potentially related to widespread use.
7 Susan?
8 MS. FALKOFF: -- to the AMTL operations, the role
9 for the clean-up of the Charles River Park pesticides and
10 PAHs? How can we --
11 MR. BLEILER: Well, the PAHs certainly could be
12 attributable to that--
13 MS. FALKOFF: -- PAHs and the pesticides --
14 MR. BLEILER: Well, we looked at the pesticides.
15 My understanding is there were no great sources of
16 pesticides in the outfalls, and based on historic data,
17 there were pesticides getting into the river historically.
18 But honestly, some of those decisions were made before I got
19 involved, and I looked at the pesticide data and there were
20 no great trends in the river either upstream or downstream.
21 MS. FALKOFF: Thank you, John.
22 MR. BRODOWICZ: Anything to add on that?
23 MR. DAVIS: Well, I remember PAHs were one of the
24 drivers. When we did the explanation of significant
25 difference on the Charles River Park, was mainly the PAHs

1 that were the driver, not the -- the driver on Charles River
2 Park, Susan, was mainly the PAHs.
3 MS. FALKOFF: But there were ultimately --
4 MR. BLEILER: Yeah, there were. There were
5 pesticides in the park as well as PAHs.
6 MS. FALKOFF: And therefore, it just seems odd
7 that you would conclude --
8 MR. BLEILER: Well, we looked that the pesticides
9 along with all of these other chemicals in the assessment.
10 We certainly didn't abandon looking at them. Maybe the
11 language in that bullet should be referred to some other
12 language, not that -- it certainly carried the pesticides
13 through.
14 I guess what I, the data that I saw on the river,
15 in my mind, and I think in the mind of the review was more
16 indicative of, sort of, widespread application of pesticides
17 rather than, you know, point source and non-point source
18 discharge. There were really no pesticide hot spots,
19 although we may have seen some other stuff earlier on. For
20 instance, there was a PCB hot spot that attracted quite a
21 bit of attention.
22 MS. FALKOFF: I would say that -- was not
23 justified in the conclusion of what we --
24 MR. BLEILER: Point taken.
25 MR. DAVIS: Also, I want to make one other

1 statement, don't forget, Susan, the Charles River Park is
2 mainly urban fill. So, you know, you have to consider that
3 also as far as --
4 But as far as pesticides are not a major driver as
5 far as the Charles River operable unit.
6 MS. FALKOFF: That's fine. I just don't see how
7 you can possibly say -- I'll save this --
8 MR. DAVIS: Yes. Well, we say not likely because
9 there is widespread legal use of pesticides--
10 MR. BLEILER: Again, let me reiterate. There was
11 a priority of pesticides throughout the testified--
12 MR. DAVIS: Yes--
13 MR. BLEILER: -- entire process. So, this is an--
14 MS. FALKOFF: That's fine, but--
15 MR. BLEILER: So, this is an introductory slide
16 that --
17 MS. FALKOFF: What they said over and over again
18 is that the commander liked to have the green grass to look
19 at and that was the explanation for why there was such high
20 level of pesticides. So, that I don't see how you can even
21 say what you're saying.
22 MR. BLEILER: I think it would be great if we
23 could reiterate that in the second half of the meeting and,
24 again, just keep in mind that we certainly didn't discount
25 pesticides. All of the work we did looking at relationships

1 between biology and chemistry of pesticides. We looked at
2 chemicals and various assessments.
3 Yes, sir?
4 MR. ACETO: Is it true right along the bank of the
5 Charles adjacent to -- did you find arsenic in the soils
6 there?
7 MR. BLEILER: In the soils on the banks?
8 MR. DAVIS: The Home Depot, is that on the arsenal
9 site?
10 MR. ACETO: Facing the Charles River.
11 MR. BLEILER: It was typically lead arsenate you
12 know, in terms of the metals that we have here, we certainly
13 carried all the metals, including lead and arsenic into this
14 risk assessment.
15 MR. DAVIS: Okay. So regardless of whether
16 they're likely, you know, they were carried to the risk
17 assessment. Pesticides were evaluated in their entirety.
18 MR. BLEILER: PCBs, they're manmade chemicals.
19 They haven't been manufactured in the states for a number of
20 years, were also looked at in the risk assessment. In some
21 of the earlier data sets, this reach of the river through
22 the back channel, we focus quite a bit, and to try and get a
23 better sense of what was going on relative to PCBs that may
24 have been used during the operation of AMTL as well.
25 Numerous metals, again, including lead and

1 arsenic, I was unaware of the lead/arsenic cleanup, but we,
2 you know, we carried lead, divalent metals, nickels and
3 cadmium, virtually any metal you can think of, we carried
4 through the risk assessment.
5 The radio nuclides that probably were associated
6 with AMTL historic research were present at very low levels
7 in the sediment at street level quite early on in the
8 process.
9 So again, most chemicals that I've listed here
10 were carried through the risk assessment with two
11 exceptions, the bioorganic chemicals, which we didn't see
12 much of anything and were eliminated pretty early.
13 Yes, sir?
14 MR. ACETO: Were any inside the GSA property too?
15 MR. BLEILER: I'm sorry. The?
16 MR. ACETO: The radiation you found, did that
17 include the GSA property too?
18 MR. BLEILER: This is---
19 MR. DAVIS: No--
20 MR. BLEILER: --solely related to the sediment at
21 the bottom of the river--
22 MR. DAVIS: This, this--
23 MR. ACETO: -- on site?
24 MR. DAVIS: The GSA's property is a dirt FUDS
25 site, and it's not part of this public hearing. It's, you

1 know, it's being handled separately.
2 MR. ACETO: We still don't know whether that
3 drains into the Charles River.
4 MR. DAVIS: What, the Sawins Pond Brook?
5 MR. ACETO: That --
6 MR. DAVIS: Yeah.
7 MR. ACETO: It goes down over the hill, through
8 the GSA property, across the road, right into the river.
9 MR. DAVIS: Yes. That's where Sawins Pond Brook
10 flows, yes, from Sawins Pond. Yes. But it doesn't have any
11 relevance to what we're doing here at the Charles River
12 operable unit.
13 MS. FALKOFF: Do you think it's possible to tell
14 people what dirt FUDS means?
15 MR. BLEILER: We have to -- you mean the acronym?
16 MR. DAVIS: Okay. Obviously, yes, we're--
17 MR. BRODOWICZ: They're --
18 MS. FALKOFF: I said it's possible there's someone
19 in this room who doesn't know what dirt FUDS means.
20 MR. DAVIS: All right. Counting, actually, the
21 GSA sites as one of the sites that the U.S. Army Corps of
22 Engineers New England District is evaluating under the Mass.
23 Contingency Plan since it's not a Superfund site, and we're
24 still doing work on that close out.
25 MR. ACETO: -- three of the Charles River --

contaminated from the constant run off.

MR. DAVIS: From the Sawins Pond Brook?

MR. ACETO: Yes.

MR. DAVIS: Yes. What's your point? Sawins Pond Brook also drains Sawins Pond south, and there's a lot of other upgradient sources there, so I'm not too sure the point you're trying to make, Carmine.

MR. ACETO: On the --

MR. DAVIS: Yes, yes, we have that data. We've screened that data. We've looked at that data. The data is in our reports.

MR. ACETO: At that point in time, it might be. We don't know tomorrow though; do we? Suppose that it's contaminating the GSA site.

MR. DAVIS: GSA site is, at this point, downstream and down gradient of this site here.

MR. BRODOWICZ: Question for you. Craig?

MR. DURRETT: The information that's being presented by Bob and John here has to do strictly with the Superfund site, the AMTL Superfund site, and the operable unit for the, which consists of the Charles River.

What you're talking about is a GAS site located downstream from the, from the Superfund portion, and just to clarify, the radiological aspect of that site has been cleared up with extensive public input on that too, and the

1 Nuclear Regulatory Commission was involved with that, along
2 with Department of Public Health Radiation Control Program.
3 So that shouldn't be a concern at this point. It
4 has been addressed and it's in public documents.
5 MR. BRODOWICZ: Thank you, Craig.
6 MR. DURRETT: Did that help clarify?
7 MR. DAVIS: We're actually, continuing to work, we
8 have a site visit Thursday at 4:00 on the GSA site to
9 continue looking at some of the concerns from the public,
10 but it's a separate site under a separate regulatory
11 process, Carmine.
12 MR. ACETO: Bob, it's still part of the Superfund
13 site.
14 MR. DAVIS: No.
15 MR. ACETO: It's not?
16 MR. DAVIS: No. Legally, it's not, no. It's
17 being looked at under the Defense Environmental Restoration
18 Program at former used defense sites, and it's a tier 1(a)
19 site under the Mass. Contingency Plan, but it's not a
20 Superfund site.
21 MR. BLEILER: It's under state level--
22 MR. DAVIS: Yes, yes--
23 MR. BLEILER: --and federal regulation.
24 MR. DAVIS: Yes.
25 MR. ACETO: I have a problem separating it out.

1 That's my problem.
2 MR. DAVIS: The GSA site was never part of the
3 AMTL Superfund site.
4 MR. BRODOWICZ: There may have been the confusion,
5 but what led to confusion is years ago, when we were having
6 Restoration Advisory Board meetings, I think a lot of the
7 key players from the RAB were also involved with the GSA
8 site, ie, regulators, public, they combined the two meetings
9 at the same time.
10 So we had the RAB meeting going on and the GSA
11 site and, in fact, the RAB meetings ended up picking up the
12 tab to record it and help facilitate. We had separated
13 those meetings about six months, seven or eight months ago,
14 I think in January, we separated those two meetings, and I
15 think there was some confusion because they were being held
16 at the same time, same place, same people talking, but there
17 was definitely a dichotomy between Superfund and federally
18 regulated sub CERCLA site versus a national site and a state
19 site.
20 So that's one of the things we do now in the RAB
21 meeting. We break down and we say, 'This is going to be the
22 GSA portion' so people understand that they're two separate
23 sites and different regulations.
24 MR. DAVIS: Another example for clarification
25 comment is Jim Okun is working for the, you know, the

1 Watertown Citizens Environmental Safety, and under the
2 technical assistant grant, he gets funded through EPA to be
3 here, and under the TAPS grant, under the dirt FUDS program,
4 he gets assistance to represent the community on the GSA
5 site, two separate processes, two separate funding
6 mechanisms for Jim Okun to assist the citizens of Watertown.
7 MR. BLEILER: I think just before we leave these
8 slides then, the take home message is a lot of chemicals are
9 present in the Charles River sediment and it's certainly not
10 a pristine or clean system, and we carried those chemicals
11 through the risk assessment, the heavy metals and the PAHs
12 and --
13 MR. DAVIS: And should also understand that we're
14 concerned about arsenic; however, we did complete
15 remediation of AMTL proper, and we did, you know, remediate
16 Charles River Park, so we did remediate all the land
17 portions of all the contaminants.
18 MR. BLEILER: So we carried those constituents or
19 compounds through the risk assessments, which have all been
20 completed at this point by the Army under state and federal
21 supervision, the purpose of these risk assessments is to
22 evaluate not just potential current, but also future
23 exposures for effects of chemicals on human health and the
24 environment.
25 The results of these risk assessments really form

1 the basis of the proposed plan. The risk assessments are,
2 in essence, sort of the hinge between this investigative
3 piece of work that we've done and the proposed plan
4 evaluating the pathways forward and the Army, pursuant to
5 both, state and federal law, with the human health and
6 ecological risk.
7 I just have two quick slides on human health risk
8 assessment which was done in the mid 1990s, I believe, 1995,
9 and I think it was republished or, at least, portions of it
10 were republished in 1998. It evaluated a number of
11 different potential exposure pathways in the Charles River
12 that look at incidental ingestion, surface water and
13 sediment.
14 It looked at consumption of fish. It looked at
15 the radiation in the sediment. It looked at, you know, what
16 if someone was swimming and having to get, you know, dermal
17 exposure, got sediment on their skin or ate fish, and a lot
18 of these evaluations are rather conservative, so it's sort
19 of additive, you can evaluate somebody wading and eating
20 fish, and it did a variety of different exposure pathways.
21 The work, again, was completed, I think, in 1995,
22 it was approved by EPA and Mass. DEP. We do have a copy of
23 the risk assessment with us this evening, if anyone would
24 like to look at it. Betsy Ruffle is the toxicologist who's
25 been through it as well and can certainly helped us out with

1 the details on it.
2 The conclusions in this risk assessment that there
3 was, in the human health risk assessment, was that there's
4 no unacceptable risk to human health associated with
5 exposure to surface water or sediment or, for that matter,
6 fish tissue, so since this human health risk concern was
7 laid to rest in the mid 1990s, the bulk of the work in the
8 last decade or so has been focused on ecological risks,
9 evaluate the potential risk to the environment.
10 We've looked at a lot of different potential, what
11 I've referred to here as, ecological receptors, a lot of
12 different organisms that potentially could be at risk due to
13 exposure to contaminated sediment in the Charles River.
14 Aquatic vertebrates, fish, obviously, are a potential
15 concern with exposures of fish to sediment.
16 Benthic invertebrates is a term you may not be
17 overly familiar with, but basically, it's those
18 invertebrates, those animals without backbones that are in
19 direct contact with the sediment, organisms that make their
20 living anywhere of the surface of the sediment or in the top
21 6 inches, or so, of the sediment, clams, worms, fresh water
22 mussels, a variety of insect larvae.
23 These animals are in direct contact with the
24 sediment, often don't, aren't able to move away from
25 contamination, so they're a pretty good sentinel organism or

1 pretty good indicator of risks to the environment.
2 Then we also looked at wildlife consumers of
3 these. We looked at birds and mammals the risk assessment
4 looked at -- the reason the risk assessment did a modeling
5 exercise looking at racoons, great blue heron, muskrat,
6 evaluating, you know, what if one of these animals ate a
7 contaminated fish or what if one of these animals ate the
8 contaminated bugs and, also, swallowed some contaminated
9 sediments? We did a variety of modeling exercises in that
10 work.
11 Again, just to reiterate what I started on
12 earlier, there are four reaches to the Charles River that we
13 evaluated, an upstream reach, what we've referred to as the
14 back channel reach behind Sunrise Island, an adjacent reach
15 of the river, and from here down, what we refer as to the
16 downstream reach of the Charles River.
17 Yes, sir?
18 MR. ACETO: What impact would the fish in the
19 Charles River have on human consumption?
20 MR. BLEILER: I think there are two answers to
21 that. One is the risk assessment which was completed in the
22 1990s indicated that there was no, and it was based largely
23 on modeling, indicated that there was no risk from
24 consumption of fish tissue.
25 So relative to the human health risk assessment,

that was defined, and more recently, EPA has done some fish work in the Charles River. I believe there's a fish advisory in the entire lower Charles River basin, so it's not really related to this site one way or another, but the entire Charles River basin has a fish advisory, and I think it's PCBs, primarily, that's driving the fish advisory.

Brian and Kymberlee, you may know more, but I believe it's PCBs.

MR. ACETO: -- indicates there is a risk in the fish in the Charles River, the toxins with that --

MR. BLEILER: That's right, the entire lower Charles River basin is subject to that advisory.

MR. ACETO: -- tiny risk, right?

MR. BRODOWICZ: As attributed to AMTL, yes, on our report, that's correct. We don't contribute to that.

MR. ACETO: Excuse me?

MR. BRODOWICZ: That is correct. Based on this, you know, risk assessment, we don't contribute any risk from AMTL as part of that modeling from our data so there is a warning out from, is it DCR? Did they put that out, Rick?

MR. CORSI: I think it's public health.

MR. DAVIS: Yes. It's Mass. Department of Public Health, obviously, in conjunction with the Fisheries and Wildlife because they're usually the ones that take the fish samples. In this case, EPA did that special study, the

1 Hillary Smith--
2 MR. BLEILER: Done at the Lexington Labs --
3 MR. DAVIS: Yeah, Lexington Labs back in '99,
4 sample all the different reaches along the Charles, and--
5 MR. BLEILER: So it's kind of apples and oranges.
6 That's not really related to the site, but the entire
7 Charles River basin is subject to that fish advisory, that
8 is correct. There's the site itself, attributable to the
9 site was put to bed in 1995.
10 MR. DAVIS: So, yes, there are concerns in the
11 Charles with consumption of fish, and there's actually some
12 special concerns with populations that like to eat a lot of
13 fish, so there are public health concerns, generally, on the
14 lower Charles River relative to eating fish.
15 MR. ACETO: My question I asked, what location is
16 adjacent to --
17 MR. DAVIS: We have copies of these studies, if
18 you'd like to see those, you know, where they sampled the
19 different reaches of the Charles and looked at the different
20 fish, but even -- pardon?
21 MR. ACETO: Which department?
22 MS. FALKOFF: Was it --
23 MR. DAVIS: No. It was actually Hillary Smith, of
24 the, which published the report out of the US EPA Lexington
25 Lab, now in Chelmsford.

MR. CORSI: They just put the signs up.

MS. FALKOFF: Didn't Albe go out?

MR. DAVIS: Yes. I think he went out and did some of that electro fishing when they were capturing the fish back then.

Actually, Dave McDonald, who is the Watertown Conservation Commission chairperson for many years, actually, partook in that study because he told me it was pretty cold in November electro fishing at night.

MS. FALKOFF: Yes. As a result of the --

MR. DAVIS: Well, remember, we had that discussion, Susan, at one of the RAB meetings. It probably would be prudent for certain populations that do eat a lot of fish to recognize that, you know, there is contamination of the fish in the Charles, and so some, some populations that are more subsistence type, you know, fishing families need to be more concerned, but the average person that lives in Watertown -- you know, how many fish meals do you eat a year out of the Charles River, Susan?

MS. FALKOFF: My question was rhetorical.

MR. CORSI: I'm pretty sure the signs are multilingual.

MR. DAVIS: They should be. They really need to reach the affected populations.

MR. BLEILER: When I left off relative to the

ecological risk exam that included the reaches upstream, back channel, adjacent and downstream. Several summers ago, we did a Summer-wide program, and we looked at a variety of different data sets, and the key with this slide is that these are co-located, where we collected the sediment chemistry sample, we also collected the tox test.

Those two data types, we also looked at the bio accumulation in the sample tissue collected at identical stations. We also looked at the macroinvertebrates at the stations, and also did some, what I refer to as, sediment profile imaging, some photographic interpretation of the bottom of the river.

So these sampling stations are co-located in space and in time which gives us the ability to look at cause and effect, look at concentration versus biological responses and see if we can tease out any trends out of the compounds near or adjacent to the AMTL facility responsible for or correlated with the toxicity level observed on the Charles River.

This slide is also in the back of your handout. I understand it's a little hard to see on the half page, but I think it's on the last page in your handout. What it shows is that we have quite a few sediment sampling stations at reaches of the river in question. Overall, there are 47 stations. These are all surfacial sediment stations that we

1 reviewed some of the ecological risks. That's the horizon
2 or the layer of the sediment that's that the most concern to
3 the wildlife and benthic organisms in the study.
4 At 16 of these stations, we collected quite a bit
5 of data. All 47 of them had 7 points. At a subset of those
6 stations, we've got the biology data, and there are sediment
7 tox testing, bio accumulation in tissue studies, field
8 surveys of the health of the community that's making a
9 living at those stations, and those 16 stations were fairly
10 equally distributed upstream, adjacent, in the back channel
11 and downstream.
12 It's a pretty big study for a river in
13 Massachusetts. Again, it's not as exhaustive of some of the
14 huge Superfund studies, but for a site like this, that's a
15 lot of sampling stations.
16 This is just simply showing the sediment
17 chemistry. We had to collect large volumes of sediment for
18 some of the work that we did out here, gallons and gallons
19 of sediment to ship to various laboratories.
20 We actually brought out a marine going vessel, the
21 Ted Young dredge. It's a fairly sizable dredge and
22 collecting, using such a piece sizable piece of really
23 oceanographic equipment, we were able to get quite a bit of
24 sediment and the dredge itself, as they dig, it scraped that
25 6 inch veneer off the top of it and avoid having to go down

multiple times to dredge back up to the surface, and we -- it's a hazardous waste site, so our crew was dressed accordingly.

The sediment, at times, does have an oily sheen associated with it when pulled up. You could see boat traffic going through the river with the propwash sometimes stir up the sediment, and you can see the oily sheen, so we were concerned about the crew potentially getting exposed to this, you know, everything that was in the sediment, and basically, the sediment was homogenized in, in a stainless steel cafeteria equipment and shipped off to the laboratories.

Many compounds are present in the sediment. In general, at virtually all stations, upstream, downstream, adjacent, we would see screen values, EPA, DEP, NOAA and other sediment screen values. Across the board in the Charles River, the sediment is present in excess of the stream values, what we call low effect and severe effect thresholds.

When we look at the chemistry relative to upstream, which is of course, what you want to do, is ascertain whether the incremental increase in contamination near the site any different than upstream or other landscape.

In the bulk sediment chemistry, the straight data,

it is a little bit different. It's a little bit dirtier as you go down the river, and the problem with that analysis is the sediment composition changes as you go downriver. This tends to be a sandy gravel area that tends to be more of a depositional environ so it's hard to tease out what's coming from above versus what's coming from over here, so we did quite a bit of statistical analysis in conjunction with EPA's Las Vegas laboratory, and in the normalized sediments, when you looked at the sediment relative to organic compound or organic carbon or relative to the percent finds, it's one in the same data set. You really can't see any difference upstream and downstream, adjacent and so forth.

FROM THE FLOOR: Isn't the depositional due to runoff?

MR. BLEILER: I think it's more channelized up here because a lot of what's going on so you get the visual current velocity moving right through here and the sides are scoured the old Watertown land, and as the river widens up, it becomes more of a depositional environment.

FROM THE FLOOR: Another question I had is particularly about Spring runoffs. Doesn't the stuff just get covered up? I mean, there's a lot of silt in the springtime, so if you just look at the surface, the site the last 20 years, so hasn't it just been buried under the silt and the runoff?

MR. BLEILER: From a, it may well be. There may be issues of material down below. From an ecological risk perspective, which we were looking at, we were really looking at the surfacial areas, surfacial exposures there are some areas like up by the Newton Yacht Club, the storm drains are coming in, I think it's part of the road sand.

FROM THE FLOOR: I just want to know if you have considered other reference sites, whether upstream or downstream --

MR. DAVIS: As you go further up the Newton Yacht Club, it's really hard bony substrate and it's not depositional at all.

MR. BLEILER: It's probably, in terms of the sediment--

MR. DAVIS: Yes--

MR. BLEILER: --composition in this region where it starts to widen up, but it's still well above where the outfalls are the most useful in terms of --

MR. DAVIS: So, for example, when you're in an area of the river that's really sandy, regardless of what's gone by that area, the contaminants don't kind of bind to the sand.

As we get further down river, we get further depositional, and the reports from the USGS estimated that, since they put the new Charles River Dam in, you know, where

1 the Boston Museum of Science is, there's been 45 million
2 cubic yards of sediment that has settled in since the early
3 1900s.
4 I mean, we actually did it in our report, we took
5 a few measurements where it was a certain amount of fluff,
6 so obviously, some of the, you know, sediments, historic
7 sediments along the whole reach of the river.
8 MR. BLEILER: I'm going to try to go through some
9 of these slides fairly quickly. I know this is a working
10 aid for me at the public hearing, I don't know if you wanted
11 maybe to hold questions or see how it goes. We've got
12 another 8 or 10 slides to get through here, so I'll try to
13 do what I can.
14 The amphipod is a small invertebrate that we did
15 laboratory type specimens. We split a bucket of sediments
16 in an active chemistry lab, an active toxicity testing lab
17 and again, tried to see if there was any relationship
18 between chemistry and toxicity.
19 The amphipod are the small invertebrate that we
20 did laboratory tox testing. So we split a bucket of
21 sediment, half to a chemistry lab and half to a toxicity
22 testing lab and again, tried to see if there was any
23 relationship between chemistry and toxicity . We did a
24 similar study with midge larvae, little fly larvae and,
25 also, with fish, it was fat head minnow, fish in the

1 laboratory with sediment and evaluating sediment chemistry.
2 In terms of bio accumulation, we field collected fresh water
3 mussels, you know, floaters, they're called. They're a
4 common mussel you find in shells up and down on the banks of
5 the river and in gravel beds.
6 So we did a field collected bio accumulation
7 study. We also grew these worms for 28 days in the
8 laboratory. These sort of hyper accumulating worms so if
9 there is PCBs and metals in the sediment, these worms tend
10 to pick it up, it's a very conservative asset.
11 The results of this study indicate that the
12 sediment in the Charles River is somewhat toxic upstream,
13 downstream, adjacent to the site. It really doesn't matter
14 where you go in terms of the sampling reach. There are some
15 individual spaces that are more or less toxic, but in
16 general, the sediment is, I guess you could say, moderately
17 toxic. It's not as severe as you might expect, given the
18 chemistry.
19 The chemistry would suggest that you're probably
20 going to have some problems. In the laboratory, it's
21 moderately toxic, not as severe as you'd expect. And again,
22 relative to the various reaches of the river, it was
23 difficult to tease out any trends and all this tox testing
24 that we did upstream, downstream, adjacent is really one
25 data set.

1 This just shows the mussel tissue collection that
2 we did. We spent several days, long days, on the river with
3 this long-arm stainless steel rake raking the bottom of the
4 river for mussels. We collected a number of different
5 composite samples, three mussels per sample, to try to get a
6 sense of biological variability.
7 We tried to shoot for the same size in age class
8 for this fresh water mussel, the same species, scrubbed them
9 clean and sent them off to the chemistry laboratory. In
10 general, the mussels had extremely low levels of compounds
11 present in the tissue. We viewed worms in the laboratory,
12 likewise, extremely low levels of compounds present in the
13 tissue. Maybe not a huge surprise. You're not getting on
14 mercury side or PCB side where you have a lot of the bio
15 accumulative things like mercury, PBCs are at relatively low
16 levels.
17 We did some modeling to look at fin fish tissue.
18 The models that we used in Army's risk assessment were
19 actually a little bit more conservative than the data we
20 talked about earlier, that the PCB data from the field
21 collecting, a case study or two, three parts per million in
22 our models were more conservative than four or five, six
23 ppm.
24 So we felt comfortable that we were erring on the
25 conservative side relative to the fish tissue, and again, as

I mentioned earlier, we looked at wildlife consumers. We looked at racoons, muskrats, great blue heron, little to no risk to these organisms relative to either the sediment contamination or the ingestion of potentially contaminated tissue.

This is just miscellaneous photos. We got many, many photos from the site. The bottom of the Charles River is not pristine. There's a handgun that we pulled out with one of the mussel rakes.

MR. DAVIS: We turned it over to Watertown Police.

MR. BLEILER: Yes, turned it over to the police department.

That's the Charles River sampling crew. That's Ken Finkelstein from NOAA, that's actually a Corps of Engineers electro fishing boat that was used as observation platform. We had all kinds of guests, EPA, NOAA. I'll try to leave that out for Dave, he stayed out with us. We had quite a few people coming and going and had several observation boats, as well as the sampling boats.

The bug analysis that I mentioned, we collected sediment, sieved it in the field, preserved it in ethanol and shipped that off to the laboratory. It's a great way to get a sense of what's actually going on instead of some of the laboratory studies, this is an actual field program that looks at the health of community, diversity, pollution

1 sensitivity, pollution tolerance and what is actually
2 present at the site.
3 Sixteen stations were looked at. Again, just like
4 the tox testing, all reaches of the river were somewhat
5 impaired, although it changed. As the substrate changed
6 going downstream, we saw more and more worms coming in,
7 fewer and fewer insects coming in, and if you look at other
8 factors besides the contamination, you start seeing trends
9 where the grain size changes. You go from sort of a gravity
10 sandy substrate upstream to more of the black muck adjacent
11 and in the back channel, and the organic carbons, it's a
12 little bit, not quite as apparent, but again, you get humps
13 in the organic carbon as you get more into the depositional
14 environment.
15 So my guess is what you're saying is the actual
16 macroinvertebrate study and lesser reflections of
17 contamination and more reflection of substrate.
18 Sediment profile imaging. Again, this is kind of
19 a fun technology. It's an oceanographic technology where
20 you lower a camera into the sediment. It penetrates about
21 21 centimeters down and actually gets you a photograph of
22 the sediment. We did it as sort of a confirmatory study to
23 look at the actual insitu conditions, and we looked at the
24 same stage.
25 There's nothing we really looked at in risk

1 assessment, but you can see there's sediment in the water in
2 Phase 2. Some of these areas, we just really want to
3 confirm where we weren't seeing many macroinvertebrates, and
4 we went out and actually photographed and see a similar data
5 set, and yes, that's what we did see. See methane bubbles
6 throughout the system.
7 So in summary, the risk assessment completed a
8 couple months ago indicated, and signed off on by all the
9 agencies, that there are many compounds present that are
10 upstream, downstream, adjacent to the site.
11 The majority of them are causing concentrations
12 that are consistent with upstream conditions. The potential
13 for risk is present, however. Especially if you're in the
14 spectra of a macroinvertebrate that makes a living in close
15 contact with the sediment. But the potential for risk is
16 very similar upstream, downstream, adjacent. I really can't
17 pick out any smoking guns or trends or even the sort of
18 signature attribution from the AMTL site, and there
19 certainly is no increase to the back channel area where you
20 might expect there to be given that the majority of the
21 outfall went into the back channel.
22 And as a result of all of the risk assessments
23 that we've completed to date, the human health risk
24 assessment, the ecological risk assessment, the various
25 sediment studies, surface water studies, the Army has

1 recommended a no further action proposed plan.
2 It's been presented to the regulatory agencies at
3 this point, and I believe everyone is in agreement that as
4 Kymberlee and Craig indicated earlier, it's the best
5 approach going forward, thee's no further action planned.
6 The potential risks are even similar to go upstream,
7 downstream. It's really, really hard to tease out any rate
8 trends in the data set despite the 47 sampling stations that
9 we studied out here.
10 I think that's the end of the summary that I have
11 of the remedial investigation and the risk assessment work
12 completed to date. Mark, perhaps you can finish up with the
13 last piece--
14 MR. BRODOWICZ: Sure. As I mentioned earlier, the
15 no further action ROD being signed by the regulator, moving
16 up the five year review, and this is what we can see right
17 here, the five year review. It begins, again, examines the
18 effectiveness of the remedial solutions that we had in place
19 for the Charles River Park.
20 It was to be completed by March 2007. We moved
21 that up to 2006, and we will have, begin that draft this
22 summer, the portion that pertains to the Charles River Park
23 so that it can be agreed on by the regulators so that they
24 feel comfortable to authorize a no further action ROD.
25 That's the end of the slide.

1 Any questions on that one before we go to the next
2 one?
3 (No response.)
4 MR. BRODOWICZ: This brings up the final part of
5 the process here, which is why we're here. We're open for
6 your comments to the proposed plan in response to questions
7 you may have. It's a 30 day period by law. It started
8 May 1st. It ran in The Boston Globe, notified everybody,
9 The Watertown Tab, and--
10 MR. DAVIS: Boston Herald--
11 MR. BRODOWICZ: --and The Boston Herald.
12 MR. DAVIS: And The Boston Globe--
13 MR. BLEILER: --and The Boston Globe. Thank you.
14 We're looking for your comments, which is what
15 we'll do in the segment this evening after break. Again,
16 there's both, John and Robert mentioned, you can also, if
17 you don't comfortable asking questions here, this is so you
18 can provide comments and then stamp it and mail it. This is
19 also in the proposed plan as another way to communicate.
20 MR. DAVIS: Or provide comments and leave it with
21 us tonight.
22 MR. BLEILER: Or you can do it tonight when you're
23 doing that, and then there's also, you can contact Robert
24 Davis when you mail it to him.
25 MR. DAVIS: Yes, and the address is on the

proposed plan.

MR. BRODOWICZ: And as mentioned, the documents, they're all available for review at the Watertown Public Library. We have information on that, when it's open. Also -- yes, sir?

FROM THE FLOOR: Are you able to say what plans to review remediation are?

MR. BRODOWICZ: We've had two meetings already in the RAB, and we had a meeting back in January where we were looking at the projects, and then last month, we walked the banks of the Charles.

We have another meeting planned June 29th. We're hoping more people from the public will join us to go through that aspect of it, so we're working on this at the same time in conjunction with that. I can talk to you on the break with specifics to move us along here, but I'll answer those questions here.

Any other questions?

(No response.)

MR. BRODOWICZ: What we'll do is, we'll take a ten minute break, and then we'll have the second portion which is going to be the public hearing.

Oh, yes?

MS. FALKOFF: Why are we going to take a break?

MR. BRODOWICZ: Well, we can move it forward, if

1 you want to keep it moving, that's fine with me.

2 MS. FALKOFF: I'd rather keep moving.

3 MR. BRODOWICZ: All right. Well, I guess you do.

4 All right. The, we'll wait for Rob to get back. We'll call

5 the public hearing to order here as soon as he gets back.

6 (Pause.)

7

P U B L I C H E A R I N G

MS. FALKOFF: I'm Susan Falkoff. I'm the committee co-chair of the Restoration Advisory Board, and I have a few comments. I have a written comment letter from the RAB which I will present to you. I will read in a moment, but first I want to make some comments based on the presentation.

The first thing I want to say is, in your responsiveness summary, I hope that you know that "comment noted" is not an adequate response.

The second thing is there were some things that distressed me a great deal in your presentation, and I try to work with you guys, but you're supposed to be scientists, and when you do something that shows a real ignorance of scientific process, it really calls into question your competence to be doing this work.

When you say that the chemicals found in the Charles -- the pesticides found in the Charles River are likely not related to the AMTL operations, I know that your data does not support that conclusion, and it's not just that, okay, we'll change the language. It's really upsetting and offensive to me that you would say something so clearly untrue.

You spent a great deal of money cleaning up the

1 pesticides in the park. When we'd say, why were there so
2 many pesticides, the answer was always, oh, all the Army
3 bases used a lot of pesticides, they like green grass.
4 My next comment has to do with the fact that we've
5 told you before, the main library's closed, and it's a
6 question of competence that you can't get that fact into
7 this document. It is not true that you could go to 123 Main
8 Street and find those documents if there's a hole in the
9 ground there, and so you need to figure out where the
10 temporary location is. I'm not going to tell you. You
11 figure it out, and then you can figure out if the documents
12 are available there or not. I'm not sure.
13 Now, I'll read my statement. The statement is,
14 "Dear Mr. Brodowicz," I don't know if that's the correct
15 heading or not, you can correct that in the responsiveness
16 summary, "Thank you for the opportunity to review the
17 proposed plan for the Charles River Operable Unit of the
18 Watertown Arsenal Superfund Project. Our comments are as
19 follows:
20 "We are very concerned that the proposed plan does
21 not mention the Army's assurances that they will carry out a
22 restoration project to compensate in some way for the damage
23 that has been done to the river. Although the BERA study
24 did not result in clear definition of what the Army's impact
25 was, the Army has in the past admitted to being a

1 contributor to the contamination of the river.
2 "The fact that we are in an urban environment with
3 an industrial past making it more difficult to define the
4 impact of the AMTL should no penalize us or prevent us from
5 receiving compensatory action for what was done.
6 "Indeed, we believe the BERA did not clear the
7 AMTL of adverse impact. If the data are evaluated on a
8 reach specific basis, statistically significant differences
9 are not apparent; however, if the data are evaluated on a
10 sample specific basis, adverse effects are clear.
11 "Stations 2, 10, 16, 20 and 26 exhibited increased
12 chemistry, increased toxicity or both. While further study
13 may be able to identify attribution, we think the Army's
14 resources would be better spent on a restoration project.
15 "This was discussed at several RAB meetings and
16 received public support; however, the draft proposed plan
17 does not state clearly that a restoration project will be
18 done, what the restoration project entails or if sufficient
19 funding for it has been acquired.
20 "Are the specific actions that have been
21 discussed, for example, bank stabilization, still the Army's
22 plans for the Charles River Park area? And why should we
23 take it on faith?
24 "There has been discussion of a potential bank
25 stabilization project for the Charles River Park area, but

1 during the April 14, 2005, site walk of the Charles River
2 Park, it was not entirely clear what was being proposed as
3 part of the restoration project and what was required as
4 part of maintenance of the park to prevent contaminant
5 migration.
6 "It seems that most of the effort discussed as
7 part of the restoration project is something that is already
8 required. Please, clarify what is being done under each
9 category and explain the Army's commitment.
10 "We believe that the proposed plan should be
11 rewritten to include the Army's commitment to conduct the
12 restoration project. We strongly believe that the Army
13 should compensate the public for damages to the Charles
14 River resources as evidenced by the Army's data discussed
15 above, and we look forward to discussing the design of the
16 project with you in greater detail."
17 MR. STEADMAN: I'm Stephen Steadman. I just want
18 to repeat what I made in, the comment that I made during the
19 informational session. I mean, it's ten years since the
20 study was done, and there wasn't much activity at the
21 arsenal for the previous ten years, so we're talking about a
22 20 year, 20, 30 years, before any significant work was done
23 at the arsenal.
24 So during that time, you get all the sediment
25 being deposited on the bottom of the river, which has now

1 covered over the original contamination, so it's a little
2 bit of a, you know, cover-up, to say it that way, to say,
3 okay, well, we don't see anything now, so that means it's
4 not there.
5 So, I mean, I think the damage was done to the
6 river. I think that's why it was originally part of the
7 Superfund site. We waited a certain period of time, and now
8 it's covered up, but that doesn't really absolve the Army
9 really completely from the damage that was done.
10 MS. VON TSCHARNER: My name is Renata Von
11 Tscharner. I'm with the Charles River Conservancy, and I
12 addressed the letter to Mr. Davis.
13 "Dear Mr. Davis, I'm in receipt of April 2005
14 document entitled Proposed Plan, No Further Action Necessary
15 to Address Sediment Contamination in Charles River.
16 "As a member of the RAB who has attended several
17 meetings where restoration project in Squibnocket Park,
18 which I know you call the Charles River Park funded by the
19 Army was discussed.
20 "I was surprised not to find any reference to that
21 in the above-mentioned booklet. When you, RAB members and
22 many others visited the site, we looked at shoreline
23 restoration. Since the shoreline is crumbling in many
24 places, the toxins that were on the site and were then
25 buried in new soil, underneath new soil, could well be

leaking out into the river.

"I, therefore, recommend that this restoration effort be explicitly included in the Army's next steps and that this restoration effort also addresses the remediation of possible contamination from the eroding soil at Squibnocket Park."

MR. BRODOWICZ: Thank you.

MR. DEERING: My name is Charles Deering, and I am a resident of 508 Belmont Street, in Watertown, and I confess that I have not read all of the details of your studies, but there are a couple things that have jumped out at me that strike me as things that I don't understand.

In particular, I see a slide that refers to the human health risk assessment, and it says that several exposure pathways that we're considering, including consumption of fish, and then down below it, I see, "No unacceptable risks associated with exposure to surface water and sediment at the Charles River," no mention of consumption of fish.

It's my understanding that Mass. DEP and the Mass. Department of Public Health do not permit fishing for human consumption in the Charles River, and the reason for that is because of PCBs, and in addition, as far as I know, there is no body of fresh water in the Commonwealth of Massachusetts that is not subject to an advisory for mercury, and if Mass.

DEP and Mass. DPH wants to issue that advisory, stop generating new data.

So if the conclusion of the Army is that there's no risk for human health consumption, no risk to human health from consumption of fish in the Charles because there's no recent data on the fish, I think that's a great lapse in logic, and I object to the bullet saying that this conclusion has been approved by EPA and Mass. DEP because they know perfectly well it is not true.

Secondly, I do not believe that it is logical to say that, if you can't solve the whole problem, and there are other people who are responsible for the problem, as well as you, that the correct result is to do nothing, and I object to the Army proposing that conclusion, and I object to Mass. DEP and EPA purporting to endorse it.

Whether or not that's the ultimate result for the Charles River, I don't think that our state and federal agencies should accept that train of reasoning. I thoroughly object to that idea.

MR. BRODOWICZ: Thank you. Anyone else?

MR. HOFFMAN: My name is Charley Hoffman, and I'm the commodore of the Watertown Yacht Club presently, and I think there's a couple of other issues here.

I've been on this river around Watertown since about 1952 when my father joined that club, and they used to

1 anchor boats out there where it's now too shallow up in this
2 upper end where it widens up.
3 The river's filling in. Every day, the river's
4 filling in. The leaves, everything, sediment coming down.
5 It's filling in everywhere, and if it's ignored, we're not
6 going to have this asset down the road.
7 Now, I'm getting off on a little tangent here from
8 what you folks are trying to do, but I believe that there
9 is, that the contamination is underneath that sediment, to
10 start with, and it all ought to be taken out by a dredging
11 process, maybe bigger than just this area eventually, but
12 I'm not an expert in this area, but it's my understanding
13 that lakes and rivers fill in over time just because of
14 runoff, and I've seen this in my lifetime where you can,
15 it's not deep out there any more. There's hardly any water
16 out in this wide area.
17 Where the yacht club is, the back channel there,
18 fills up because we have like three drains that flow
19 continuously into the river right by the yacht club, and it
20 brings down sediment and stuff from God knows where because
21 I don't know where it starts from, but I'll tell you, when
22 it rains hard, there's one that comes out right in front of
23 the yacht club that has such a stream that it pushes it
24 right across the back channel to the island there, and all
25 of that river bed down there is filling up every day because

of that.

So, you know, I put that out as another concern that could be solved in part by a dredging operation that would make it a lot, the river a lot better down the road.

MS. MacFARLANE: I'm just going to echo some of Susan's -- sorry. I'm Allison MacFarlane, a member of the RAB, a resident of Watertown. I'm just going to echo some of Susan's statements.

And I know it's sort of too late now, but if you do look at these five stations, right, they're half of the, almost half, of the stations at which, if you look on this map, they're the blue triangles where you did all of the testing; right? And they're a third of your, almost a third, of your 16 stations where you looked at bio accumulation and all that fun stuff, which is a significant number. All right. And so it tells me that perhaps there's more going on here than you give credit to.

In addition, you know, as somebody pointed out earlier during the presentation, you did look only at the surface sediments, and if you really want to find the Army's impact, you would, of course, look deeper, and I think if you did, it would clearly be there.

I understand why you looked at the top, but nonetheless, the data is, you know, you still, you didn't find the fingerprints exactly, and you could have done it.

1 So I guess I would like to say that, again, the
2 Army didn't, this BERA report didn't clear the Army of
3 adverse impact, and therefore, I think it would be really
4 important to have spelled out very clearly, this is a
5 litigious society, and this is how we operate, exactly what
6 the plans are for a restoration project and what the funding
7 will be, where it will be acquired from and then present it
8 to us as if, to see if it's acceptable.
9 MR. BRODOWICZ: Anybody else?
10 (No response.)
11 MR. BRODOWICZ: And, again, we will accept all
12 your comments in writing or respond to every person's
13 question/comments in the response to comments down the road
14 here. Have we identified the schedule? That would come out
15 sometime in about 60 days? I have a calendar here. What
16 happens is the Army responds to the comments, sends them to
17 the EPA and then sends them out for public review; is that
18 correct? Or DEP, too, I'm sorry, EPA and DEP.
19 And then, so that takes a little bit of time, so
20 it normally takes about 30 days for the Army to get their
21 response, put it together, send it over for the EPA, DEP's
22 thoughts and comments just to make sure we're responding in
23 the way they, according to federal and state regulation, and
24 then we release that out to the public at that point.
25 Any other questions? Because I think we can

1 adjourn the meeting at this point if there's no other
2 comments.
3 (No response.)
4 MR. BRODOWICZ: Again, thank you so much for
5 coming. We really appreciate it and look forward to working
6 with you, and again, June 29th, a meeting here at 7:00 with
7 regards to restoration--
8 MR. DAVIS: With more details to follow.
9 MR. BRODOWICZ: With that, thank you so much,
10 again, for coming tonight, folks, and we look forward to
11 seeing you June 29th.
12 (Whereupon, at 8:26 p.m., May 16, 2005, the above
13 meeting was adjourned.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings before: MARK BRODOWICZ

In the Matter of:

PUBLIC HEARING RE:

PROPOSED PLAN
CHARLES RIVER OPERABLE UNIT
ARMY MATERIALS TECHNOLOGY LABORATORY
WATERTOWN, MASSACHUSETTS

Place: Watertown, Massachusetts

Date: May 16, 2005

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above entitled proceeding.

Eric Pedersen
May 16, 2005
Reporter
Date

Susan Hayes
June 16, 2005
Transcriber
Date