United States Environmental Protection Agency
New England
Office of Site Remediation and Restoration
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Enforcement-Sensitive Information Attached

Memorandum

Date: November 21, 2000

Subject: Request for Removal Action Housatonic River 1 ½-Mile Reach at the GE-Pittsfield/Housatonic River Site, Pittsfield, Massachusetts–**Action Memorandum and Exemption from the Statutory $2,000,000 and 12-Month Limits on Removal Actions**

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To: Mindy S. Lubber
Regional Administrator

I. Purpose

The purpose of this Action Memorandum is to request and document approval for the proposed removal action described herein for a 1 ½-mile portion of the Housatonic River at the GE-Pittsfield/Housatonic River Site, Pittsfield, Massachusetts. The proposed removal action will mitigate the human health and environmental threats posed by the existing levels of polychlorinated biphenyls ("PCBs") and other hazardous substances in this 1 ½ mile portion of the river. This Action Memorandum also requests and documents the approval of a "consistency" exemption from the $2 million and 12-month statutory limits for removal actions under the National Contingency Plan.

This Action Memorandum concerns the 1 ½ mile section of the East Branch of the Housatonic River and its riverbanks from Lyman Street, Pittsfield, Massachusetts to the confluence with the West Branch of the Housatonic River and is referred to in this Memorandum as the "1 ½ Mile Reach." The 1 ½ Mile Reach does not include the actual/potential lawns and other non-riverbank portions of the floodplain properties adjacent to this Reach. As discussed below, EPA and GE will jointly finance, and EPA will perform, the required removal action activities for the sediments and riverbanks in the 1 ½ Mile Reach. GE will conduct the required removal actions on the non-bank portions of the properties adjacent to the 1 ½ Mile Reach.

The ½ mile section of the East Branch of the Housatonic River including riverbanks from Newell Street to Lyman Street, which is located immediately upstream of the 1 ½ Mile Reach, is defined in this Memorandum as the "½ Mile Reach" or the "Upper ½ Mile Reach."

The 1 ½ Mile Reach is part of the larger GE-Pittsfield/Housatonic River Site, as defined by the Consent Decree (discussed below), which consists of the GE Plant Area, the Former Oxbow Areas, the Allendale School Property, the Housatonic River Floodplain - Current Residential Properties, the Housatonic River Floodplain - Non-Residential Properties, the Silver Lake Area, the Upper ½ Mile Reach, the 1 ½ Mile Reach, the Rest of the River (located downstream of the 1 ½ Mile Reach), and other properties or areas to the extent that they are areas to which waste materials that originated at the GE Plant Area have migrated and which are being investigated or remediated pursuant to the Consent Decree. As used in this Action Memorandum, the term "Site" shall refer to this overall GE-Pittsfield/Housatonic River Site as defined by the Consent Decree.

EPA has issued this Action Memorandum for a removal action to be performed by the EPA pursuant to a final Consent Decree in United States, et al. v. General Electric Company (D.Mass.) ("Consent Decree"). The Consent Decree memorializes an agreement to address releases and threats of releases of hazardous substances from GE's facility in Pittsfield, Massachusetts, including, but not limited to, the releases and threats of releases of hazardous substances addressed in this Action Memorandum. The U.S. District Court for the District of Massachusetts formally approved and entered the Consent Decree on October 27, 2000.

EPA will perform the removal action for the 1 ½ Mile Reach, with funding of the 1 ½ Mile Reach removal action being shared between GE and EPA based on the cost sharing procedures contained in Paragraph 103 of the Consent Decree.

II. 1 ½ Mile Reach Conditions and Background

CERCLIS ID #: MAD002084093
Site ID #: 0167

A. Description

1. History

On September 25, 1997, pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), as amended, 42 U.S.C. § 9605, EPA proposed the Site for inclusion onto the National Priorities List (NPL). The Site received a Hazard Ranking System score of 70.71.

On May 26, 1998, EPA Region I's Director of the Office of Site Remediation and Restoration issued a Combined Action and Engineering Evaluation/Cost Analysis ("EE/CA") Approval

Memorandum documenting the need for a removal action in both the Upper ½ Mile Reach and the 1 ½ Mile Reach. (Together these reaches are referred to as the "Upper Reach.")

The Combined Action and EE/CA Approval Memorandum specified certain source control actions and riverbank and sediment excavation activities in the Upper ½ Mile Reach.

The Combined Action and EE/CA Approval Memorandum also authorized EPA to conduct an EE/CA to determine the appropriate removal action activities for the 1 ½ Mile Reach. Figure 1 shows the 1 ½ Mile Reach and the general vicinity, including the location of the GE facility.

Pursuant to the Consent Decree, the parties have agreed that EPA and GE will jointly finance, and EPA will perform, the required removal action activities for the sediments and riverbanks in the 1 ½ Mile Reach and that GE will finance and conduct the required removal action activities in the adjacent floodplains. Accordingly, the 1 ½-Mile Reach does not include the actual/potential lawns and other non-riverbank portions of the floodplain properties adjacent to this Reach.

On August 4, 1999, EPA issued an Action Memorandum approving a number of response actions at the GE-Pittsfield/Housatonic River Site. Included in that August 4, 1999 Action Memorandum was the approval for disposal of contaminated soils, sediments, asphalt, and debris in the Hill 78 Consolidation Area, the Building 71 Consolidation Area, and, potentially, in an on-site consolidation area on the corner of New York Avenue and Merrill Road. Disposal in these On Plant Consolidation Areas (OPCAs) was approved for the response actions listed in the Action Memorandum, including the 1 ½ Mile Reach removal action. The August 4, 1999 Action Memorandum concluded that use of the OPCAs will not pose an unreasonable risk of injury to health or the environment.

2. *Removal Site Evaluation*

The Removal Site Evaluation consisted of a review of the existing reports submitted by GE, the results of sampling events conducted by EPA, and information gathered by EPA personnel during numerous site visits conducted over the past several years. A brief description of the 1 ½ Mile Reach and a summary of the contamination is presented in Section 3.

3. *Physical Location and Site Characteristics*

The GE facility in Pittsfield has historically been the major handler of PCBs in western Massachusetts. Although GE conducted many activities at the Pittsfield facility throughout the years, the activities of the Transformer Division were the likely primary source of PCB contamination. GE's Transformer Division activities included the construction and repair of electrical transformers using dielectric fluids, some of which contained PCBs (primarily Aroclors-1254 and -1260). GE manufactured and serviced electrical transformers containing PCBs at this facility from approximately 1932 through 1977.

The release of PCBs and other hazardous substances to the Housatonic River is mostly attributable to releases from sources located within the GE facility, Silver Lake, and Former Oxbows Areas. These releases have occurred due to surficial runoff, as well as discharge of contaminated groundwater and free product to the Housatonic River.

According to GE's reports, from 1932 through 1977, miscellaneous releases of PCBs reached the wastewater and storm systems associated with the facility and were subsequently conveyed to the East Branch of the Housatonic River and to Silver Lake.

During the 1940s, efforts to straighten portions of the East Branch of the Housatonic River by the City of Pittsfield and United States Army Corps of Engineers ("USACE") resulted in the isolation of 11 former oxbows from the river channel. These oxbows were filled, in part, with materials from GE that were later discovered to contain PCBs and other hazardous substances.

Potential sources of contamination to the Housatonic River are located on or near property currently or formerly operated by GE, including 11 former oxbows of the Housatonic River that have been landfilled with hazardous materials; soil contaminated with hazardous substances, including PCBs, Volatile Organic Compounds, and Semi-Volatile Organic Compounds, due to spills from a number of above-ground storage tanks, under-ground storage tanks, and facility oil pipelines currently or formerly located on GE property north of the Housatonic River in the vicinity of East Street; two landfills located on GE property; a former waste stabilization basin located adjacent to Unkamet Brook; the contaminated sediments and banks of Unkamet Brook itself; and Silver Lake, which has received contaminated stormwater runoff from the GE facility since the 1940s; as well as sediment in the Housatonic River itself. Additional potential sources of contamination, including numerous non-aqueous phase liquid ("NAPL") plumes, are cited in the May 1998 Combined Action and EE/CA Approval Memorandum. These potential sources will be addressed through the Consent Decree.

Contamination, particularly PCBs, has been detected in the sediments and soils of the 10-year floodplain of the Housatonic River downstream from the GE facility to the Connecticut state line and beyond. Analyses of samples collected upstream of the GE facility revealed trace or non-detectable concentrations of Aroclors-1254 or -1260 in the sediment. Beginning at the confluence of Unkamet Brook and the Housatonic River, either Aroclor-1254, or -1260, or both, as well as other hazardous substances, have been detected in samples collected at the GE facility, and from within the banks and floodplain of the Housatonic River. The highest concentrations of Aroclor-1254 and -1260 have been detected in the vicinity of the GE facility, downstream of the former Building 68 PCB spill, which is located just upstream of the Lyman Street Bridge.

The majority of Pittsfield's 46,000 residents reside within 1 mile of the Housatonic River and Unkamet Brook. The Housatonic River is used for recreation, including fishing, boating, and swimming. In both Massachusetts and Connecticut, fish consumption advisories are in place due to the elevated levels of PCBs. In Massachusetts, consumption advisories are also in place for frogs and turtles, and more recently ducks. The duck and fish PCB levels are among the highest in the country. Land use along the 1 ½ Mile Reach is somewhat variable, with residential and commercial uses the most predominant. For the purposes of the 1 ½ Mile Reach, however, only two land uses are considered: residential and recreational. Residential land use includes all properties that contain a building used as residences at least part of the year. All other properties including industrial, commercial, agricultural, or undeveloped open space are considered recreational because the banks can be easily accessed by recreational users. Recreational and residential uses vary widely between sub-reaches and between the East and West banks of the river. Based on footage of river frontage, the 1 ½ Mile Reach consists of approximately 34% residential property and 66% recreational property.

Anticipated future land uses within the 1 ½ Mile Reach are expected to remain constant. There is very little developable property remaining along this reach. The exception being Oxbows A and C which are currently zoned commercial. Remaining open space land along this reach is either undevelopable due to high steep banks or is a City owned park.

4. Release or Threatened Release into the Environment of a Hazardous Substance, or, Pollutant or Contaminant

The primary contaminants of concern in the 1 ½ Mile Reach are PCBs. PCBs are hazardous substances as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14). PCBs are present in soils, sediments, surface water, and groundwater at various portions of the 1 ½ Mile Reach. Therefore, a release into the environment of hazardous substances has already occurred. Other hazardous substances as defined by Section 101(14) of CERCLA that have been found in soil or sediment at the 1 ½ Mile Reach include, but are not limited to, 4,4-DDD, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd) pyrene, flouranthene, fluorene, benzo(g,h,i)perylene, phenanthrene, pyrene, lead, copper, antimony, beryllium, and nickel.

There continues to be a threat of additional releases of PCBs and other hazardous substances from the contaminated soils and NAPLs into the surface water and groundwater at the 1 ½ Mile Reach. River bank soil and river sediments within the 1 ½ Mile Reach are contaminated with PCBs. This soil and sediment also poses a threat of release into the river from erosion and/or sediment transport.

Based on sampling conducted during the 1 ½ Mile Reach investigations and contained in the *Final Draft Engineering Evaluation/Cost Analysis for the Upper Reach of the Housatonic River*, dated February 11, 2000 (the "EE/CA" or "EE/CA Report"), the 95% Upper Confidence Limit ("UCL") PCB concentration for sediments within the 1 ½ Mile Reach, by sub-reach and by depth, ranges from 0.3 parts per million ("ppm") to 649 ppm with an overall concentration of 19.8 ppm for all sub-reaches and depths. The 95% UCL PCB concentration for bank soils by sub-reach and by depth ranges from 4.9 ppm to 238 ppm. The total mass of PCBs in sediments within the 1 ½ Mile Reach is estimated at 1,702 kg with 91% estimated to be within the top 3 feet. The total mass of PCBs in the top three feet of bank soils is estimated at 1,440 kg.

5. NPL Status

As stated above, EPA proposed the Site for inclusion onto the NPL on September 25, 1997. As part of the Consent Decree, EPA has agreed to defer a final decision on the proposed listing subject to certain conditions, including GE's successful implementation of its obligations under the Consent Decree.

B. Other Actions to Date

GE has performed several Short-Term Measures relevant to the 1 ½-Mile Reach (also referred to as Immediate Response Actions), under oversight of the Massachusetts Department of Environmental Protection ("MA DEP"), in recent years. These actions include, but are not limited to the following: Excavation and off-site disposal of PCB-contaminated soils at portions of approximately twelve residential properties located adjacent to the 1 ½ Mile Reach; and excavation and off-site disposal of contaminated surface soils and the installation of a temporary soil cover at Oxbow C.

In addition, EPA has previously determined that CERCLA removal actions were warranted at the following portions of the Site:

The Building 68 Area/Upper ½-Mile Reach

On December 18, 1996, pursuant to Section 106 of CERCLA, EPA issued GE a Unilateral Administrative Order requiring the excavation of heavily contaminated riverbank soils and sediments from a 550-foot stretch of the Housatonic River adjacent to Building 68. From June 1997 through December of 1998, GE excavated and disposed of 12,640 tons of PCB-contaminated soils and sediments, and installed 180 feet of impermeable sheetpiling to limit the migration of DNAPL from entering the Housatonic River.

The "Upper Reach" of the Housatonic River (approximately two miles)

The May 26, 1998 Combined Action and EE/CA Approval Memorandum specified certain source control actions and riverbank and sediment excavation activities in the Upper ½ Mile Reach.

GE agreed to perform the required source control activities pursuant to the Consent Decree. From May 1998 through the present GE has conducted numerous subsurface investigations; installed approximately 485 linear feet of impermeable sheetpile along the riverbank at the East Street Area 2 - South area of the Site to supplement the existing groundwater/NAPL recovery well system and prevent Light Non-Aqueous Phase Liquid ("LNAPL") from discharging into the Housatonic River; installed approximately 105 linear feet of impermeable sheetpile along the riverbank at a second portion of the East Street Area 2 - South area of the Site to prevent the migration of DNAPL into the Housatonic River; installed an automated recovery system to remove DNAPL from the Newell Street II area of the Site; and has submitted a detailed design for the installation of impermeable sheetpile at the Lyman Street Area of the Site to supplement the existing groundwater/NAPL recovery well system and prevent LNAPL and DNAPL from discharging into the Housatonic River.

As part of the Consent Decree, GE agreed to perform the required riverbank and sediment excavation activities in the Upper ½ Mile Reach. GE submitted a Draft Work Plan in January 1999 and a Final Work Plan in August 1999 for the Upper ½-Mile Reach removal action. GE initiated the required removal action in the Upper ½ Mile Reach in October 1999 and has completed approximately 35% of the required activities.

C. State and Local Authorities' Roles

The Massachusetts and Connecticut Departments of Environmental Protection ("DEPs"), the Massachusetts and Connecticut Natural Resource Trustees and the City of Pittsfield were extensively involved with Consent Decree negotiations regarding the proposed removal action specified in this Action Memorandum. These agencies and the City of Pittsfield have been consulted and concur with and support EPA's decision to take a removal action in the 1 ½ Mile Reach, as signified by their signing of the Consent Decree. In addition, the Massachusetts DEP has concurred with the recommended alternative in a letter of support to EPA dated August 22, 2000. The Connecticut DEP has commented upon EPA's Recommended Alternative, in a letter dated August 29, 2000, and EPA has responded to these comments in its Responsiveness Summary.

III. Threats to Public Health or Welfare or the Environment

As described below, the conditions at the 1 ½ Mile Reach meet the general criteria for a removal action, as set forth in 40 C.F.R. § 300.415(b)(1), in that "there is a threat to public health or welfare of the United States or the environment." In addition, conditions present at the 1 ½ Mile Reach meet the specific criteria for a removal action set forth in 40 C.F.R. § 300.415(b)(2) as described below.

- **"Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants" [300.415(b)(2)(i)].**

Potential exposure to nearby humans from contaminated soil and sediments.

An "Evaluation of Human Health Risks from Exposure to Elevated Levels of PCBs in Housatonic River Sediments, Bank Soils and Floodplain Soils in Reaches 3-1 to 4-6" ("Human Health Risk Evaluation") was prepared on May 14, 1998 in support of the May 26, 1998 Combined Action and EE/CA Approval Memorandum. It should be noted that floodplain soils in the Human Health Risk Evaluation refers to residential and recreational properties beyond the top of bank, which are beyond the scope of the removal action selected in this Action

Memorandum. (In accordance with the Consent Decree, EPA will cleanup the river sediments and bank soil in the 1 ½ Mile Reach, and GE is responsible for cleanup of the adjacent floodplain soil.) The Human Health Risk Evaluation considered potential exposure of three different groups—youths (aged 9 to 18) who walk and play in and near the river on a regular basis (identified as youth trespassers), young children (aged 5 to 12) who contact PCBs in soils and sediments adjacent to their residence while playing or wading (identified as child waders), and very young children (aged 1 to 6 years) who contact PCBs in soils and sediments while playing at his or her residence and wading at the river's edge (identified as child residents). The Human Health Risk Evaluation evaluated the "Upper Reach", which includes both the Upper ½ Mile Reach and the 1 ½ Mile Reach, beginning at Newell Street and ending at the confluence of the East and West Branches.

Elevated levels of PCBs have been found in Housatonic River sediments and soils throughout the Upper Reach. According to the Human Health Risk Evaluation, PCBs have historically been detected in surficial sediments at levels as high as 905 ppm. In surficial riverbank soils, PCBs have been found at levels as high as 5800 ppm. PCBs have also been found at high levels (over 1,000 ppm) in subsurface sediments and bank soils throughout the area. Moreover, PCBs have been detected in surficial floodplain soils at levels as high as 160 ppm. The EE/CA sampling was conducted after the preparation of the Human Health Risk Evaluation; therefore, the analysis of the EE/CA samples was not considered in the risk evaluation. However, EE/CA sampling data are consistent with the data used in the Human Health Risk Evaluation.

The Human Health Risk Evaluation evaluated the potential cancer and noncancer risks from hypothetical exposure to PCBs in soils and sediments. Cancer risks for PCBs were evaluated using the 95% upper confidence limit of the linear-slope factor (or cancer slope factor) of 2 $(mg/kg/day)^{-1}$. Chronic noncancer risks were evaluated using the EPA-published Reference Dose ("RfD") of 2×10^{-5} mg/kg/day for Aroclor-1254. Reference doses for Aroclor-1254 were used because they are closest to being applicable to the type of PCB mixture found in the Housatonic River (Aroclors-1254 and -1260).

In the area of the river from Newell Street to Elm Street, exposure to PCB-contaminated soil was evaluated for a hypothetical youth trespasser (aged 9 to 18 years) who walks and plays 2 days per week in riverbank and floodplain soils from April to October. Exposure pathways that were evaluated included dermal absorption and incidental ingestion of PCBs.

From Elm Street to Dawes Avenue, exposure was evaluated for a hypothetical child wader (aged 5 to 12 years) who wades in the water and plays in floodplain and riverbank soils and sediments 5 days per week from June through August. Exposure for a child who plays in the riverbank and floodplain soils 5 days per week from April to October was also evaluated.

From Dawes Avenue to the confluence, exposure for a very young child (aged 1 to 6 years) was evaluated for contacting riverbank and floodplain soils and sediments at the water's edge while wading and hypothetically playing 5 times per week from June through August.

The following cancer and noncancer risks were calculated for each subreach in the Human Health Risk Evaluation:

Cancer and Noncancer Risks for Subreaches in the Human Health Risk Assessment

	Soil	Sediment
Newell Street to Elm Street		
Hazard Index (subchronic noncancer risk)	200	3
Hazard Index (chronic noncancer risk)	200	4
Excess Lifetime Cancer Risk	$1 x 10^{-3}$	2×10^{-5}
Elm Street to Dawes Avenue		
Hazard Index (subchronic noncancer risk)	70	200
Hazard Index (chronic noncancer risk)	90	100
Excess Lifetime Cancer Risk	$4 x 10^{-4}$	5×10^{-4}
Dawes Avenue to the Confluence		
Hazard Index (subchronic noncancer risk)	20	9
Hazard Index (chronic noncancer risk)	30	6
Excess Lifetime Cancer Risk	$7 x 10^{-5}$	2×10^{-5}

A hazard index greater than 1 is the threshold above which EPA can take an action based on noncancer health risks. As seen in the table above, chronic and subchronic hazard indices exceed this action level for all three subreaches within the Upper Reach. Further, EPA uses a cancer risk range of 10^{-4} to 10^{-6} as a target range within which the Agency strives to manage risks. In two of the subreaches evaluated, this level is exceeded.

The Human Health Risk Evaluation concludes that "short-term exposures to elevated levels of PCBs in Housatonic River floodplain soils, riverbank soils, and river sediments in Reaches 3-1 to 4-6 (Newell Street to the confluence) in Pittsfield, Massachusetts, present significant risks to human health".

The human health effects of some of the hazardous substances present in contaminated soil and sediment at the 1 ½ Mile Reach are presented below.

PCBs

The concentrations of PCBs present at the 1 ½ Mile Reach exceed or have the potential to exceed default standards and cleanup levels considered protective of public health including: the Massachusetts Contingency Plan Method 1 default standard of 2 ppm for both residential and industrial soils; EPA's PCB regulations at 40 C.F.R. Part 761 (10 ppm in residential areas— if capped, 25 ppm in industrial areas); and the risk-based preliminary remediation goals (1 ppm for residential areas, 10 to 25 ppm for industrial use) specified in EPA OSWER Directive 9355.4-01.

Numerous studies on the health effects of PCBs have been performed. PCBs have been demonstrated to cause a variety of adverse health effects, both carcinogenic and noncarcinogenic. These health effects include cancer, liver toxicity, reproductive toxicity, immuno-toxicity, dermal toxicity and endocrine effects. Studies of workers exposed to PCBs suggest that PCBs can cause skin irritations, such as acne and rashes, and cause irritation of the nose and lungs. Other reported human health effects include general weakness and respiratory symptoms (*Toxicological Profile for Polychlorinated Biphenyls, Draft for Public Comment (Update)*, by the U.S. Department of Health and Human Services/Agency for Toxic Substances and Disease Registry, September 1997 ("*ATSDR Toxicological Profile*")). There are also studies which have reported neurological, behavioral, and developmental abnormalities in children born to mothers who ate PCB-contaminated fish. However, in these studies, the mothers' exposures to PCBs were estimated and not measured directly (*ATSDR Toxicological Profile*). PCBs, at sufficiently high levels, have been shown to produce a wide variety of adverse effects in many test animals, including severe acne, liver, stomach and thyroid damage, and reproductive and developmental effects. Monkeys, which are physiologically more similar to humans than other animals, have developed adverse immunological and neurological effects, as well as skin and eye irritations after being fed PCBs. PCBs may cause similar health effects in people (*ATSDR Toxicological Profile*).

PCBs have also been found to cause cancer in animals. Based on the animal studies, the United States Department of Health and Human Services has determined that PCBs may reasonably be anticipated to be human carcinogens. Similarly, EPA classifies PCBs as a probable human carcinogen, and the International Agency for Research on Cancer has determined that PCBs are probably carcinogenic to humans (*ATSDR Toxicological Profile*).

Therefore, exposure to the high levels of PCBs present at the 1 ½ Mile Reach could increase both the cancer risk and non-cancer risk to area residents, workers, recreational users and trespassers.

Non-PCB Hazardous Substances

Characterization of non-PCB hazardous substances present at the 1 ½ Mile Reach was performed as part of the EE/CA investigations. Based on the sampling completed to date, there is potential for elevated levels of non-PCB hazardous substances to be present in soils and sediment at areas of the 1 ½ Mile Reach. Some of the more toxic compounds detected in soils at relevant areas of the 1 ½ Mile Reach and their potential effects to human health are:

Lead

Exposure can occur through dust inhalation and soil ingestion. Lead poisoning in children may cause brain damage, mental retardation, behavioral problems, and developmental delay. Lead exposure in adults may cause irritability, poor muscle coordination, nerve damage, and increased blood pressure. At high levels of exposure, lead can severely damage the brain and kidney in adults or children. Lead exposure may have effects on reproduction. Pregnant women exposed to lead may have premature births, smaller babies, or miscarriages. (*Toxicological Profile for Lead, Draft for Public Comment (Update)*, by the U.S. Department of Health and Human Services/Agency for Toxic Substances and Disease Registry, September 1997.)

Other Probable Human Carcinogens present in soils at the 1 ½ Mile Reach

The following hazardous substances present in soils at the 1 ½ Mile Reach are classified by EPA as probable human carcinogens: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd) pyrene.

Potential exposure to humans from consuming fish from the Housatonic River.

Appendix A to the Human Health Risk Evaluation evaluated the potential human health risks from consuming fish from the Housatonic River. Although in Massachusetts there is a fish consumption advisory for the Housatonic River in place for all fish species, there is no enforcement mechanism in the advisory and no monitoring of the advisory's effectiveness in preventing exposure. 37% of male and 31% of female Pittsfield residents surveyed by the Massachusetts Department of Public Health (MA DPH 1997) reported eating freshwater fish (not necessarily from the Housatonic River). The fish consumption advisory is communicated by a brochure distributed when individuals receive fishing licenses. In addition, the advisory is posted on some locations on the river. However, young people under 16 years old can fish without a license, and they may walk to and fish from locations that are not posted.

In 1994 and 1995, the National Biological Survey of the US Geological Survey ("USGS") collected largemouth bass from Woods Pond, the first impoundment 10 miles downstream from the 1 ½ Mile Reach, and analyzed the samples for PCB congeners as well as total PCB concentrations. Total PCB concentrations in whole fish ranged from a minimum of 27 ppm to a maximum of 206 ppm and averaged 100 ppm. Four additional samples in which only the fillet was analyzed ranged from 13 to 70 ppm PCBs. It was reasonable to use fish collected from Woods Pond in the evaluation of risk to humans consuming fish in the upper portions of the river, since other measurements of the concentrations of PCBs in fish tissue of fish captured closer to the GE facility (while not analyzed for congeners) demonstrated similar concentrations of total PCBs to those observed in Woods Pond.

The risk calculations for the adult angler and subsistence angler assume that the fish advisory currently in effect in Massachusetts for the Housatonic River is not adhered to. The calculations for the child angler represent the short-term PCB doses and risks that a child could receive during one summer of consuming contaminated fish caught between GE and Woods Pond Dam.

Adult Angler: To estimate risks to the adult angler, EPA used exposure assumptions that consider the amount of site data available and the site conditions. The exposure assumptions described below are reflective of the Reasonable Maximum Exposure ("RME") for adult residents who consume contaminated fish.

These calculations assume that an adult angler consumes a daily average of 26 grams of fish over the course of 365 days (Ebert et al., 1993). This could represent 3 or 4 (8-ounce) fish meals per month throughout the year or 7 (8-ounce) fish meals per month during the warmer months (April through October). A daily average of 26 grams represents the 95th percentile of fish consumption for all water bodies in Maine (Ebert et al., 1993). Because the Housatonic River is the largest water body in the region and an attractive resource, this value is appropriate.

Subsistence Angler: To estimate risks to the subsistence angler, EPA used exposure assumptions that consider the amount of site data available and the site conditions. The exposure assumptions described below are for a sensitive subpopulation that is highly exposed.

These calculations assume that a subsistence angler consumes a daily average of 140 grams of fish over the course of 365 days per year. This could represent 4 or 5 (8-ounce) fish meals per week during the year. The daily average of 140 grams per day was estimated by EPA Office of Water staff based on a review of the literature on fish consumption by Native Americans and subsistence anglers (EPA 1995). Given site conditions, this value is appropriate for subsistence anglers as a whole: a particular group or tribe of Native Americans may consume more fish. The body weight used in this evaluation is 70 kg, which represents the average body weight for and adult (EPA, 1989)

Child Angler: To estimate the subcronic risks to the child angler, EPA used exposure assumptions that consider the amount of site data available and the site conditions. The exposure assumptions described below are reflective of short term exposures and do not represent the RME.

These calculations assume that the child angler (age 9 years) consumes one small (6- or 7-ounce) fish meal per week during the summer months (June, July, August). EPA assumes 13 weeks per summer.

The one summer exposure period used in this evaluation is shorter than the 30-year exposure period (for cancer risks) typically evaluated by EPA as part of the RME. The purpose of this calculation is to examine whether short term exposures could provide enough dose and present enough risk, at some point later in life, to be a concern.

For fish ingestion for the child angler, EPA used 182.5 g/week. This is the same value for residential fish consumption mentioned above and adjusted to a weekly consumption rate (26g/day time 365 days/year divided by 52 week/year).

The body weight used in these calculations is 30 kg, which represents an average of the 50th percentile body weights for females age 9 years (DEP, 1995; EPA, 1989)

Cancer & Noncancer Risks From Consuming Fish From the Housatonic River

	Cancer Risk	Noncancer Risk
Adult Angler	5×10^{-02}	969
Subsistence Angler	2×10^{-01}	5219
Child Angler	9×10^{-04}	897

The cancer risks for the adult angler and the subsistence angler who consume PCB contaminated fish are two orders of magnitude (100 times) or more above the upper end of the EPA cancer risk range of 10^{-06} to 10^{-04}.

Even a child who consumes one fish meal per week over the course of one summer has a cancer risk from short term exposure which is nine times higher than the upper end of the EPA cancer risk range of 10^{-06} to 10^{-04}.

The chronic noncancer risks for the adult angler and the subsistence angler whom consume PCB contaminated fish are over 900 times the chronic Hazard Index of 1.

The noncancer risks (subchronic) for a child who consumes one fish meal a week over the course of one summer are over 800 times the chronic Hazard Index of 1.

The evaluation concludes that consuming fish from the Housatonic River, even for periods as short as one summer, presents a significant risk to human health.

- **"Actual or potential exposure to nearby human populations, <u>animals, or the food chain</u> from hazardous substances, pollutants or contaminants" [300.415(b)(2)(i)], and "Actual or potential contamination of drinking water supplies or <u>sensitive ecosystems</u>" [300.415(b)(2)(ii)].**

The ecological significance posed by exposure to elevated levels of PCBs in Upper Reach Housatonic River sediments, surface water, fish tissue, and avian and mammalian receptor modeling was documented in the May 1998 *Upper Reach—Housatonic River Ecological Risk Assessment* ("Ecological Risk Assessment"). The EE/CA sampling was conducted after preparation of the Ecological Risk Assessment; therefore, the analysis of the EE/CA samples was not considered in the risk assessment. However, the EE/CA sampling data are consistent with the data used in the Ecological Risk Assessment.

Seventy-two surface water samples (excluding duplicate samples) collected by GE as part of their surface water monitoring program were compared to EPA's chronic freshwater Ambient Water Quality Criteria (AWQC). Forty-three of these samples, collected in the 1 ½ Mile Reach between the Lyman Street Bridge and the Dawes Avenue Bridge, had detected concentrations of

PCBs, exceeding the chronic AWQC. During the 12-month period (June 1996 through May 1997) when these samples were collected, 9 out of 15 samples collected from the Elm Street Bridge exceeded the AWQC. By comparison, only 5 out of 14 samples collected during the same period at the location upstream of the Upper Reach exceeded the AWQC.

A total of 110 surficial sediment samples were collected in the Upper Reach. The Ontario Ministry of the Environment and Energy ("OMEE") sediment guidelines were used to evaluate potential effects of PCB contamination on the benthic (bottom dwelling) community within the Upper Reach. The lowest effect level (LEL) for PCBs was exceeded in 108 of 110 samples and the severe effect level (SEL) was exceeded in 70 of 110 samples. The SEL is a value at which pronounced disturbance of the sediment-dwelling community could be expected, affecting the majority of benthic species. Sediments with these concentrations are considered "heavily contaminated.

In the assessment, the National Oceanographic and Atmospheric Administration (NOAA) Effect Range-Low (ER-L) and Effect Range-Median (ER-M) were used to supplement the evaluation performed with the OMEE guidelines. At all 110 sampling locations PCB concentrations exceeded the NOAA ER-L guideline and 106 of 110 samples exceeded NOAA's ER-M guideline. The ER-L is a concentration equivalent to the lower 10th percentile of the range of reported values associated with biological effects, a concentration below which effects were rarely observed. The ER-M represents the 50th percentile of the data in which effects were observed, a concentration above which adverse effects were frequently or always observed or predicted with most aquatic species tested (Long, et al.).

Application of EPA's sediment quality guideline calculations for PCBs using the equilibrium partitioning methodology resulted in 108 exceedences in the 110 samples.

Fish sampling in the Housatonic River has confirmed that there is an actual exposure of "animals and the food chain" to PCBs. The average concentration of PCBs in adult largemouth bass in Woods Pond (which is approximately 10 miles downstream of the Upper Reach) observed in historical data is 87 ppm, and range from 13.2 to 206 ppm. Young-of-the-year fish (less than one year old) that were collected by GE in 1994 and 1996 in the vicinity of New Lenox Road (approximately 5 miles downstream of the Upper Reach) had concentrations of PCBs ranging from 21 to 36 ppm. As a point of reference, the U.S. Food and Drug Administration action level for fish tissue for human consumption (not risk based) is 2 ppm.

It has been extensively documented in the peer-reviewed literature that PCBs in the ecosystem may cause a variety of adverse effects to ecological receptors including: death, birth defects, reproductive failure and impairment, liver damage, tumors, behavioral modifications (such as abandonment of nest building activities), and a "wasting" syndrome.

An evaluation of the potential effects of exposure to PCBs was performed for the kingfisher, great blue heron, and river otter. Both the kingfisher and the heron have been observed in the Upper Reach, and the sole siting of otter sign (observed in the Rest of River study area above Woods Pond) was observed immediately below the confluence of the East and West Branches, just outside the Upper Reach.

Comparison of the estimated doses of PCBs to the kingfisher and the great blue heron foraging the Upper Reach with levels observed to cause effects in avian toxicity studies of Aroclor-1254 indicated an exceedance of reproductive Lowest Observed Adverse Effect Levels ("LOAELs") derived for the kingfisher and great blue heron. The estimated daily dose of PCBs exceeded the reproductive LOAEL by approximately a factor of three for the great blue heron and a factor of four for the kingfisher. Comparison of the estimated doses of PCBs to the river otter foraging in the Upper Reach with mammalian toxicity studies of Aroclor-1254 indicated that many of the Reference Toxicity Values (based on reproductive endpoints) were exceeded. The potential for ecological effects to occur in avian species using the Upper Reach is considered possible to probable, and for semiaquatic mammalian species is considered likely.

Furthermore, the Ecological Risk Assessment states that as a result of PCB contamination, the potential for adverse effects on the fish, birds (e.g., kingfisher and blue heron), and semiaquatic mammals (e.g., the river otter) in the Upper Reach is likely.

The presence of high levels of PCBs in these sensitive ecosystems (i.e., water bodies) coupled with the literature-documented adverse effects of PCBs on ecological receptors, indicates there is a current or potential threat to the environment in both the ½ Mile Reach and the 1 ½ Mile Reach.

- **"High levels of hazardous substances or pollutants or contaminants in soil largely at or near the surface, that may migrate" [300.415(b)(2)(iv)] and "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released" [300.415(b)(2)(v)].**

A total of 764 sediment samples were collected from the 1 ½ Mile Reach for the EE/CA investigation including 82 by GE between July 1980 and May 1996, and 682 by EPA under an interagency agreement with the USACE between October 1998 and July 1999. The GE samples were collected from random locations in response to various EPA and MADEP directives and were analyzed for total PCBs and in some cases, selected Aroclors. The EPA/USACE sediment sampling program included collecting samples for chemical and physical analysis at 100-ft intervals (transects) along the axis of the river, where possible, throughout the 1 ½ Mile Reach. Samples were collected at three approximately equidistant points on every transect (right side, mid-channel, and left side). Samples were collected at 6 inch intervals to a depth of 2 feet. Additional samples were collected at selected locations to maximum depths obtainable with manual equipment.

In addition, the EE/CA investigation used riverbank soil data collected under three programs: historical GE data collected between August 1992 and July 1996; samples collected by EPA under the Superfund Technical Assistance and Response Team (START) contract between September and December 1998; and those collected by EPA under the interagency agreement with USACE during October and November 1998. A total of 1,523 samples were collected from the riverbanks for the EE/CA investigation, including 38 collected by GE, 791 collected by EPA-START, and 694 collected by EPA under the interagency agreement with USACE. EPA/USACE riverbank samples were collected along the same 100-ft transects used for sediment sampling. EPA-START collected samples along the bank in a manner similar to that performed by EPA/USACE. However, EPA-START collected samples primarily on the banks of residential properties and collected samples at transects at intervals of less than 100-ft spacing. Sampling locations on the transect included:

Bottom of bank (water's edge).
Midbank.
Top of bank.

Samples were collected perpendicular to the slope of the riverbank at depths of 0 to 0.5, 1 to 1.5, and 2 to 2.5 feet and analyzed for PCBs.

The distribution of total PCBs in sediment and riverbank soils was assessed in accordance with the EPA OSWER *Supplemental Guidance to Risk Assessment Guidance for Superfund (RAGS): Calculating the Concentration Term*. The arithmetic average and 95% Upper Confidence Limits (UCLs) for sediment were calculated for specific depth intervals within each subreach. The 95% UCL PCB concentration by subreach in the 0-1 foot depth of sediments ranged from 13.2 ppm to 649 ppm with a concentration of 25.7 ppm over the entire 1 ½ Mile Reach. For the 1 - 2 foot depth, the 95% UCL PCB concentration was calculated at 33 ppm. These concentrations correspond to an estimated PCB mass of 495 kg in the 0 - 1 foot depth and 877 kg in the 1 -2 foot depth of the sediments. For riverbanks, the 95% UCL concentration for the 0 - 1 foot depth (surface/near surface) ranges from 13 ppm to 117 ppm. Concentrations in the 1 - 3 foot depth ranged from 5 ppm to 566 ppm.

The PCB contamination in the 0-1 foot depth interval of riverbank soils are most susceptible to erosion during rain storms and/or snow melt. However, as evidenced in certain areas of the river within the 1 ½ Mile Reach, severe undercutting of the riverbank has occurred exposing PCB contamination from the deep soil intervals. PCB contaminated soils eroded from the riverbank are carried away by the river current and eventually settle out either in the riverbed or are deposited on floodplains downstream. Similar PCB migration problems exist for the PCBs in the sediments. The Housatonic River is characterized as a very "flashy" river. The average daily flow within the 1 ½ Mile Reach is approximately 60 cubic feet per second. This flow can quickly increase to over 4,000 cubic feet per second during storm events.

IV. Endangerment Determination

Actual or threatened releases of hazardous substances from the 1 ½ Mile Reach, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

V. Exemption From Statutory Limits

The removal action recommended in this Action Memorandum meets the requirements of CERCLA Section 104(c): a response action continued beyond twelve months and valued at over $2 million that is otherwise appropriate and consistent with the remedial action to be taken at the Site. No additional remedial activities are expected to be performed in the 1 ½ Mile Reach. However, EPA is evaluating the need for, and the extent of, remedial actions in the Rest of the River (as defined by the Consent Decree) below the confluence of the East and West branches of the river. Excavating and removing contaminated sediment and riverbank soil upstream in the 1 ½ Mile Reach will not interfere with likely remedial alternatives to address sediment and soil contamination downstream. Accordingly, this response action is consistent with the remedial action to be taken at the Site. This removal action is also appropriate because the migration of contaminants further downstream will be minimized. The Proposed Action will contribute to the efficient, cost-effective performance of a long-term remedial action for the Housatonic River.

VI. Proposed Action and Estimated Costs

A. Proposed Action

1. Proposed Action Description

The May 26, 1998 Combined Action and EE/CA Approval Memorandum demonstrated that high levels of PCBs were detected in surficial sediments, bank soils, and floodplain samples throughout the 1 ½ Mile Reach. Based upon the threat posed by such contamination, the following removal action objectives were established for the 1 ½ Mile Reach:

- Remove, treat, and/or manage PCB-contaminated river sediments to prevent human exposures exceeding risk-based levels by the dermal adsorption and incidental ingestion routes.

- Remove, treat, and/or manage PCB-contaminated river sediments to prevent ecological exposures exceeding risk-based levels.

- Remove, treat, and/or manage PCB-contaminated riverbank soils to prevent human exposures exceeding risk-based levels by the dermal adsorption and incidental ingestion routes.

- Remove, treat, and/or manage PCB-contaminated riverbank soils to prevent ecological exposures exceeding risk-based levels.

- Eliminate or mitigate existing riverbank soil and sediment sources of contamination to the 1 ½ Mile Reach of the Housatonic River.

- Prevent recontamination of previously remediated areas and further contamination of other areas.

- Prevent the downstream migration of contaminated sediments and bank soils.

- Minimize long- and short-term impacts on wetland and floodplain areas.

- Enhance habitat (riparian and aquatic) in a manner consistent with the above objectives.

The 1 ½ Mile Reach habitat restoration objectives are listed below and are similar to those established by the natural resource trustees for Connecticut and Massachusetts, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (the "Natural Resource Trustees") for the Upper ½-Mile Reach.

- Implement the removal action for the 1 ½ Mile Reach as approved by EPA.

- Perform the restoration, including the enhancement of the river sediment and bank habitat, in accordance with the Consent Decree, to increase the diversity and productivity of the biological community.

- Restore the riverbank to provide overlying cover, in accordance with the Consent Decree, and to enhance the bank vegetation by reestablishing plantings using native species.

- Minimize the potential for erosion of residual PCB-containing bank soils and river sediments that would result in recontamination of river sediments or transport of PCBs, and which could impair the river restoration by adversely impacting the ecological receptors.

Contaminated soils and sediments response actions

Removal activities are limited to riverbank soils and sediments in the 1½-Mile Reach. As discussed previously, GE is responsible for cleanup of residential and recreational properties beyond the top of bank. For the purpose of this Action Memorandum, the top of the bank is defined as the highest point of the bank slope where the "slope breaks down."

The 1 ½ Mile Reach is composed of many individual residential, commercial, and recreational properties that abut the Housatonic River. Long-term maintenance of the riverbanks within this reach is necessary to meet the removal action objectives of eliminating or mitigating existing riverbank sources of contamination and preventing the downstream migration of contaminated bank soils. Because the 1 ½ Mile Reach is made up of many individual properties, long-term maintenance following the removal action will involve significant access issues. In addition, if maintenance inspections identify areas where riverbanks must be repaired to prevent downstream migration of contamination, further neighborhood disruptions will occur. The cleanup criteria identified below, the use of the 95% UCL to determine removal limits, and the restoration plans reflect the desire to reduce the level of the effort required for long-term inspection and maintenance of the banks.

Riverbank Soils PCB Cleanup Criteria

The cleanup criteria for total PCBs in bank soils in the 1 ½ Mile Reach are based on human and ecological exposure exceeding risk-based levels and are as follows:

> Riverbank soils adjacent to recreational or commercial properties are classified as recreational use. The recreational use cleanup criteria will be 10 ppm in the top 3 feet. In areas where there is a potential for future exposures that are inconsistent with recreational use (e.g., future residential use) or where exposures may occur at depths greater than 3 feet, Environmental Restrictions and Easements (EREs) will be obtained. The rationale for the criteria of 10 ppm in the top three feet for "recreational" property is based, in part, on protection of ecological receptors. The critical ecological receptors of concern from exposure to PCB contaminated riverbank soils include small mammals such as shrews and moles that typically have small foraging areas (e.g. as small as one-fifth an acre), and other larger mammals that burrow and den in and on the banks. In the 1 ½ Mile Reach numerous species of large burrowing and den-building mammals have been noted, including beaver, muskrat, woodchuck, fox, racoon, and skunk. The cleanup of 10 ppm in the top 3 feet is expected to be fully protective for ecological receptors including those deep burrowing species without additional precautions for risk reduction. In addition to protection of ecological receptors, the criteria of 10 ppm in the top 3 feet for "recreational" property is based on reducing human health exposures, reducing long-term inspection and maintenance within this reach and minimizing the potential for erosion of residual PCB-containing bank soil that could result in re-contamination of river sediments or impact down stream ecological receptors. In establishing a PCB cleanup standard of 10 ppm in the top three feet for all bank areas that are not in residential use, EPA has considered the Human Health Risk Evaluation. Cleanup to a depth of 3 feet on recreational property is consistent with the cleanup standard contained in the Consent Decree.

Riverbanks on residential properties will be remediated to the residential use criterion of 2 ppm to a depth of 3 feet and to an average of 10 ppm below 3 feet to a maximum of 15 feet (as calculated in the EE/CA Report) or to the groundwater table whichever is less. The cleanup standard of 2 ppm is the Massachusetts DEP's default standard for Method 1 soils (unrestricted use). Because existing laws and regulations restrict excavation of riverbanks, EPA and MADEP agree that applying the residential cleanup goal of 2 ppm below 3 feet in the riverbanks is overly conservative, due to the reduced potential for human exposure. Rather, applying a recreational type exposure scenario to residential bank soils below 3 feet is more indicative of the exposures that could be expected and is consistent with the removal action objectives described earlier. Therefore, residential bank soils below 3 feet will be cleaned up to meet an average PCB concentration of 10 ppm and a not to exceed concentration for any one sample of 50 ppm.

The following table summarizes the cleanup criteria for riverbank soils:

Areas	**Cleanup Level**		**Excess Cancer Risk**	**Hazard Quotient**
	Concentration (PPM)	Depth (ft)		
Recreational	10	0 - 3	$7 X 10^{-6}$	1.4
Residential	2 10	0 - 3 3 - 15*	$4 X 10^{-6}$ $7 X 10^{-6}$	0.8 1.4

* maximum depth of 15 feet or to the groundwater table whichever is less.

The risk justification and calculations associated with these cleanup standards can be found in the August 4, 1999 risk justification memorandum found in Appendix D to the Consent Decree (Attachment A hereto).

Sediment PCB Cleanup Criteria

Sediment is defined as the material below the mean annual high-water line. Above the mean annual high-water line, the soils are defined as riverbank soils.

The cleanup objective for sediments is to prevent human and ecological exposure to PCB levels that present unacceptable risks. In order to meet that objective, EPA considered the exposure pathways of direct contact and ingestion of sediments by humans and potential adverse effects to ecological receptors.

For protection against adverse effects to ecological receptors, EPA considered various sediment quality guidelines including NOAA standards, OMEE standards, and a level calculated using EPA's draft Sediment Quality Guidelines (SQG) approach (utilizing equilibrium partitioning theory). These guidelines represent a range of PCB concentrations from approximately .03 ppm to 5.7 ppm that could result in adverse effects to ecological receptors. EPA's SQG approach, which incorporates site specific inputs into the calculation, results in a level of .08 ppm. (See EPA's February 2000 Memorandum, Attachment B hereto.

In order to protect against exposure to humans, EPA also had to consider that certain areas of the 1 ½ Mile Reach as subject to residential exposures. The Consent Decree established a performance standard of 2 ppm for residential exposures and provides that this 2 ppm standard meets the protectiveness goals in the NCP for both cancer and non-cancer effects. The risk justification and calculations associated with this level can be found in the August 4, 1999 risk justification memorandum found in Appendix D to the Consent Decree (Attachment A hereto).

Therefore, EPA determined that a cleanup goal below 2 ppm, and approaching .08 ppm, would be appropriate for protecting against both adverse ecological and human health effects. A level of 1 ppm (as opposed to a lower guideline value) was used in the design and evaluation of EE/CA alternatives in recognition of the fact that, even using 1 ppm, the entire 1 ½ Mile Reach would be excavated to depths of at least 2 feet and backfilled with at least 2 feet of clean material, effectively reducing exposure to only those levels that can be detected in the clean backfill (estimated at .075 ppm for analysis at a fixed off-site laboratory). Even should mixing of clean backfill and residual sediments (generally less than 1 ppm) occur, the resulting concentrations would remain well below 1 ppm.

EPA believes that the utilization of the 1 ppm action level, coupled with the replacement of contaminated sediments with clean (non-detect PCB levels) backfill material, will result in PCB levels that are protective of humans, aquatic life, piscivorous birds, and mammals. In addition, in the long term, EPA also believes this action level to be an important step in reducing the PCB concentration in fish and contribute to the overall site-wide strategy of reducing human exposure to PCBs from fish consumption.

PCB contamination shall be removed based on the 95% Upper Confidence Limit (UCL) of the mean PCB concentrations in the sediments and bank soils, except for riverbanks below 3-feet on residential properties, which will be removed based upon an average concentration and a not-to-exceed limit. The 95% UCL was calculated in accordance with the procedures outlined in *Supplemental Guidance to RAGS: Calculating the Concentration Term* (99-0003). Use of the 95% UCL is based on the goal of providing a reasonable level of assurance that material exceeding applicable standards has been removed where data tend to be variable in space and time.

Riverbank and Sediment Appendix IX Cleanup Criteria

In addition to ecological risks and human health risks from fish consumption calculated using PCB sampling results, risks posed by Appendix IX compounds were evaluated. The Consent Decree sets forth an agreed upon procedure GE must follow for evaluating and removing

Appendix IX contamination. Since GE is responsible for cleanup actions beyond the banks in the 1 ½ Mile Reach, for consistency, a similar approach is also applied for the 1 ½ Mile Reach banks and sediments. Where Appendix IX contamination is not co-located with PCB contamination, the limits of the PCB excavation will be extended to remove exceedences for the Appendix IX contaminants.

For sediments, the Appendix IX data were compared against three screening criteria: Massachusetts Contingency Plan ("MCP") S-2 Soil Standards, OMEE Lowest Effect Level ("LEL") values, and OMEE Severe Effect Level ("SEL") values. The OMEE Sediment Quality Guidelines define three levels of chronic effects on benthic organisms. The no-effect level is defined as the level at which no toxic effects have been observed on aquatic organisms and food chain biomagnification is not expected. The LEL indicates a level of sediment contamination that can be tolerated by most benthic organisms. The SEL indicates a level of contamination at which pronounced disturbance of sediment-dwelling organisms will occur and the contaminant concentration will be detrimental to the majority of benthic species (Persaud, et al., 99-0015). For this assessment, both LELs and SELs were used to assist in evaluating potential effects on the benthic community. The comparison was made on a subreach basis and used the average concentration for each parameter (calculated using half the detection level in the case of a non-detect). Analytical data indicate that Appendix IX contamination exceeding the sediment criterion is predominantly co-located with PCB contamination and will be mitigated by the removal of PCB-contaminated sediment.

For riverbank soils, samples were compared to EPA Region IX Preliminary Remediation Goals ("PRGs"), background concentrations, and MCP S-2 soil cleanup standards. The comparison was made on an individual sample basis. The observed concentration for each parameter was compared to the PRG. If the observed concentration exceeded the PRG, it was compared to the average background concentration and the maximum background concentration. If the observed concentration exceeded both background values (average and maximum), or if the observed concentration exceeded either background concentration by greater than 150%, the result was compared to the MCP S-2 soil cleanup standards. Compounds that failed the background comparison and the comparison to MCP S-2 soil cleanup standards were flagged as requiring remediation. Except for some riverbank soils in five subreaches (totaling approximately 1,500 yd^3), Appendix IX contamination in riverbank soil is also co-located with PCB contamination.

Proposed Action

The Proposed Action consists of the excavation and disposal of approximately 95,000 cubic yards of contaminated sediment and riverbank soil. The excavated areas will be backfilled with clean material. The remediation will consist of Sheetpiling and Pump Bypass (modified Base Alternative 2 of the EE/CA). Disposal will consist of consolidation of 50,000 cubic yards of contaminated soil and sediment at the GE On Plant Consolidation Areas ("OPCAs"), which were the subject of EPA's August 4, 1999 Action Memorandum, with off-site disposal of the excess material (Option A). The Proposed Action was chosen based on what the Region believes to be the most effective and efficient approach to remediation in the 1 ½ Mile Reach based on existing data. In addition to the Proposed Action, an excavation alternative is also recommended for the lower stretch of river below approximately Transect 168: pump bypass. The excavation alternative will allow EPA the flexibility to adjust field operations to take advantage of its contractor's capabilities and experiences as well as experiences gained in observing the removal action in the Upper ½ Mile Reach currently being performed by GE. The excavation alternative would be implemented in the instance where the contractor can show, after EPA approval, that the alternate excavation method is a more effective and efficient approach to remediation. In addition to the proposed excavation activities, the Proposed Action also includes activities to minimize potential contaminant migration into the river from surface water run-off, drainage swale erosion and riverbank erosion. These activities include, but are not limited to, the construction of settling basins, overflow weirs and the lining of drainage swales with rip rap.

The Proposed Action is a modified version of Base Alternative 2. Beginning at the Lyman Street Bridge, sheetpiling will be installed in the river to prevent water flow to the areas/cells to be excavated from Transect 64 and continue downstream to approximately Transect 96 (Figure 2). Since sheeting cannot be installed under the Lyman Street Bridge, wet excavation, with in-stream diversion, is proposed only for excavation under the bridge. Sheetpiling is proposed for this section primarily because the river abuts Oxbows A, B and C. These Oxbows were filled with material, some of which came from GE, and are contaminated with PCBs. (GE is required under the Consent Decree to further characterize the extent of contamination in these Oxbows.) Between June 13, 2000 and July 21, 2000, EPA advanced a total of 51 soil borings along the base of the riverbank to evaluate the presence of NAPL in the vicinity of these former oxbows. This investigation and the results are presented in the EE/CA Addendum. Of the 51 borings, 19 were completed as piezometers to assess the possible presence of free-phase (i.e., pure liquid) NAPL. Evidence of NAPL, such as a slight sheen or odor, was observed in 4 of the 20 piezometers, however, free-phase NAPL volumes, sufficient to collect a sample, were not found. Based on this information, no significant impacts due to free-phase NAPL are expected. Although sampling results to date give no indication that free-phase NAPL is present in the area of Oxbows A, B and C, based on conditions encountered during the removal activities in the Upper ½ Mile Reach, the potential still exists for encountering isolated pockets of NAPL rather than widespread areas of NAPL. The Region believes that sheetpiling will provide better excavation control in the smaller cells if an isolated pocket of NAPL is found and that sheetpiling is appropriate in this portion of the 1 ½ Mile Reach.

Pump bypass will be used from approximately Transect 96 to approximately Transect 168, because it is the alternative that best accommodates the difficult conditions of this portion of the 1 ½ Mile Reach. From approximately Transect 96 down to the Elm Street Bridge, the eastern banks are very high and steep. Access along this bank is also limited due to the homes and businesses making it virtually impossible to install sheetpiling or excavate from the top of bank on this side. Although the bank on the west side of the river is lower with a more moderate slope, installation of sheetpiling on the west side will greatly impact an existing business (supermarket). Bedrock below the river bed also appears to be rising toward the surface in this section of the river which further complicates the use of sheetpiling. The section of river below the Elm Street Bridge to about Transect 154 is characterized by the abundant cobbles that cover the streambed (cobble reach). Flow in this section of the river is swift. The streambed elevation drops about 8 feet in this section compared to only 10 feet over the entire 1 ½ Mile Reach. Except for some deeper pockets, bedrock in this section is about 2 feet below the streambed. Because of the shallow depth to bedrock, sheetpiling this section is not possible. Water depths range from 1 - 4 feet and sediment thicknesses range from 0 - 2 feet, except in the deeper pockets where it can exceed 4 feet.

While sampling banks and sediment in June 1999 for the EE/CA Report, NAPL was observed coming off the west bank at approximately Transect 122. Analysis of this material showed no detectable PCBs. It must be noted, however, that there was an increased detection limit on the PCB analysis because of the presence of the oil. The analysis did indicate that the material was probably a residual from the thermal production of gas. Further investigations were conducted as part of the EE/CA Addendum to determine the nature and extent of this NAPL source. During these additional investigations, a total of 20 test plots were excavated from just upstream of the Elm Street Bridge to just below Transect 158. Based on the visual observations of soil staining, sheens, or the suspected presence of NAPL, the sediment was mixed with Sudan IV dye. The dye changes color if NAPL is present in the sample. Indications of the possible presence of NAPL were observed in 16 out of the twenty test plots. Six piezometers were installed to assess the presence of free phase NAPL. Free phase NAPL was encountered in one piezometer but was too viscous to collect a sample. Based on the results of the additional investigations, EPA anticipates that extra precautions will be necessary during excavation in the Cobble Reach to control the migration of NAPL. All free phase NAPL collected will be disposed of at an approved off-site disposal facility. No NAPL will be disposed in either of the GE On Plant Consolidation Areas. Off-site disposal of sediments saturated or significantly contaminated by NAPL may be required.

From Transect 154 to Transect 168, the river consists of residential properties on both sides. Sheetpiling is not recommended between these transects because of the limited access. Access requirements for pumping bypass are less than for sheetpiling and, therefore, will result in slightly less impact to the residents. Although wet excavation is possible for this section, this option presents a greater risk of allowing sediments to migrate downstream and is not recommended.

Sheetpiling is recommended from approximately Transect 168 to the confluence, except for under the Pomeroy Avenue Bridge where wet excavation will be used. Bypass pumping could also be used, as the alternative excavation technique in this section, including under the Pomeroy Avenue Bridge. However, the discharge for the bypass pump operation will have to be constructed below the confluence or in the West Branch of the Housatonic River. This will require careful design and operation of the discharge to avoid disturbance of contaminated sediments below the confluence.

As bank soil and sediment is excavated, the material will be staged, based on pre-construction and/or additional sampling data, as either non-Resource Conservation and Recovery Act ("RCRA") regulated hazardous waste (below 50 ppm PCB), Toxic Substances Control Act ("TSCA")-regulated (above 50 ppm PCB), or as RCRA regulated hazardous waste. All TSCA and RCRA regulated waste (approximately 15,000 to 25,000 yds^3) and approximately 25,000 to 35,000 yds^3 of non-RCRA/non-TSCA regulated waste will be disposed of at the GE On Plant Consolidation Areas. The remaining non-RCRA waste material will be sent to an off-site disposal facility. EPA will evaluate the feasibility of disposing of bank soils that are non-RCRA waste and have less than 2 ppm PCBs as landfill cover material as opposed to disposing of this material as solid waste. Also, as stated previously, sediments and soils that are significantly impacted by NAPL may require off-site disposal.

In order to reduce the volume of material for off-site disposal, an evaluation will be performed during design to determine if oversized material (e.g., cobbles greater than 2 inches in diameter, boulders, concrete, and construction and demolition debris) can be screened out from the soils and sediments. The cobbles and boulders could potentially be pressure washed and returned to the River. The concrete and construction and demolition debris could potentially be disposed of separately from contaminated soils and sediments. This could reduce the volume of contaminated soils and sediments sent off-site by greater than 5,000 yds^3.

Habitat restoration is necessary to meet applicable and relevant and appropriate requirements (ARARs) as part of the response action and to meet the natural resource damage objectives in accordance with the Consent Decree. It is also necessary to stabilize the forces of erosion in the regraded riverbed and riverbank. The restoration objectives will be met through a combination of regrading, vegetation, bioengineering, and potential installation of habitat improvements (e.g., low-stage dams, current deflectors, and boulders). The placement of aquatic habitat improvements and regrading will be conducted such that the flood elevations in the river are not significantly affected and flood storage is not reduced.

Chapter 6 of the EE/CA Report, Recommended Alternative, identified additional investigation activities scheduled for the Summer of 2000, the results of which are reported in an Addendum to the EE/CA Report. The purpose of the additional investigations was to collect data and information to further assess potential NAPL sources, obtain additional geotechnical data, and assess contamination in banks and sediments at depth. The main objectives of the investigation were as follows:

- Investigate the nature and extent of potential NAPL in the Oxbow A, B, and C areas (south of Lyman Street), and further determine the nature and extent of the NAPL previously observed in the cobble reach (Elm Street to Dawes Avenue), where evidence of NAPL was observed during the 1999 sampling.
- Further define the nature and extent of PCB and Appendix IX constituent contamination at depth (3 to 6 ft) in the riverbanks on nonresidential properties and in aggrading bars in the river.

- Obtain PCB and Appendix IX constituent data from riverbank soils on previously unaccessed properties.
- Further define soil and sediment geotechnical parameters that may affect the selection of response actions and/or design parameter values for bank stability, sheetpile depth, or restoration method.
- Collect data on groundwater quality and flux into the river using seepage meters.
- Deeper sediment sampling at Appendix IX exceedences.

The results for the first bullet were previously discussed in this Action Memorandum. The results from the remaining bullets are as follows:

Deeper Riverbank Samples - Soil samples were collected at riverbank transects that previously had an Appendix IX exceedance. A total of seven locations were targeted for sampling; however, refusal was encountered at three of the locations before the target depth (4 to 4.5 ft) was reached. Thus, a total of four samples were collected for laboratory analysis. The Appendix IX data were evaluated in the same manner as described in the EE/CA Report and included a comparison to EPA Region IX Preliminary Remediation Goals, background concentrations, and MCP S-2 soil cleanup standards. A comparison of the results shows that only 3 of the 21 total samples exceeded the standards. One sample location was collected from a depth of 0 - 0.5 feet and will be removed as part of the PCB excavation. The other 2 locations were from a depth of 4.0 - 4.5 feet on recreational property. Since these 2 locations are below the 3 foot removal depth for recreational properties they will not require removal.

In order to assess the levels of PCBs at depths greater than 3-feet that were not previously sampled, soil samples were collected from the middle bank location at nonresidential riverbank transects. Samples were collected from the 3- to 3.5-ft, 4- to 4.5-ft, and 5- to 5.5-ft depth intervals. Eighty-five middle-bank borings were planned, but refusal was encountered at 26 locations before the target depth-interval was reached. Thus, a total of 59 locations were advanced to at least the shallowest target sampling depth and samples were collected for analysis. The results indicate that there is little to no reduction in PCB concentrations with depth. Average PCB concentrations range from 36.5 ppm at the 3.0 - 3.5 foot depth to 18.6 ppm at the 5.0 - 5.5 foot depth. Since these concentrations are below the three foot removal depth for recreational property and are not expected to cause water quality problems based on the pore water sampling results discussed below, no further excavation is required. These properties may require an Environmental Restriction and Easement, however.

Deeper Sediment Sampling - Deeper sediment sampling was conducted to fill data gaps relative to the 2 to 3-foot depth interval in Subreach 4-4A and at a location where there was previous Appendix IX parameter exceedances at depth. A total of seven samples were collected from the 2 to 3-foot depth interval and analyzed for PCBs to supplement previous sampling efforts in this area. The concentration of PCBs in all seven samples exceeds the cleanup goal of 1 ppm. The 95% UCL of the average concentration is 26.6 ppm. This data indicates that all the sediment in the 2 to 3-foot depth interval in Subreach 4-4A will require removal. This is consistent with the volume calculations in the EE/CA Report. Therefore, no additional excavation is required. In one sediment sampling location (4 to 4.5 foot interval), there were Appendix IX exceedances of the OMEE LEL for some polyaromatic hydrocarbons in an area not targeted for removal. However, since the LELs are only slightly exceeded, and due to the depth of the sample interval and the fact that this is the only exceedance in areas not targeted for removal in the entire 1 ½-Mile Reach, no additional excavation is proposed.

Aggrading Bars - A total of 110 samples were collected from the aggrading bars to assess the potential for PCBs to exceed cleanup goals with depth. The results indicate that PCBs exceed the cleanup goal below the previously assumed excavation depth. Based on a conservative estimate of the area and depth of each aggrading bar and assuming excavation to reach the cleanup goal of 1 ppm, the estimated sediment volume to be removed is increased by approximately 1,834 cubic yards. This amounts to less than a 5% increase in sediment volume excavation over the volume reported in Chapter 6 of the Final EE/CA Report. The total volume of sediment and bank soil required for removal is now estimated at 95,375 cubic yards (45,128 cubic yards for sediments and 50,247 for riverbank soil). This change results in a cost increase of $120,000 for excavation and $540,000 for additional disposal cost to the Recommended Alternative and is reflected in the cost estimates presented below. The volume and cost estimate discussed above is for the aggrading bars sampled during the EE/CA process. If additional aggrading bars and/or terraces are identified during the implementation of the proposed removal action, then additional excavation in these areas may also be performed.

Riverbank Soils Samples at Previously Unaccessed Areas - Two properties that could not be sampled during the previous sampling efforts due to access restrictions were sampled. These areas include the west bank of the river just north of the Elm Street Bridge and a short section of the east bank across from Fred Garner Park. A total of 96 samples were collected from these two areas. The results of the PCB analysis for the two areas are consistent with the conclusions reached in the Final EE/CA Report. No additional excavation is required.

Pore Water - Nine seepage meters were installed at roughly equal distances along the 1 ½ Mile Reach to evaluate the quantity and quality of the groundwater that discharges to the river (pore water). The pore water quantity (flux) was used to estimate the volume of water that will need to be collected and treated during construction. The water quality information was used to determine if a sorptive layer is needed in the riverbanks to prevent contaminated groundwater from entering the river.

The calculated groundwater discharge estimates based on the seepage meter data are consistent with the flow rates used in the EE/CA Report for estimating dewatering volumes. Therefore, no changes to the estimated flow rate or size of the treatment facility are currently planned. However, the treatment capacity issue will be reevaluated during design and appropriate modifications will be made, if necessary.

The water quality results were compared to Massachusetts Contingency Plan ("MCP") GW-3 groundwater standards (which are designed to protect surface water). Only PCBs exceeded the MCP GW-3 standards at 2 of the nine sampling locations and that is likely due to groundwater passing up through the contaminated sediments that will be removed. Therefore, the continuing discharge of groundwater into the river after the removal action is complete is not expected to recontaminate the river and a sorptive cap along the banks is not necessary.

Furthermore, the groundwater beneath Oxbows A, B, and C will be evaluated pursuant to Technical Attachment H of Appendix E to the Consent Decree. If this evaluation identifies exceedences of the performance standards, then GE could be required to conduct additional response actions to address contaminated groundwater beneath these Oxbows.

Geotechnical Investigations - A total of 44 geotechnical borings were drilled to characterize conditions along the length of the 1 ½ Mile Reach. Thirty-one of the 44 borings were drilled along the top of the bank and the remaining 13 borings were drilled through the riverbed using a barge-mounted rig. Samples were collected at 5-foot intervals to the elevation of the riverbed and then at 10-foot intervals to a depth of 20-feet below the riverbed or to refusal. Each sample was submitted for grain-size, moisture content, Atterberg limits, organic content, and specific gravity analyses. The results of geotechnical investigation confirm that sheetpile should be able to be installed in the areas proposed.

Revised Excavation Rate - A comment provided by GE during the public comment period, July 17, 2000 through September 1, 2000, stated that GE believed that the estimated excavation rate presented in the EE/CA Report was unrealistic. The estimated completion time for the 1 ½ Mile Reach was based on a riverbed excavation rate of approximately 250 cubic yards per day. GE based its comment on experience with the Upper ½ Mile Reach removal action currently ongoing and recommended a more realistic excavation rate of 130 cubic yards per day. EPA agrees that the production rate of excavation can be impacted by poor weather and unforeseen conditions such as encountering NAPL. This is evidenced by the impacts GE and its contractors have experienced. EPA, however, believes that the potential for encountering NAPL in the 1 ½ Mile Reach is substantially less than for the Upper ½ Mile Reach and that EPA's general approach to excavating sediments should allow a slightly greater excavation rate than GE is experiencing. Even so, based on GE's experience and comment, the excavation rate for the Recommended Alternative has been reduced by 50%, to 125 - 150 cubic yards per day. This excavation rate reduction results in an estimated project duration of approximately 4 years which is still within the 3 to 5-year completion estimate in Chapter 6 of the EE/CA Report. The increased costs associated with the reduced excavation rate is estimated at $8.02 million and is reflected in the cost estimate below. A reduced excavation rate has similar impacts to the estimated project durations and costs of all alternatives evaluated in the EE/CA, and, therefore, does not affect EPA's choice of a Recommended Alternative.

Revised Sheetpiling Length - The EE/CA Report estimated that a sheeting length of 20 feet would be necessary to perform the excavation in the river to the necessary sediment excavation depths and to protect the excavation from overtopping and flooding during most storm events. However, based on observations of the current removal activities in the Upper ½ Mile Reach, it now appears that longer sheetpiles may be necessary to reduce the potential for overtopping the sheetpiles and flooding the excavation cells. In addition, longer sheetpiles are needed for the deeper excavation, such as at the aggrading bars, as described above. Therefore, the estimated sheetpiling length is increased to 28 feet. This change results in a cost increase of $250,000 to the Recommended Alternative and is reflected in the cost estimates presented below.

Post-Removal Site Control
In accordance with Section VIII, Paragraph 21.b of the Consent Decree, GE will perform post-removal site control (PRSC) as defined in Section 300.415(l) of the NCP. PRSC activities will include implementing inspection, monitoring, and maintenance plans.

EPA will develop long-term chemical and biological monitoring protocols during the design of the 1 ½ Mile Reach that will be used to assess and document the effects of the removal action. These monitoring protocols will be part of PRSC activities.

Consistent with EPA guidance documents, the cost for PRSC activities is not included in the total Removal Project Cost Ceiling specified in this Action Memorandum. However, GE costs for PRSC will be factored into the previously discussed cost-share agreement between GE and EPA under the Consent Decree.

2. Community Relations

EPA prepared and issued the Draft EE/CA Report, exclusive of Chapter 6, the Recommended Alternative, for public review on February 11, 2000. On March 1, 2000, EPA held a public meeting in Pittsfield, Massachusetts, at which the Draft EE/CA was presented. On May 17, 2000, EPA Region I presented the EE/CA Report and the Recommended Alternative to EPA's National Remedy Review Board. EPA also held neighborhood meetings on May 23, June 7 and June 8, 2000 with owners of property abutting the 1 ½ Mile Reach to discuss the EE/CA Report.

On July 17, 2000, EPA issued the final Chapter, Chapter 6, to the EE/CA Report and a fact sheet summarizing the EE/CA. Chapter 6 presented EPA's Recommended Alternative. Issuing Chapter 6 finalized the EE/CA Report and began the formal public comment period scheduled to run from July 17, 2000 through August 16, 2000. The formal public comment period was extended two weeks to September 1, 2000 by request of GE. During the comment period, EPA held a public meeting in Pittsfield, Massachusetts on July 25, 2000 and another one in Kent, Connecticut on August 9, 2000 to present EPA's Recommended Alternative. On August 15, 2000, a formal public hearing was held in Pittsfield, Massachusetts to allow concerned citizens the opportunity to present oral comments on the EE/CA Report and Recommended Alternative. The formal comment period closed on September 1, 2000. A transcript of the public hearing and a Responsiveness Summary responding to the written and oral comments EPA received during the comment period is attached to this Action Memorandum (Appendix C.).

3. Contribution to Remedial Performance

No additional remedial activities are expected to be performed in the 1 ½ Mile Reach. EPA is evaluating the need for, and the extent of, remedial actions in the Rest of the River (as defined by the Consent Decree). The Proposed Action will involve the excavation and removal of contaminated sediment and riverbank soils and restoration of the river and riverbanks. This action will prevent or minimize migration of contaminants further downstream. Accordingly, the Proposed Action will contribute to the efficient performance of a long-term remedial action to address the release and threat of releases from the GE facility for the Housatonic River.

4. Engineering Evaluation/Cost Analysis ("EE/CA")

Section 300.415(b)(4) of the NCP states that whenever a planning period of six months exists before on-site activities must be initiated, and the lead agency determines a removal action is appropriate, the lead agency shall conduct an EE/CA or its equivalent. As discussed in Section II.A.1, EPA issued a combined Action and EE/CA Approval Memorandum on May 26, 1998 and issued the EE/CA on July 17, 2000.

The public comment period on the EE/CA Report and EPA's other community relations activities are described above.

5. Description of Alternative Technologies

In accordance with Section 2.6 of the EE/CA - Identification and Analysis of Removal Action Alternatives, a number of alternatives appropriate for addressing the removal action objectives were identified and assessed. The following alternatives to land disposal were identified as being potentially able to achieve the removal action objectives and were screened during development of the EE/CA Report:

In Situ Treatment/Containment Technologies

In Situ Containment of Bank Soil

In Situ Containment of Sediments
Excavation to Capping Depth
Chemical Immobilization
Biological Treatment

Ex Situ Treatment Technologies
Physical/Chemical Treatment
Soil Washing
Solvent Extraction
Stabilization/Solidification
Chemical Dechlorination
Incineration
Thermal Desorption
Biological Treatment

Following the screening process, the following technologies were retained for use in developing removal alternatives:

Treatment/Containment Technologies
Thermal Desorption
Solvent Extraction
In Situ Capping for Bank Soils

The above technologies were then combined into the following four Treatment/Consolidation Options and evaluated based on effectiveness, implementability and cost:

Treatment/Consolidation Option A - Consolidation of up to 50,000 yd^3 of contaminated soils and sediments at designated consolidation areas at the GE facility with off-site treatment/disposal of excess material. Estimated Present Worth Cost - $13.1M. In EPA's Action Memorandum, dated August 4, 1999, "Request for Removal Actions Outside the River at the GE/Housatonic River Site, Pittsfield, Massachusetts", EPA determined the disposal of certain Housatonic River bank soils and sediment in the OPCAs is protective of human health and the environment. EPA approved the applicable and relevant and appropriate requirements (ARARs) for the consolidation areas in EPA's letter to GE dated September 17, 1999.

This option will be protective of human health and the environment in the long term with proper construction of the consolidation areas and adequate diligence in operating, maintaining, and controlling the consolidation areas. Lined landfills with leachate collection systems are commonly used for disposal of TSCA- or RCRA-regulated wastes. No reduction in the toxicity, volume, or mobility of the wastes by treatment will be achieved with this option, except for the possible treatment of leachate at the GE facility or the possible treatment of waste (e.g. NAPL) sent to off-site treatment/disposal facilities. However, this option does provide long term protection and permanence through off-site disposal of PCB contaminated soil and sediment in regulated waste management units designed for such disposal and results in the reduction of mobility and volume of PCBs from the riverbed and from the banks.

Treatment/Consolidation Option B - Off-site disposal of all excavated material. Estimated Present Worth Cost - $28.0M. This option was not chosen because it is over twice as expensive as Option A and is not more protective than Option A.

Treatment/Consolidation Option C - Treatment of excavated material at the GE facility using thermal desorption, with off-site disposal of all material. Estimated Present Worth Cost - $52.6M. This option can protect the environment in a timely manner and reduce the toxicity, volume, or mobility of the contaminated soils and sediments by treatment. Following treatment, most soils and sediments are expected to meet the contamination criteria for reuse as landfill cover. This option was not chosen because Option A is equally protective, and Option A is approximately four times less expensive.

Treatment/Consolidation Option D - Treatment of excavated material at the GE facility using solvent extraction, with off-site disposal of all material. Estimated Present Worth Cost - $42.8M. This option also can protect the environment in a timely manner and reduce the toxicity, volume, or mobility of the contaminated soils and sediments by treatment. Following treatment, most soils and sediments are also expected to meet the contamination criteria for reuse as landfill cover. This option was not chosen because Option A is equally protective, and Option A is over three times less expensive.

6. Applicable or Relevant and Appropriate Requirements (ARARs) and Other Determinations

Appendix C of the EE/CA, Tables C-1 through C-3 identify the ARARs and EPA's determination of the applicability and practicability of complying with each ARAR. EPA's determination was based on the criteria set forth in 40 C.F.R. § 300.415(j). For any off-site disposal of hazardous substances, EPA shall comply with EPA's off-site rule (40 C.F.R. 300.440 – Procedures for Planning and Implementing Off-Site Response Actions).

In addition to the ARARs described above, EPA New England's Regional Administrator, by approving this Action Memorandum, makes the following determinations.

a. TSCA PCB Remediation Waste. The removal action proposed in this Action Memorandum will be conducted in accordance with TSCA regulation 40 C.F.R. 761.61(c) which addresses risk-based response actions for the remediation of PCB waste (i.e., contaminated soil and sediments). 40 C.F.R. 761.61(c) details the requirements for the risk-based approval. Specifically, this section requires that the following elements be submitted to EPA's Regional Administrator for approval:

- A summary of the nature of the contamination;
- A summary of the sample procedures used to characterize the 1 ½ Mile Reach;
- A summary of the location and extent of the identified contamination;
- A cleanup plan for the 1 ½ Mile Reach; and
- A written certification that all sampling plans and procedures used to assess and characterize the 1 ½ Mile Reach are available for review.

The previous sampling and analytical plans and the EE/CA, which are included in the Administrative Record for this Action Memorandum, meet the requirements of the first three bullets. This Action Memorandum (including the Administrative Record) and the Consent Decree meet the requirements of the next two bullets.

40 CFR 761.61(c)(2) states that if the above-referenced summary, plans and certifications are submitted, "EPA [the Regional Administrator] will issue a written decision . . . for a risk-based method for PCB remediation wastes. EPA will approve such an application if it finds that the method will not pose an unreasonable risk of injury to health or the environment."
By signing this Action Memorandum, the Regional Administrator is making a determination that the proposed response action will not pose an unreasonable risk of injury to health or the environment. This determination is based on the Action Memorandum and the Administrative Record, including the following:

- A risk-based evaluation for the protectiveness of the proposed PCB cleanup levels was performed and is provided in Attachment A (August 4, 1999 Memorandum from Ann-Marie Burke, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health*) and Attachment B (February 7, 2000 Memorandum from Susan Svirsky, EPA to Chet Janowski, EPA titled *Ecological Risk Goals for the EE/CA for the East Branch Housatonic River*). The Attachments conclude that the PCB cleanup levels will not pose an unreasonable risk of injury to health or the environment.
- GE will perform post-removal site control activities including implementing inspection, monitoring, and maintenance plans.
- Environmental Restrictions and Easements (EREs) will be obtained in areas cleaned to recreational standards where there is a potential for future exposures that are inconsistent with recreational use or where exposures may occur at depths greater than three feet. EREs, which are deeded land use restrictions, will, at a minimum, (1) prohibit residential use in recreational areas; (2) control contact with subsurface soils; (3) restrict the use of groundwater, and (4) prohibit interference with response actions.

b. TSCA Chemical Waste Landfills. The Regional Administrator has already determined that the OPCAs are protective on pages 41-43 of the August 4, 1999 Action Memorandum.

c. Wetlands/Floodplain. Under 40 CFR Part 6, Appendix A, "Statement of Procedures on Floodplain Management and Wetlands Protection", before undertaking an Agency action, EPA must determine whether or not the action will be located in or affect wetlands. When it is apparent that a proposed or potential agency action is likely to impact a floodplain or wetland, the public must be informed through appropriate public notice procedures. An assessment must be prepared which describes the proposed action, discusses the effect on the wetlands/floodplain, and describes the alternatives considered.

Once an alternative is selected, the Agency must make public a Statement of Findings which includes (1) why the action must be located in or affect the floodplain or wetlands; (2) a description of significant facts considered in making the decision to locate in or affect the floodplain or wetlands including alternative sites and actions; (3) a statement indicating whether the proposed action conforms to applicable State or local floodplain protection standards; (4) a description of the steps taken to design or modify the proposed action to minimize potential harm to or within the floodplain or wetlands; (5) a statement indicating how the proposed action affects the natural or beneficial values of the floodplain or wetlands.

The portion of the 1 ½ Mile Reach being addressed by this response action consists primarily of a river environment and associated wetlands and floodplains, therefore EPA New England's Regional Administrator, by approving this Action Memorandum, makes the following statement: First, the removal action must occur in wetland and floodplain areas because that is where the contamination being addressed is located. Second, there were no other alternative areas in which to conduct the removal action. Third, this action will conform with the state floodplain protection standard identified in the ARAR table in the EE/CA Report. Fourth, there will be several steps taken to minimize potential harm to or within the floodplain or wetlands during excavation. These steps will be further defined during design and may include use of silt curtains, rock check dams or other devices to capture suspended solids before they migrate from the excavation area. In addition, turbidity monitoring will be conducted on a regular basis to assess the presence of increased solids attributable to the excavation. Fifth, the proposed action will affect the natural or beneficial values of the floodplain or wetlands in the 1 ½ Mile Reach due to the removal of riverbank soil and sediments contaminated with PCBs. However, the mitigation of the PCB contamination followed by riverbank and streambed restoration and habitat improvements will, in the long-term, return the natural and beneficial values to the floodplain and wetlands in the 1 ½ Mile Reach.

*7. **Project Schedule***

Excavation in the 1 ½ Mile Reach is expected to begin as soon as excavation and riverbed restoration is complete in the Upper ½ Mile Reach. The EE/CA Report estimates that it will take between 3 to 5 years to complete the removal action for 1 ½ Mile Reach. The cost estimate presented below is based upon a completion time of approximately 4 years. This cost estimate is based upon a 50% reduction in the estimated excavation rate assumed in the cost estimate presented in the EE/CA Report. Assuming a construction start in the year 2001 and a 4 year completion time, the 1 ½ Mile Removal Action will be complete by the year 2005.

B. Estimated Costs

The estimated present worth cost for the Recommended Alternative, as presented in Chapter 6 of the EE/CA Report, is $40.7 million. This cost includes a present worth base alternative cost of $27.6 million and an Option A disposal cost of $13.1 million. As discussed in Section 4.A above, the present worth cost of the Recommended Alternative is increased to $49.66 million as a result of three factors: (i) the addition of 1,834 cubic yards of PCB contaminated sediments that need to be excavated from the aggrading bars, (ii) an increase in the sheetpiling length responding to observations of overtopping of sheetpiling in the Upper ½ Mile Reach and due to deeper excavation at the aggrading bars, and (iii) a decrease in excavation rate in response to a comment received during the public comment period.[1] The effects of these cost increases are presented in the following Table:

Recommended Alternative	Total Present Worth Cost[2]
Modified Alternative 2 (Chapter 6 - EE/CA Report)	$27.60 million (from EE/CA)
Decreased Excavation Rate (Public Comment)	+$8.02 million
Increased Excavation Volume (Aggrading Bars Excavation)	+$0.12 million
Increased Sheetpiling Length (Aggrading Bars and Observations in Upper ½ Mile Reach)	+$0.25 million
Disposal Option A (Chapter 6 - EE/CA Report)	$13.13 million (from EE/CA)

[1] The EE/CA noted, in Chapter 6, that the costs in the final Action Memorandum could be further increased based on the results of the supplemental investigations as presented in the EE/CA Report Addendum.

[2] This Present Worth Cost includes the estimated contractor cost plus a markup for construction contingency (25%), engineering/design (6%), and construction management (8%), with no adjustment for escalation.

Increased Off-Site Disposal Volume (Aggrading Bar Excavation)	+$0.54 million
Total Estimated Cost of Recommended Alternative	$49.66 million

In accordance with EPA's Action Memorandum Guidance Document (OSWER Directive 9360.3-01), EPA is required to calculate a "Project Ceiling Cost" to represent an estimated maximum project cost. The Project Ceiling Cost is calculated using a nominal cost method while the cost estimates contained in the EE/CA Report and Addendum were calculated using a present worth analysis.[3] EPA guidance directs the Agency to use cost estimates based upon the present worth method in EE/CAs, so that a comparison can be made between cleanup alternatives that have different construction completion dates and operating lifetimes. See *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA*, August 1993, OSWER 9360.0-32, pg. 44. EPA's practice is to use cost estimates based upon the nominal cost method in Action Memoranda to calculate a total project ceiling that cannot be exceeded without further management approval.

The Project Ceiling Cost estimate is $53.13 million. The difference between the Present Worth estimate of $49.66 million and the Project Ceiling Cost estimate of $53.13 million is due to the fact that the Project Ceiling Cost estimate includes a cost escalation over the construction period. The total cumulative increase due to the addition of an escalation in the Project Ceiling Cost estimate is $3.47 million.

The Project Ceiling Cost is calculated as follows:

Project Ceiling Cost Estimate

Extramural Costs[4]:

Regional Allowances:
Total Estimated Cost $49.66 million

[3] Present worth analysis produces a single figure representing the amount of money that, if invested at a particular rate of return in the base year - usually the present year - and dispersed as needed, would cover all costs associated with the alternative. Nominal costs are the sum of all costs required to perform the proposed action in the base year - usually the present year- and an amount to represent inflation for work to be performed after the base year.

[4] Extramural costs are the costs to be incurred by EPA's contractors or by other Federal Agencies through an Interagency Agreement.

Escalation (estimated at 3% per year)[5]	$3.47 million
Subtotal of Extramural Costs	$53.13 million
Extramural Costs Contingency[6] (20% of Subtotal, Extramural Costs)	$10.63 million
TOTAL EXTRAMURAL COST:	$63.76 million
Intramural Direct Costs:	
EPA Direct Costs[7]	$1.00 million
Indirect Cost Rate[8]: (27.02% of extramural plus intramural direct costs)	$17.50 million
TOTAL REMOVAL PROJECT CEILING	**$82.26 million**

Although this is a removal action, EPA guidance for estimating costs for remedial actions suggests that the present worth cost estimate should reflect an accuracy of +50 percent to -30 percent. See *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, October 1988, OSWER 9355.3-01, pg. 6-12. Since an EE/CA is similar to a remedial investigation/feasibility study, the estimated present worth cost of the Recommended Alternative of $49,660,000 represents an expected cost range of between $74,500,000 to $34,800,000. The

[5] This escalation is based upon an assumed construction start date in the year 2001 and a completion date in the year 2005.

[6] The EE/CA and the EE/CA Fact Sheet noted that the final cost estimate would include this 20% contingency, which is required by EPA guidance. See *Superfund Removal Procedures Action Memorandum Guidance*, September 1990, OSWER 9360.3-01, pgs. 21-22.

[7] EPA Personnel estimated at $200,000 per yr. for 5 yrs. Intramural costs are the costs EPA incurs, as opposed to contractor costs. The EE/CA and the EE/CA fact sheet noted that the final cost estimate would include this EPA intramural cost, which is required by EPA guidance. See *Superfund Removal Procedures Action Memorandum Guidance*, September 1990, OSWER 9360.3-01. See pgs. 22-22.

[8] Indirect costs are costs that support the Superfund program as a whole and cannot be identified to any one site. *EPA Comptroller Policy Announcement No. 00-05*, May 26, 2000. Direct costs are costs incurred for site-specific activities at a particular site, such as costs for the assessment, investigation, and clean-up of a site. Id. Pursuant to guidance, the government allocates a portion of its indirect costs to the direct costs at each site. Id. The indirect costs in the Project Ceiling Cost are calculated pursuant to the *Guidance on Exercising CERCLA Enforcement Discretion in Anticipation of Full Cost Accounting Consistent with the Statement of Federal Financial Accounting Standards No.4*, May 26, 2000. EPA used an estimate of 27.02% for the indirect cost rate based upon the indirect cost rate for FY 1999. The actual indirect cost rate for FY 2000 and beyond could change based upon subsequent indirect cost calculations See id. and Memorandum: *Superfund Indirect Cost Rates for Fiscal Years 1990-2001.*

extramural cost of $63.76 million falls well within the upper range calculated for the present worth cost.

The total project ceiling cost of $82,260,000 shall be considered the estimated cost for the design and implementation of the 1 12/ Mile Reach for the purposes of Paragraph 106(b) of the Consent Decree.

VII. Expected Change in the Situation Should Action be Delayed or Not Taken

Delayed or no action will increase the human health and environmental risks by allowing for: (1) the continuation of direct contact, ingestion, inhalation and adsorption of PCBs and non-PCB hazardous substances by residents, recreational users, trespassers, and workers; (2) the continued migration of PCBs and non-PCB hazardous substances; and (3) the continued threats and damage to sensitive ecosystems (i.e., the Housatonic River).

VIII. Outstanding Policy Issues

Sediments/Dredging

The FY 2001 VA-HUD Appropriation Conference Report, which accompanied EPA's FY 2001 appropriations, includes the following language regarding EPA's use of dredging:

> Accordingly, the conferees continue to direct the EPA to take no action to initiate or order the use of dredging or invasive remedial technologies where a final plan has not been adopted prior to October 1, 2000 or where such activities are not now occurring until the [National Academy of Sciences] report has been completed and its findings have been properly considered by the Agency. As in previous years, exceptions are provided for voluntary agreements and for urgent cases where contaminated sediment poses a significant threat to public health.

The FY 2000 VA HUD Appropriation Conference Report, which accompanied EPA's FY2000 appropriations, stated that "the Agency should only initiate or order dredging in cases where a full analysis of long and short-term health and environmental impacts has been conducted."

Similarly, the FY 1999 VA HUD Appropriations Conference Report, which accompanied EPA's FY 1999 appropriations, included the following language regarding EPA's use of dredging:

> The conferees urge EPA to await the completion of the [National Academy of Sciences] study before spending any Superfund money on dredging, initiating any new dredging action, or issuing any more dredging orders. Exceptions to this should be considered where EPA has found on the record that the contaminated sediment poses a significant threat to the public health to which an urgent or time critical response is necessary.

remedial and/or removal alternatives have been fully evaluated, an appropriate site for disposal of contaminated material has been selected, and the potential impacts of dredging, associated disposal, and alternatives have been explained to the affected community. [emphasis added][9]

Although conference report language is not legally binding, EPA has indicated in two memoranda that it intends to generally act in accordance with the views expressed in conference language to the extent possible within the confines of its statutory language. See "Implementing FY '99 Appropriations Conference Report Language on Sediment Dredging" (May 17, 1999) and "Implementing FY2000 Appropriations Report Language on Sediment Dredging" (January 19, 2000.) Consistent with that directive, EPA is considering the FY 1999, 2000 and 2001 Conference Report language even though such language does not apply because the Consent Decree is a voluntary agreement that is not subject to the Conference Report language and because EPA is selecting a dry excavation alternative (mechanical excavation) for this removal action and not a dredging alternative.

The National Academy of Sciences dredging study is not yet completed. Therefore, when considering dredging issues at a Superfund Site, EPA looks to the criteria mentioned in the FY 1999 and FY 2000 VA HUD Appropriations Conference Report. As applied to the 1 ½ Mile Reach, EPA analyzes dredging issues as follows:

- First, the contaminated sediment and riverbank soils in the 1 ½-Mile Reach pose a substantial threat to the public health and the environment that requires a response. The long and short-term threat to public health is explained in detail in Section III of this Action Memorandum, in the Combined Action and EE/CA Approval Memorandum, as well as in the EE/CA Report.

- Second, removal alternatives have been fully evaluated for the 1 ½-Mile Reach. The EE/CA Report which evaluates the removal alternatives in detail, was compiled and released to the public on July 17, 2000. Among other options, this evaluation considered and rejected capping of the sediments and river bank soils. EPA rejected capping of the sediments because of the insignificant difference between the volume of sediment removal required to install a cap compared to the volume required to excavate to depths to achieve the cleanup goals without the need for a cap. See EE/CA Section 4.3. Capping the sediments also presents long-term maintenance costs and access issues. As discussed in this Action Memorandum, based upon analysis of pore water samples, a sorptive cap along the riverbanks is not necessary. For the Combined Action and EE/CA Approval Memorandum, EPA also evaluated and rejected no action and monitored

[9] It should be noted that a colloquy between Senators Lautenberg and Bond clarified this language. EPA interprets the colloquy to mean that any response action that involved dredging of contaminated sediments that "pose a substantial threat to public health or the environment" should proceed, with the appropriate analysis performed and documented in the administrative record file. See "Implementing FY2000 Appropriations Report Language on Sediment Dredging" (January 19, 2000).

natural attenuation options because of the threats posed by the PCB-contaminated soils and sediments and because the USACE estimated that monitored natural attenuation would not result in acceptable levels of PCBs in the river sediments for approximately 500 years. See pg. 17 of Combined Action and EE/CA Approval Memorandum.

- Third, an appropriate site for disposal of contaminated material has been selected. As explained in Section V.A.1 of this Action Memorandum, disposal activities associated with this removal action consist of the consolidation of 50,000 cubic yards of contaminated soil and sediment at the GE OPCA with off-site disposal of the excess material (Option A). The EE/CA explains in detail why this disposal option is appropriate.

- Fourth, the potential impacts of this response, associated disposal, and alternatives have been explained to the affected community. As explained in Section V.A.2 of this Action Memorandum (community relations), EPA has had extensive discussions with the affected community regarding this removal action.

In conclusion, for this response EPA has clearly met the criteria established by the FY 1999, 2000, and 2001 VA HUD Appropriations Conference Reports, even though such criteria are not applicable to this removal action.

IX. Enforcement — Intended for Internal Distribution Only

See attached.

X. Recommendation

This decision document represents the selection of a removal action for the 1 ½ Mile Reach of the GE-Pittsfield/Housatonic River Site, in Pittsfield, Massachusetts. The proposed removal action was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision document is based on documents contained in the administrative record for the 1 ½ Mile Reach. (See Appendix A for the Administrative Record File Index and Appendix B for the List of Selected Key Guidance Documents.)

As stated in Section III, conditions at the 1 ½ Mile Reach meet the NCP §300.415(b)(2) criteria for removal actions in that there are:

- "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants" [300.415(b)(2)(i)];
- "Actual or potential contamination of drinking water supplies or sensitive ecosystems" [300.415(b)(2)(ii)];
- "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate" [300.415(b)(2)(iv)], and

- "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released" [300.415(b)(2)(v)].

Furthermore, conditions at the 1 ½ Mile Reach meet the criteria for the CERCLA Section 104(c) consistency exemption from the 12-month and $2 million limitations on removal actions. The total project ceiling if approved will be $82,260,000. As all costs are expected to be funded under the provisions of the Consent Decree, none of this project ceiling will be from the Regional removal allowance. However, should subsequent ceiling increases be required, other funding sources may be necessary. The removal action proposed in this Action Memorandum will abate, prevent, minimize, stabilize, mitigate and/or eliminate the release or threat of release of hazardous substances at the 1 ½ Mile Reach. Therefore, I recommend your approval of this Action Memorandum and the exemption from the 12-month and $2,000,000 limitations.

Approval: ____________________ Date: ______________
Mindy S. Lubber
Regional Administrator

Disapproval: ____________________ Date: ______________
Mindy S. Lubber
Regional Administrator

Attachments:

Enforcement Strategy (Confidential)

Attachment A: August 4, 1999 Memorandum from Ann-Marie Burke, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health*

Attachment B: February 7, 2000 Memorandum from Susan Svirsky, EPA to Chet Janowski, EPA titled *Ecological Risk Goals for the EE/CA for the East Branch Housatonic River*

Appendix A: Administrative Record File Index
Appendix B: Index of Selected Key Guidance Documents
Appendix C: Responsiveness Summary and Transcript of August 15, 2000 Public Hearing.

LEGEND:

EE/CA Reach

GE Facility

NOTE: Base features derived from USGS Pittsfield East and West 1:24,000 quadrangles.

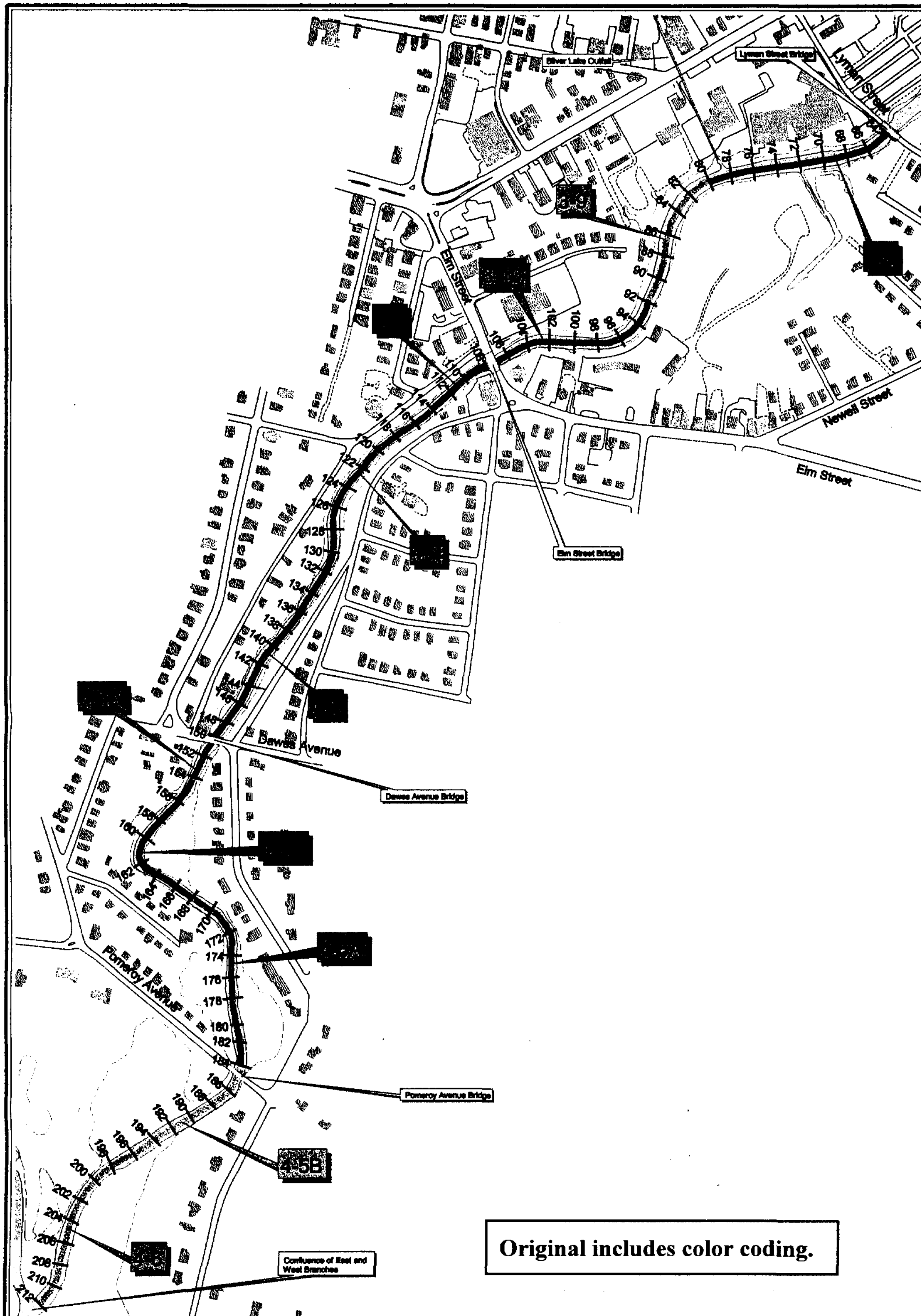
N

Scale In Feet

600 0 600 1200

Addendum to the
ENGINEERING EVALUATION/COST ANALYSIS
Upper Reach of the Housatonic River
Pittsfield, Massachusetts

FIGURE 1
LOCATION MAP



Original includes color coding.

LEGEND:
- Transect
- Roads
- 10-year Floodplain
- Surface Hydrology
- Building Footprints

N

Scale in Feet

200 0 200 400 600

Addendum to the
ENGINEERING EVALUATION/COST ANALYSIS
Upper Reach of the Housatonic River
Pittsfield, Massachusetts

FIGURE 2
SUBREACH LOCATION MAP

ATTACHMENT A

United States Environmental Protection Agency

Region I
One Congress Street, Suite 1100
Boston, MA 02114-2023

Memorandum

DATE: August 4, 1999

SUBJECT: Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health

FROM: Ann-Marie Burke, Toxicologist
Technical Support Section, EPA Region 1

TO: Richard Cavagnero, GE Project Leader
USEPA, Region 1

The purpose of this memorandum is to present an evaluation of the protectiveness of the cleanup levels (i.e., performance standards), for PCBs in soil in the Action Memorandum for Removal Actions Outside the River at the GE-Housatonic River Site, Pittsfield, Massachusetts and in the Action Memorandum for Allendale School, GE-Pittsfield/Housatonic River Site, Pittsfield, Massachusetts.

Subpart E of the National Contingency Plan (NCP)(Superfund), supplemented by Agency Guidance, establishes the criteria for determining when exposure levels are protective of human health. As noted in EPA's OSWER Directive 9355.0-30 "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," EPA uses a cancer risk range of 10^{-4} to 10^{-6} as a "target range" within which the Agency strives to manage risks. Although the Agency has expressed a clear preference for cleanups achieving the more protective end of the range (i.e. 10^{-6}), waste management strategies achieving reductions in site risks anywhere within the risk range may be deemed acceptable. As is noted in Subpart E, the *total* cancer risk attributed to the response goals (e.g., cleanup levels) should fall within a 10^{-4} to 10^{-6} lifetime excess cancer risk range. Thus if other contaminants of concern are detected in these areas, the cleanup levels of these contaminants and those presented below for PCBs must collectively meet EPA's target risk range.

In choosing cleanup levels for compounds having noncarcinogenic effects, it is EPA's policy to select a concentration of a compound at which adverse effects are unlikely to occur. The hazard quotient is the measure of the potential for noncancer effects. The hazard quotient is the ratio of the exposure dose of a single substance to a reference dose (RfD) for that substance. The RfD attempts to establish a level of exposure below which there is a high degree of confidence that no effects will occur. Since the actual observed effects occur at significantly higher doses than an RfD value, we assume that the threshold of effects is somewhere between the estimated RfD and the Lowest Observable Effect Level (LOEL). Because of the conservatism built into the RfD an exposure that is only slightly above an RfD value does not signify that adverse effects are likely to occur. Rather for exposures close to an RfD it is reasonable to assume that it is generally unlikely that adverse effects would occur. Likewise a HQ slightly above one does not indicate adverse effects will occur. Based on the above, the cleanup levels for PCBs are protective of the most sensitive receptor for each exposure area as defined below.

The following table shows the calculated excess cancer risk and hazard quotient associated with the cleanup level for each exposure area of the site.

Areas	Cleanup Level (ppm)	Depth (ft)	Excess Cancer Risk	Hazard Quotient
Recreational	10	0-1	$7x10^{-6}$	1.4
Recreational	15	1-3	NC	NC
Industrial (surface)	25	0-1	$6x10^{-6}$	0.4
Indust.(subsurface)	200	1-6	$1x10^{-5}$	0.9
Residential	2	0-15	$4x10^{-6}$	0.8
Allendale School	2	0-15	$4x10^{-6}$	0.8

NC - not calculated; see qualitative discussion below

1. Recreational Areas 0-1ft (10 ppm)

This cleanup level applies to any area of the Site in which the current or future use is recreational. This includes areas in which there may by a playground, a ballfield, a bike path, a picnic area, a scenic walkway, etc. A daycare scenario is not considered in deriving this cleanup level since this use does not typically occur in recreational settings. Since the actual activity which will occur in each area of the Site designated as "recreational" is unclear, this cleanup level is protective of the recreational use which is likely to result in the greatest exposure to the most sensitive receptor. Thus the cleanup level of 10 ppm for PCBs in soil is protective of a young child visiting a playground. For other recreational areas in which less exposure occurs to less sensitive individuals, this cleanup level is lower and more protective than the Agencies would typically set. However, due to the uncertainty about future exposures, one cleanup level has been chosen for all recreational areas. Choosing one cleanup level which is protective of the most sensitive receptor for all recreational scenarios provides a simplified yet reasonable and protective approach for soil cleanup.

In estimating noncancer hazards and excess cancer risks associated with this, cleanup level it is assumed that a child (ages 1-13) visits the playground 3 days per week for 7 months of the year

(May through November) when the ground is not frozen or covered with snow. It is also assumed that a child's head, lower arms, hands, lower legs and feet could be exposed to contaminated soil during the warmer months (from May through September) and that in the colder months (from October through November) a child's head and hands could be exposed.

Estimated noncancer hazard associated with oral and dermal exposure to recreational soils

$$HQ = C_s \times F \times D \left[\left(\frac{1}{(BW_C \times AT_{nc})RfD_o} \times \frac{IR_c \times FI \times ABS_o}{10^6\,mg/kg}\right) + \left(\frac{1}{RfD_o} \times \frac{[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7] \times ABS_d}{10^6 mg/kg}\right)\right]$$

HQ = hazard quotient
C_s = PCB concentration in soil, (i.e., cleanup level) (10mg/kg)
F = exposure frequency; (84dys/yr)=3dys/wkx4wks/mos 7mos/yr, (May-Nov); site-specific
D = duration;(6 yrs); Site-specific
IR_c= soil ingestion rate for child 1-6; 200mg/dy; EPA, 1991
FI = fraction ingested from site; (0.5); site-specific
ABS_o- GI absorption fraction; (1); PTI, 1993
SA_1 = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 cm^2 ;EPA, 1997; Based on;

- Mean fraction total SA for child obtained from Table 6-8, (EPA, 1997)
- Total SA determined by averaging 50^{th} percentile SA by body part for males/females of appropriate age groups, from Table 6-6 and 6-7 (EPA, 1997)
- Due to lack of data for the indicated ages, assumed <1 and 1<2 year olds had the same total SA as 2>3 year olds
- Assumed forearm-to-arm ratio (0.45) and lower leg-to-leg ratio (0.4) equivalent to an adult.

AF_1 = overall skin adherence factor weighted by body-part exposed;
For child 1-6 = 0.24mg/cm^2 -event:

- data from Kissel et. al, 1998., (children playing in dry soil)
- No AF was available for feet or head so overall AF based on AFs for face, forearms, hands and lower legs. However, SA in equation for HQ based on SA of all exposed body parts. Thus feet AF assumed by default to have same amount of soil adhered as weighted AF.
- Used 95th percentile for AF for each body part exposed which resulted in a 95th percentile overall skin adherence factor (mg/cm^2).

$$AF_1(child_{1\text{-}6}) = \frac{(AF_{face})(SA_{face})+(AF_{forearms})(SA_{forearms})+(AF_{hands})(SA_{hands})+(AF_{lowerlegs})(SA_{lowerlegs})}{(SA_{face})+(SA_{forearms})+(SA_{hands})+(SA_{lowerlegs})}$$

$$= \frac{(326)(0.022)+(393)(0.135)+(358)(0.413)+(650)(0.329)}{326 + 393 + 358 + 650} = 0.24$$

SA_2= surface area for a child exposed during Oct thru Nov. = head and hands;
= 1340 cm^2 for 1-6 yr old
AF_2= overall skin adherence factor weighted by body part exposed from Oct thru Nov

AF_2 (child $_{1\text{-}6}$) $= \frac{(326)(0.022) + (358)(0.413)}{326(\text{face}) + 358} = 0.23$

ABS_d = dermal absorption fraction; (0.14), Wester et. al, 1993

BW = average body weight; 15 for 1-6yr old (EPA, 1997)

AT_{nc} = averaging time, 6yrsx365dys/yr - (2190 dys); Site-specific

RfD = reference dose for Aroclor 1254 = $2\text{x}10^{-5}$ mg/kg-dy; IRIS, 1998

Substituting the values above into the equation:

$$THQ = \frac{10\text{x } 84 \text{ x}6}{[15\text{x}2190]} \left[\frac{(1 \text{ x}200 \text{ x } 0.5)}{2\text{x}10^{-5} \quad 10^6} + \frac{(1}{2\text{x } 10^{-5}} \text{ x } \frac{[((2900\text{x } 0.24 \text{ x } 5)+(1340 \text{ x}0.23 \text{ x } 2))/7]\text{x } 0.14}{10^6} \right]$$

$$= \frac{5040}{(32850)} \left(\frac{100}{20} + \frac{[((3480)+(616.4))/7] \text{ x}0.14)}{20} \right) = 45845.8/32850 = 1.4$$

Estimated excess cancer risk associated with oral and dermal exposure to recreational soils

$$ELCR = \frac{C_s \text{ x F } [(CSF\text{x}ABS_o\text{x } IF_{adj}) + (SFS_{adj} \text{ x } CSF\text{x } ABS_d)]}{AT_c \text{ x } 10^6 \text{ mg/kg}}$$

Where;.

ELCR = excess lifetime cancer risk

C_s = PCB concentration in soil, (i.e., cleanup level)(10mg/kg)

F = exposure frequency; (84dys/yr)=3dys/wkx4wks/mos 7mos/yr, (May-Nov); site-specific

CSF = cancer slope factor for PCBs (2 mg/kg-dy)$^{-1}$; IRIS, 1998

ABS_o= GI absorption fraction; (1); PTI, 1993

IF_{adj}= age- adjusted soil ingestion factor, equal to:

$$\frac{(FI)(IR_{1\text{-}6})(D_{1\text{-}6})}{BW_{1\text{-}6}} + \frac{(FI)(IR_{7\text{-}13})(D_{7\text{-}13})}{BW_{7\text{-}13}} = 40 + 8.2 = 48.2\text{mg-yr/kg-dy}$$

Where;

IR_c= soil ingestion rate; child 1-6; 200mg/dy; child 7-13; 100mg/dy; EPA, 1991

FI = fraction ingested from site; (0.5); site-specific

BW = average body weight; 15 for 1-6yr old; 36.8, based on average of mean body weights for boys/girls ages 7-13, from Table 7-3; EPA, 1997,

D = duration;(6 yrs); Site-specific

SFS_{adj} = age-adjusted soil contact factor=

$$\frac{(D_{1\text{-}6})[((AF_1 \text{ x } SA_1 \text{ x } 5)+(SA_2 \text{ x } AF_2 \text{ x } 2))/7]_{1\text{-}6}}{BW_{1\text{-}6}} + \frac{(D_{7\text{-}13})[((AF_1 \text{ x } SA_1 \text{ x } 5)+(SA_2 \text{ x } AF_2 \text{ x } 2))/7]_{7\text{-}13}}{BW_{7\text{-}13}}$$

$$= \frac{(6)[((0.24\text{x}2900\text{x}5)+(0.23\text{x}1340\text{x}2))/7]}{15} + \frac{(6)[((0.26\text{x}4276\text{x}5)+(0.26\text{x}1733\text{x}2))/7]}{36.8} = 384.5$$

Where;

SA_1 = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 cm^2 (see above), for child 7-13=4276 cm^2;EPA, 1997; Based on same assumptions as for SA_1 above (see noncancer calculations).

AF_1 = overall skin adherence factor weighted by body-part exposed;

For child 1-6 = 0.24mg/cm² -event(see above); For child 7-13:

- **used same data and approach as for child 1-6 above. Surface area based on 7-13 yr old**

AF_1 (child $_{7\text{-}13}$) = $\frac{(429)(0.022)+(633)(0.413)+(667)(0.135)+(1096)(0.329)}{429+633+667+1096}$ = 0.26

AF_2(child$_{1\text{-}6}$) = 0.23 mg/cm²-event(see above)

AF_2(child$_{7\text{-}13}$) = (429)(0.22) + (633) (0.413) / (429) + 633 = 0.26

SA_2= surface area for a child exposed during Oct thru Nov. = head and hands; 1340 cm^2 for 1-6 yr old; 1733 cm^2 for 7-13 yr old

ABS_d = dermal absorption fraction; (0.14), Wester et. al, 1993

AT_c = averaging time, 70yrsx365dys/yr - (25550days); Site-specific

Substituting the values above into the equation:

$$ELCR = \frac{10x84\ [(2x1x48.2) + (384.5\ x0.14\ x2)]}{(25550)(10^6 mg/kg)}$$

$$= \frac{840(96.4 + 107.7)}{25550x10^6} = \frac{171410.4}{25550x\ 10^6} = 6.7 \times 10^{-6}$$

Thus a 10 ppm cleanup level in recreational soils is associated with an excess cancer risk of $7x10^{-6}$ and a noncancer hazard of 1.4.

2. Recreational 1-3ft (15ppm)

A child at a playground is expected to be exposed to soils in the top foot. This is based on the typical activities which tend to occur in playgrounds and the expectation that an Environmental Restriction and Easement (ERE) will limit exposures at depth. However, since elevated concentrations of PCBs do exist below one foot in certain areas of the Site, an added measure of protection was selected to further reduce any possibility of exposure to the contaminated soils in the 1-3 foot interval. As a result, soils at the 1-3 foot depth will be cleaned up to a level of 15 ppm as an added measure of protection.

3. Commercial/Industrial 0-1ft (25 ppm)

For future commercial/industrial areas of the Site, the cleanup level has been set at 25 ppm. A daycare scenario is not considered in deriving this cleanup level since this use does not typically occur in industrial settings. Those individuals who are the most likely to receive the highest exposure to surface soils in these areas are groundskeepers who will be involved in activities such as gardening, mowing the lawn, sculpturing bushes, etc. In estimating noncancer hazards and excess cancer risks associated with this cleanup level, it is assumed that an groundskeeper works outdoors for 3 days per week for 7 months of the year (May through November) when the ground is not frozen or covered with snow. It is also assumed that a groundskeeper's head, forearms and hands are exposed to contaminated soil throughout this time.

Office workers could also be exposed to contaminated surface soil. However, their exposure is likely to be much lower than that of a groundskeeper. Thus the cleanup level for a groundskeeper should be protective for an office worker.

Estimated noncancer hazard associated with oral and dermal exposure to a groundskeeper in industrial areas

$$HQ = \frac{C_s \times F \times D}{(BWa \times AT_{nc})}\left[\left(\frac{1}{RfD_o} \times \frac{IR_c \times FI \times ABS_o}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_o} \times \frac{AF \times SA \times ABS_d}{10^6 mg/kg}\right)\right]$$

Where;

HQ = hazard quotient
C_s = PCB concentration in soil, (i.e., cleanup level) (25mg/kg)
F = exposure frequency; (84dys/yr)=3dys/wkx4wks/mos 7mos/yr, (May-Nov); site-specific
D = duration;(25 yrs); EPA, 1991
IRa = soil ingestion rate for adult worker; 50mg/dy; EPA, 1991
FI = fraction ingested from site; (1); professional judgement
ABS_o = GI absorption fraction; (1); PTI, 1993
SA = surface area of a groundskeeper exposed during May thru November = head, forearms and hands ($3300 cm^2$)

- average of 50th percentile SA for body part of males/females >18yrs
- Assume female adult forearm SA is 45% of the arm SA (based on info in males)

AF = overall skin adherence factor weighted by body part exposed($0.1 mg/cm^2$ -event)
Based on gardener data from EPA, 1997, using the 50th% for the AF for each body part which results in an overall 50^{th} % AF. The AF dataset for a gardener was chosen because it represents a "high-end" activity for a groundskeeper. When using a high-end activity, the 50^{th} percentile for the AF best approximates the RME scenario, thus the choice of the 50^{th} % for the adherence factor.
ABS_d = dermal absorption fraction; (0.14), Wester et. al, 1993
BW = average body weight; 70kg (EPA, 1997)
AT_{nc} = averaging time, 25yrsx365dys/yr - (9125 dys); Site-specific
RfD = reference dose for Aroclor 1254 = 2×10^{-5} mg/kg-dy; IRIS, 1998

Substituting the values above into the equation:

$$HQ = \frac{25 \times 84 \times 25}{(70 \times 9125)}\left[\left(\frac{(1)}{2\times10^{-5}} \times \frac{(50 \times 1)}{10^6}\right) + \left(\frac{1}{2\times10^{-5}} \times \frac{(3300 \times 0.1 \times 0.14)}{10^6}\right)\right]$$

$$= \frac{52500}{638750}\left(\frac{50}{20} + \frac{46.2}{20}\right) = 0.4$$

Estimated excess cancer risk associated with oral and dermal exposure to groundskeeper in commercial areas

$$ELCR = \frac{C_s \times F \times D \times CSF\,[(ABS_o \times IR \times FI) + (SA \times AF \times ABS_d)}{BW \times AT_c \times 10^6\ mg/kg}$$

See above for additional definition and values of terms;
At_c = averaging time, 70yrsx365dys/yr - (25550 dys); EPA, 1991
CSF = cancer slope factor for PCBs (2 mg/kg-dy)$^{-1}$; IRIS, 1998
Substituting into this equation;

$$ELCR = \frac{25 \times 84 \times 25 \times 2\ [(1)(50) + (0.1 \times 0.14 \times 3300)}{(70)(25550)(10^6 mg/kg)}$$

$$= \frac{105000\ (50+46.2)}{1788500 \times 10^6}$$

$$= \frac{10101000}{1788500 \times 10^6} = 5.6 \times 10^{-6} \text{ or } 6 \times 10^{-6}$$

Thus a 25 ppm cleanup level in soils is associated with an excess cancer risk of 6×10^{-6} and a noncancer hazard of 0.4.

4. Commercial/Industrial Subsurface (1-6 foot depth) - 200 ppm

The cleanup level for the 1-6 foot depth interval on commercial/industrial properties is 200 ppm. Based on the EREs and other Consent Decree provisions, it is expected that the only individual likely to be exposed to PCBs at 200 ppm in the 1-6 foot depth interval would be a utility worker conducting infrequent, short-term work in existing utility corridors (e.g., emergency utility repairs).

This cleanup level is deemed protective for such situations. In estimating cancer and noncancer risks associated with this cleanup level, it is assumed that the worker is exposed during these situations to contaminated subsurface soil for 5 days per year for 25 years. This exposure is evaluated cumulatively over 25 years, not as separate acute exposures. Dermal contact with and incidental ingestion of soil was considered. It was assumed that the worker's head, hands and forearms could come into contact with contaminated soil.

The cleanup level of 200 ppm equates to a Hazard Index of 0.9 and an excess cancer risk of 1×10^{-5}.

The values used to calculate the risk levels associated with 200 ppm are provided below. Sources for each value are also provided. The equations used are the same as those used to estimate risks for Industrial areas and are shown in Section 3.

Values used to estimate risks associated with the cleanup level of 200 ppm

HQ	=	Hazard Quotient
ELCR	=	Excess Lifetime Cancer Risk
IR	=	Soil Ingestion Rate, 137 mg/kg (ChemRisk, 1997)
F	=	Exposure Frequency, 5 days/yr (Geraghty and Miller, 1992)
D	=	Exposure Duration, 25 yrs; Site specific
C_s	=	Concentration in soil (cleanup level), 200 mg/kg
BW	=	Body weight, 70 kg (EPA 1991)
At_{nc}	=	Averaging Time for noncancer, 9125 days (25 years x 365 days/yr)
At_c	=	Averaging Time for cancer, 25550 days (70 yrs x 365 days/yr)
SA	=	Skin surface area, 3300 cm^2, (head, hands, forearms) (EPA 1997)
AF	=	Adherence Factor, 0.8 mg/cm^2-day, The AF dataset for a utility worker was chosen because it represents a "typical" or central tendency activity for a utility worker. The 95th % AF of this dataset best approximates an RME scenario, (Kissel *et al.*, in press; EPA 1998)
ABS_d	=	dermal absorption factor, 0.14 for PCBs (Wester *et al.*, 1993)
ABS_o	=	GI absorption factor, 1 for PCBs (from PTI, 1993)
RfD	=	Reference Dose, 2 x 10^{-5} mg/kg/day (IRIS 1996)
CSF	=	Cancer slope factor for PCBs, 2 $(mg/kg\text{-}day)^{-1}$ (IRIS 1998)
C	=	Conversion, 10^{-6} kg/mg

Substituting the above values into the equation for estimating noncancer risks:

$$HQ = \frac{200 \times 5 \times 25}{70 \times 9125}\left[\frac{(1)}{2 \times 10^{-5}} \times \frac{(137 \times 1 \times 1)}{10^{6}} + \frac{(1)}{2 \times 10^{-5}} \times \frac{(3300 \times 0.8 \times 0.14)}{10^{6}}\right]$$

$$HQ = \frac{25000\,[137/20 + 369/20]}{638750} = 0.9$$

Substituting the above values into the equation for estimating cancer risks:

$$ELCR = \frac{200 \times 5 \times 25 \times 2\,[(1 \times 137 \times 1) + (3300 \times 0.8 \times 0.14)]}{70 \times 25550 \times 10^{6}}$$

$$ELCR = \frac{50000\,[137+369]}{1788500 \times 10^{6}} = 1.4 \times 10^{-5}$$

5. Current and Future Residential Property (0-15 foot depth)- 2 ppm

A cleanup level of 2 ppm must be met in residential areas. The 2 ppm concentration is the MA DEP's generic Method 1 soil cleanup standard for residential use. We have relied on the Method 1 standard in determining the cleanup level. However, below we have also presented risk calculation to provide quantitative risk measurements. This level is protective for young children and adults who may be exposed to contaminated soil while playing in their yard or

while gardening or doing yard work. In evaluating risks associated with this cleanup level, it was assumed that residents are exposed to contaminated soil in their yard 5 days per week for 7 months of the year (May through November) when the ground is not frozen or snow-covered. Noncancer risks were evaluated for a young child aged 1-6. Cancer risks were evaluated for a resident aged 1-30 years. It was assumed that a child resident's head, lower arms, hands, lower legs and feet could be exposed to contaminated soil from May through September and that an adult resident's head, lower arms, hands and lower legs would be exposed. In October and November, both a child and adult resident's hands and face could be exposed. Dermal contact with soil and incidental ingestion of soil were considered.

The values used to calculate the risks are provided below.

Estimated noncancer hazard associated with oral and dermal exposure to recreational soils

$$HQ = C_s \times F \times D \left[\left(\frac{1}{(BW_C \times AT_{nc})\,RfD_o} \times \frac{IR_c \times FI \times ABS_o}{10^6\,mg/kg}\right) + \left(\frac{1}{RfD_o} \times \frac{[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7] \times ABS_d}{10^6 mg/kg}\right)\right]$$

HQ = hazard quotient
C_s = PCB concentration in soil, (i.e., cleanup level) (2mg/kg)
F = exposure frequency; (150dys/yr)=5dys/wk for 7mos/yr, (May-Nov); site-specific
D = duration;(child - 6 yrs); Site-specific
IR_c= soil ingestion rate for child 1-6; 200mg/dy; EPA, 1991
FI = fraction ingested from site; (1); site-specific
ABS_o= GI absorption fraction; (1); PTI, 1993
SA_1 = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 cm^2 ;EPA, 1997; Based on same information for noncancer calculations for a recreational child (see above).
AF_1 = overall skin adherence factor weighted by body-part exposed;
For child 1-6 = 0.24mg/cm^2 -event: See calculations for recreational child above.
SA_2= surface area for a child exposed during Oct thru Nov. = head and hands;
= 1340 cm^2 for 1-6 yr old
AF_2= overall skin adherence factor weighted by body part exposed from Oct thru Nov; 0.23mg/cm^2 (see calculation for a recreational child)
ABS_d = dermal absorption fraction; (0.14), Wester et. al, 1993
BW = average body weight; 15 for 1-6yr old (EPA, 1997)
AT_{nc} = averaging time, 6yrsx365dys/yr - (2190 dys); Site-specific
RfD = reference dose for Aroclor 1254 = 2×10^{-5} mg/kg-dy; IRIS, 1998
Substituting the values above into the equation:

$$THQ = 2 \times 150 \times 6 \left[\left(\frac{1}{[15 \times 2190]\, 2\times10^{-5}} \times \frac{200 \times 1}{10^6}\right) + \left(\frac{1}{2\times10^{-5}} \times \frac{[((2900 \times 0.24 \times 5) + (1340 \times 0.23 \times 2))/7] \times 0.14}{10^6}\right)\right]$$

$$= \frac{1800}{(32850)}\left(\frac{200}{20} + \frac{81.9}{20}\right) = 0.055 \times 14 = 0.77 \text{ or } 0.8$$

Estimated excess cancer risk associated with oral and dermal exposure to residential soils

$$ELCR = \frac{C_s \times F\,[(CSF \times ABS_o \times IF_{adj}) + (SFS_{adj} \times CSF \times ABS_d)]}{AT_c \times 10^6 \text{ mg/kg}}$$

Where;.

ELCR = excess lifetime cancer risk

C_s = PCB concentration in soil, (i.e., cleanup level) (2mg/kg)

F = exposure frequency; (150dys/yr)=5dys/w for 7mos/yr, (May-Nov); site-specific

CSF = cancer slope factor for PCBs (2 mg/kg-dy)$^{-1}$; IRIS, 1998

ABS_o = GI absorption fraction; (1); PTI, 1993

IF_{adj} = age- adjusted soil ingestion factor, equal to:

$$\frac{(FI)(IR_{1\text{-}6})(D_{1\text{-}6})}{BW_{1\text{-}6}} + \frac{(FI)(IR_{7\text{-}31})(D_{7\text{-}31})}{BW_{7\text{-}31}} = 80 + 34.28 = 114\text{mg-yr/kg-dy}$$

Where;

IR_c = soil ingestion rate; child 1-6; 200mg/dy; child 7-31; 100mg/dy; EPA, 1991

FI = fraction ingested from site; (1); site-specific

BW = average body weight; 15 for 1-6yr old; 70 for 7-31 yr old; EPA, 1997,

D = duration; 1-6yrs old -6 yrs; 7-31 yr old - 24yr; Site-specific

SFS_{adj} = age-adjusted soil contact factor=

$$\frac{(D_{1\text{-}6})[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7]_{1\text{-}6}}{BW_{1\text{-}6}} + \frac{(D_{7\text{-}31})[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7]_{7\text{-}31}}{BW_{7\text{-}31}}$$

$$= \frac{(6)[((0.24 \times 2900 \times 5)+(0.23 \times 1340 \times 2))/7]}{15} + \frac{(24)[((0.1 \times 5700 \times 5)+(0.15 \times 2110 \times 2))/7]}{70} =$$

$$= \frac{6[(3480+616.4)/7]}{15} + \frac{24[(2850+633)/7]}{70} = 234.1+170.6 = 404.7$$

Where;

SA_1 = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 cm^2 (see above), for 7-31=5700 cm^2;EPA, 1997; Same assumptions and approach as in recreational calculations.

AF_1 = overall skin adherence factor weighted by body-part exposed;

For child 1-6 = 0.24mg/cm^2 -event(see recreational scenario above);

For 7-31:= 0.1mg/cm^2-event Based on;

- **used Kissel data listed in EPA, 1997 for gardeners. Used 50th percentile AFs which result in overall 50th percentile AF. Surface area based on 7-31 yr old**

AF_2 = overall skin adherence factor weighted by body-part exposed; hands and face exposed

For child 1-6 = 0.23mg/cm^2 (see recreational scenario above)

$$AF_{2(7\text{-}31)} = \frac{(402)(0.053)+(904)(0.19)}{402+904} = 0.15\text{mg/cm}^2$$

SA_2= surface area for a child exposed during Oct thru Nov. = head and hands; 1340 cm^2 for 1-6 yr old; 2110 cm^2 for 7-31 yr old

ABS_d = dermal absorption fraction; (0.14), Wester et. al, 1993
ABS_d = dermal absorption fraction; (0.14),Wester et. al, 1993
AT_c = averaging time, 70yrsx365dys/yr - (25550days); Site specific

Substituting the values above into the equation:

$$ELCR = \frac{2x150\ [(2x1x114) + (404.7x0.14\ x2)]}{(25550)(10^6 mg/kg)}$$

$$= \frac{300(228 + 113.3)}{25550x10^6} = \frac{102394.8}{25550x\ 10^6} = 4.0 \times 10^{-6}$$

The cleanup level of 2 ppm equates to a Hazard Quotient of 0.8 and an excess cancer risk of $4x10^{-6}$.

6. Allendale School (0-15 feet) 2 ppm

A cleanup level of 2 ppm has been chosen for Allendale School. This is the generic MCP Method 1 standard for PCB at residential properties. The assumptions and calculation would mirror those assumptions and calculations for the residential properties presented above. This cleanup level is also protective of the current use of this area (i.e. as a playground and sports field).

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ATTACHMENT B

MEMORANDUM

DATE: February 7, 2000

SUBJECT: Ecological Risk Goals for the EE/CA for the East Branch Housatonic River

FROM: Susan C. Svirsky Susan C. Svirsky

TO: Chet Janowski

This memorandum summarizes the ecological risk-based goals to be used in the Engineering Evaluation/Cost Evaluation (EE/CA) for the 1 ½ mile reach of the East Branch of the Housatonic River. Goals need to be established for remediation of both river sediments and bank soils that are protective of ecological receptors. The goal for the river sediments is to protect aquatic life and piscivorous mammals and birds. The goal for the bank soils is to protect terrestrial mammals and birds. These goals are based upon the information and conclusions summarized in the "*Upper Reach - Housatonic River Ecological Risk Assessment*" (ERA)(Weston, 1998), and subsequent sediment and river bank data that have been collected for the purpose of the EE/CA.

BACKGROUND

It has been documented extensively in the literature that polychlorinated biphenyls (PCBs) in the ecosystem cause a variety of adverse effects to ecological receptors, including death, birth defects, reproductive failure impairment, liver damage, tumors, behavioral modifications, and a "wasting"syndrome (Eisler, 1996), and that some forms of PCBs (congeners) are believed to result in endocrine disruption in ecological receptors. PCBs bioaccumulate and biomagnify, primarily due to the affinity PCBs have for fatty tissue. This ability to biomagnify means that the concentrations of PCBs in the organisms at the bottom of food chain have a profound effect on entire food chain.

Studies documented in the literature demonstrate that different animals (for example, fish vs. mammals) have greatly differing sensitivities and resulting effects from exposure to PCBs. Even difference species within a group (such as river otter vs. mink) may have varying sensitivities to PCBs.

For this reason, the ecological risk-based goals for the EE/CA are derived to be protective for the more sensitive receptors, and in doing so are deemed to be protective of the entire ecosystem.

RIVER SEDIMENTS

The most sensitive pathway for ecological exposure to PCB contamination in the river is through the aquatic food chain. One measure of this exposure is the EPA draft Sediment Quality Guidelines (SQG) approach, which is based upon the equilibrium partitioning theory using the chronic Ambient Water Quality Criteria (AWQC). For PCBs, the chronic AWQC was derived for the protection of mink consuming fish. Additional measures of aquatic effects are documented by the numerous other sediment quality benchmarks for PCBs which have been established to provide the scientific and regulatory communities with tools to evaluate the severity of sediment contamination. Some of the benchmarks use adverse effects to the benthic community as endpoint, while others indirectly use food chain transfers the endpoint.

A summary of the SQG and existing applicable benchmarks for PCBs is outlined in Table 1. Table 2 provides comparison of these benchmarks against existing sediment and total organic carbon data collected from the EECA reach expressed as Hazard Quotients, that is the amount by which the guideline is exceeded.

This comparison results in a qualitative evaluation which identifies whether potential impacts to the benthic community and piscivorous receptors are possible or probable based upon the concentration of PCBs present in sediments. The concentrations of PCBs in river sediments that result in adverse effects to a number of different ecological endpoints (including benthic invertebrates, fish, and birds and mammals which rely upon fish for large portion of their diet), range from 0.0227 mg/kg to 5.72 mg/kg at approximately 1% organic carbon. The lower values are thought to be conservative, either influenced to some degree by other, co-occurring contaminants or representing a theoretical exposure based upon equilibrium partitioning. While there is uncertainty surrounding the protectiveness of a level of 1 mg/kg, it is not representative of worst-case assumptions nor is it a no adverse effect level. In addition, the benchmark values were based upon data sets that generally reviewed total PCB data and may not be reflective of the more highly chlorinated PCB mixtures (primarily Aroclor 1260) that are found at the site.

RIVER BANK SOILS

The critical ecological receptors of concern from exposure to PCB contaminated river bank soils include small mammals such as shrews and moles that typically have smaller foraging areas (e.g. as small as one-fifth an acre), and other larger mammals that burrow and den in and on the banks. In this reach, numerous species of large burrowing and den-building mammals have been noted, including beaver, muskrat, woodchuck, fox, racoon, and skunk.

PCB cleanup concentrations were derived for the protection of human health exposure to river bank soils in the EE/CA reach. Two scenarios are being applied, a residential exposure and a recreational exposure. The resultant PCB cleanup concentrations are 2 mg/kg, and 10 mg/kg in the top 3 feet minimum, respectively. These cleanup numbers and the application of these numbers in the EE/CA was evaluated to determine the protectiveness of these actions for ecological receptors.

All residential properties will be remediated to a 2 mg/kg 95% UCL concentration of PCBs in river bank soils. Most of the residential property river banks contain habitat likely to support a number of ecological receptors, including the more affected species described above. The cleanup of the river banks on these properties to 2 mg/kg 95% UCL will be adequate to eliminate risk to ecological receptors with unlimited exposure and under any scenario. This will also be protective, with the restoration of the banks with clean materials, for the potential of erosion of river bank soil into the river.

Properties determined to have recreational rather than residential use in this reach are so designated due to the very steep nature of the banks. These properties will have the top 3 feet of river bank soil removed and replaced with clean soil to achieve 10 mg/kg 95% UCL. This cleanup as proposed in the EE/CA is also expected to be fully protective for ecological receptors including those deep burrowing species without additional precautions for risk reduction. While a site-specific cleanup goal has not been calculated for this reach, the assessment performed in the ERA for exposure of receptors in the river banks, the degraded, urbanized habitat present in this reach, and calculations of cleanup goals performed for the exposure of these or similar receptors to PCBs at other sites support this finding. In addition, restoration of the banks with clean material will further reduce the potential for erosion of highly contaminated river bank soil into the river resulting in recontamination of river sediments.

Table 1

Sediment Quality Guidelines for Polychlorinated Biphenyls
Upper Reach – Housatonic River
Pittsfield, Massachusetts

Guideline	Total PCBs
NOAA Standards [a] ***(mg/kg DW)***	
Effects Range – Low (ER-L)	0.0227
Effects Range – Median (ER-M)	0.18
Ontario Standards [b] ***(mg/kg DW)***	
Lowest Effect Level (LEL)	0.07
Severe Effect Level (SEL)	5.72[c]
EPA SQG [d] ***(mg/kg DW)***	
SQG	0.0818

[a] Long et al., 1995.
[b] Persaud et al., 1996.
[c] The bulk sediment SEL is derived by multiplying the sample-specific fraction organic carbon (FOC) (to a maximum of 0.1) by 530 mg PCB/kg OC. The FOC is equivalent to the total organic carbon (TOC) in units of % divided by 100.The bulk sediment SEL presented in this table was calculated using an average site-specific FOC of 0.0108 (i.e., 1.08%). (Average FOC calculated with non-detects included at 1/2 the SQL.)
[d] U.S. EPA, 1993a. The SQG was calculated as a bulk sediment value (i.e., in mg/kg DW) using the equation below. Note that mg/kg is equivalent to µg/g.

SQG (mg/kg DW) = K_{oc} * FOC * CF * FCV
where: K_{oc} = 5.41E+05 L/kg, based on Aroclor 1254 (Mackay et al., 1992).
FOC = 0.0108, average site-specific value.
CF = 1E-03 kg/g.
FCV = 0.014 µg/L (Federal AWQC for Aroclor 1254).

Table 2

Comparison of Total PCB Concentrations to Sediment Guidelines

Location ID	Total Organic Carbon (mg/kg)	Total PCBs (mg/kg)	Hazard Quotient — NOTE: Hazard quotients represent the degree of exceedance — NOAA[a] Effects Range-Low (ER-L)[c]	NOAA[a] Effects Range-Median (ER-M)[d]	OMEE[b] Lowest Effect Level (LEL)[e]	OMEE[b] Severe Effect Level (SEL)[f]	SQG[g]
Lyman Street to Elm Street							
SE000007	1.34E+03	3.60E+00	1.59E+02	2.00E+01	5.14E+01	5.07E+00	3.53E+02
SD010661	3.94E+03 J	5.49E+00	2.42E+02	3.05E+01	7.84E+01	2.63E+00	1.83E+02
SD010662	2.10E+04 J	1.72E+01	7.58E+02	9.56E+01	2.46E+02	1.55E+00	1.08E+02
SD010681	3.28E+03 J	5.50E+01	2.42E+03	3.06E+02	7.86E+02	3.16E+01	2.21E+03
SD010682	5.30E+03 J	1.25E+00	5.51E+01	6.94E+00	1.79E+01	4.45E-01	3.10E+01
SD010683	3.09E+03 J	1.35E+00	5.95E+01	7.50E+00	1.93E+01	8.24E-01	5.75E+01
SD010701	1.66E+03 UJ	9.02E+01	3.97E+03	5.01E+02	1.29E+03	1.02E+02	7.15E+03
SD010702	2.66E+03 J	2.75E-01 *	1.21E+01	1.53E+00	3.92E+00	1.95E-01	1.36E+01
SD010703	3.06E+03 J	1.87E+00	8.24E+01	1.04E+01	2.67E+01	1.15E+00	8.04E+01
SD010721	2.07E+03 J	1.39E+01	6.12E+02	7.72E+01	1.99E+02	1.27E+01	8.84E+02
SD010722	9.27E+03 J	4.54E+00	2.00E+02	2.52E+01	6.49E+01	9.24E-01	6.44E+01
SD010723	4.90E+03 J	3.39E+00	1.49E+02	1.88E+01	4.84E+01	1.31E+00	9.10E+01
SD010741	NA	1.04E+00	4.58E+01	5.78E+00	1.49E+01	NA	NA
SD010742	NA	3.17E-01 *	1.39E+01	1.76E+00	4.52E+00	NA	NA
SD010743	NA	2.27E+00	1.00E+02	1.26E+01	3.24E+01	NA	NA
SD010761	NA	1.35E+00	5.95E+01	7.50E+00	1.93E+01	NA	NA
SD010761	NA	4.16E+00	1.83E+02	2.31E+01	5.94E+01	NA	NA
SD010762	NA	1.94E+01	8.55E+02	1.08E+02	2.77E+02	NA	NA
SD010763	NA	1.18E+01	5.20E+02	6.56E+01	1.69E+02	NA	NA
SD010781	NA	3.27E+00	1.44E+02	1.82E+01	4.67E+01	NA	NA
SD010782	NA	6.19E+00	2.73E+02	3.44E+01	8.84E+01	NA	NA
SD010783	NA	5.84E+00	2.57E+02	3.24E+01	8.34E+01	NA	NA
SD010801	NA	3.30E+00	1.45E+02	1.83E+01	4.71E+01	NA	NA
SD010801	NA	2.85E+01	1.26E+03	1.58E+02	4.07E+02	NA	NA
SD010802	NA	1.48E+00	6.52E+01	8.22E+00	2.11E+01	NA	NA
SD010803	NA	6.04E+00	2.66E+02	3.36E+01	8.63E+01	NA	NA
SD010821	NA	3.98E-01 *	1.75E+01	2.21E+00	5.69E+00	NA	NA
SD010822	NA	3.31E+00	1.46E+02	1.84E+01	4.73E+01	NA	NA
SD010823	NA	1.40E+00	6.17E+01	7.78E+00	2.00E+01	NA	NA
SD010841	NA	4.57E+00	2.01E+02	2.54E+01	6.53E+01	NA	NA
SD010841	NA	2.90E+00	1.28E+02	1.61E+01	4.14E+01	NA	NA
SD010842	NA	5.47E-01	2.41E+01	3.04E+00	7.81E+00	NA	NA
SD010843	NA	7.21E-01	3.18E+01	4.01E+00	1.03E+01	NA	NA
SD010861	NA	6.54E+00	2.88E+02	3.63E+01	9.34E+01	NA	NA
SD010862	NA	4.01E+00	1.77E+02	2.23E+01	5.73E+01	NA	NA
SD010863	NA	5.34E+00	2.35E+02	2.97E+01	7.63E+01	NA	NA
SD010881	NA	2.73E+01	1.20E+03	1.52E+02	3.90E+02	NA	NA
SD010881	NA	2.27E+01	1.00E+03	1.26E+02	3.24E+02	NA	NA
SD010882	NA	3.01E-01 *	1.33E+01	1.67E+00	4.30E+00	NA	NA

Table 2

Comparison of Total PCB Concentrations to Sediment Guidelines

Location ID	Total Organic Carbon (mg/kg)	Total PCBs (mg/kg)	Hazard Quotient — NOTE: Hazard quotients represent the degree of exceedance				
			NOAA[a]		OMEE[b]		
			Effects Range-Low (ER-L)[c]	Effects Range-Median (ER-M)[d]	Lowest Effect Level (LEL)[e]	Severe Effect Level (SEL)[f]	SQG[g]
SD010883	NA	2.74E+00	1.21E+02	1.52E+01	3.91E+01	NA	NA
SD010901	9.57E+03	1.36E+00	5.99E+01	7.56E+00	1.94E+01	2.68E-01	1.87E+01
SD010902	1.09E+02 U	2.00E+01	8.81E+02	1.11E+02	2.86E+02	3.46E+02	2.41E+04
SD010903	1.74E+04	1.07E+01	4.71E+02	5.94E+01	1.53E+02	1.16E+00	8.09E+01
SD010921	6.95E+03	2.24E+00	9.87E+01	1.24E+01	3.20E+01	6.08E-01	4.24E+01
SD010922	2.61E+03 U	4.58E-01	2.02E+01	2.54E+00	6.54E+00	3.31E-01	2.31E+01
SD010941	1.70E+04	1.97E+00	8.68E+01	1.09E+01	2.81E+01	2.19E-01	1.52E+01
SD010942	4.46E+03 U	2.96E+00	1.30E+02	1.64E+01	4.23E+01	1.25E+00	8.73E+01
SD010943	1.07E+02 U	1.19E+00	5.24E+01	6.61E+00	1.70E+01	2.10E+01	1.46E+03
SD010961	1.63E+04	2.84E+00	1.25E+02	1.58E+01	4.06E+01	3.29E-01	2.29E+01
SD010961	2.27E+04	1.48E+00	6.52E+01	8.22E+00	2.11E+01	1.23E-01	8.58E+00
SD010962	7.29E+03 U	8.33E-01	3.67E+01	4.63E+00	1.19E+01	2.16E-01	1.50E+01
SD010981	1.21E+04	1.72E+00	7.58E+01	9.56E+00	2.46E+01	2.68E-01	1.87E+01
SD010981	2.05E+04	1.42E+00	6.26E+01	7.89E+00	2.03E+01	1.31E-01	9.11E+00
SD011001	4.08E+03	6.17E+00	2.72E+02	3.43E+01	8.81E+01	2.85E+00	1.99E+02
SD011001	1.39E+04	4.93E+01	2.17E+03	2.74E+02	7.04E+02	6.69E+00	4.67E+02
SD011002	2.57E+04	1.21E+01	5.33E+02	6.72E+01	1.73E+02	8.88E-01	6.19E+01
SD011002	1.62E+04	4.01E-01 *	1.76E+01	2.23E+00	5.72E+00	4.66E-02	3.25E+00
SD011003	4.92E+04	1.79E+00	7.89E+01	9.94E+00	2.56E+01	6.86E-02	4.79E+00
SD011021	NA	1.07E+01	4.71E+02	5.94E+01	1.53E+02	NA	NA
SD011022	1.17E+04	3.80E+00	1.67E+02	2.11E+01	5.43E+01	6.13E-01	4.27E+01
SD011023	1.31E+04	5.87E+00	2.59E+02	3.26E+01	8.39E+01	8.45E-01	5.90E+01
SD011041	1.51E+04	2.79E+00	1.23E+02	1.55E+01	3.99E+01	3.49E-01	2.43E+01
SD011042	7.53E+02	3.49E+00	1.54E+02	1.94E+01	4.99E+01	8.74E+00	6.10E+02
SD011043	1.09E+03	3.99E+01	1.76E+03	2.22E+02	5.70E+02	6.91E+01	4.82E+03
SD021062	4.29E+03 U	9.09E-01	4.00E+01	5.05E+00	1.30E+01	4.00E-01	2.79E+01
SD021063	1.07E+04	1.97E+01	8.68E+02	1.09E+02	2.81E+02	3.47E+00	2.42E+02
Elm Street to Dawes Avenue							
SE000001	1.03E+04	3.53E-01 *	1.56E+01	1.96E+00	5.04E+00	6.47E-02	4.51E+00
SE000021	NA	4.15E-01 *	1.83E+01	2.31E+00	5.93E+00	NA	NA
SE000021	1.01E+03	9.70E+00	4.27E+02	5.39E+01	1.39E+02	1.81E+01	1.26E+03
SE000021	NA	5.10E+00	2.25E+02	2.83E+01	7.29E+01	NA	NA
SE000022	1.91E+04	2.20E-01	9.69E+00	1.22E+00	3.14E+00	2.17E-02	1.52E+00
SE000022	1.00E+02 U	1.80E+02	7.93E+03	1.00E+03	2.57E+03	3.40E+03	2.37E+05
SE000022	1.15E+04	1.90E+00	8.37E+01	1.06E+01	2.71E+01	3.12E-01	2.17E+01
SE000473	4.11E+04	1.11E+02	4.89E+03	6.17E+02	1.59E+03	5.10E+00	3.55E+02
SE000475	7.24E+05	1.03E+00 *	4.52E+01	5.69E+00	1.46E+01	1.93E-02	1.86E-01
SD021101	6.33E+03	2.60E+01	1.15E+03	1.44E+02	3.71E+02	7.75E+00	5.40E+02
SD021103	7.07E+03	3.06E+00	1.35E+02	1.70E+01	4.37E+01	8.17E-01	5.69E+01
SD021123	7.54E+04	1.00E-01	4.41E+00	5.56E-01	1.43E+00	2.50E-03	1.75E-01

Table 2

Comparison of Total PCB Concentrations to Sediment Guidelines

Location ID	Total Organic Carbon (mg/kg)	Total PCBs (mg/kg)	Hazard Quotient — NOTE: Hazard quotients represent the degree of exceedance				
			NOAA[a]		OMEE[b]		
			Effects Range-Low (ER-L)[c]	Effects Range-Median (ER-M)[d]	Lowest Effect Level (LEL)[e]	Severe Effect Level (SEL)[f]	SQG[g]
SD021202	5.63E+04	2.51E-01 *	1.10E+01	1.39E+00	3.58E+00	8.40E-03	5.85E-01
SD021203	2.90E+03	7.16E+00	3.15E+02	3.98E+01	1.02E+02	4.66E+00	3.25E+02
SD021223	1.27E+04	9.99E+01	4.40E+03	5.55E+02	1.43E+03	1.48E+01	1.04E+03
SD021262	3.19E+04	3.55E+01	1.56E+03	1.97E+02	5.07E+02	2.10E+00	1.46E+02
SD021281	4.66E+03 J	3.51E-01	1.55E+01	1.95E+00	5.01E+00	1.42E-01	9.91E+00
SD021282	3.73E+03	2.81E-01 *	1.24E+01	1.56E+00	4.01E+00	1.42E-01	9.91E+00
SD021283	5.69E+03	1.40E+00	6.17E+01	7.78E+00	2.00E+01	4.64E-01	3.24E+01
SD021302	5.23E+03	2.08E+00	9.16E+01	1.16E+01	2.97E+01	7.50E-01	5.23E+01
SD021362	3.28E+03	3.00E+00	1.32E+02	1.67E+01	4.29E+01	1.73E+00	1.20E+02
SD021401	1.21E+02 U	6.47E+00	2.85E+02	3.59E+01	9.24E+01	1.01E+02	7.04E+03
SD021403	3.59E+03	7.98E-01	3.52E+01	4.43E+00	1.14E+01	4.19E-01	2.92E+01
SD021403	3.22E+03 U	1.06E+00	4.67E+01	5.89E+00	1.51E+01	6.21E-01	4.33E+01
SD021442	1.68E+04	8.50E+00	3.74E+02	4.72E+01	1.21E+02	9.55E-01	6.66E+01
SD021501	1.18E+02 U	2.59E+00	1.14E+02	1.44E+01	3.70E+01	4.14E+01	2.89E+03
Dawes Avenue to Confluence							
SD021522	6.36E+03	3.08E+00	1.36E+02	1.71E+01	4.40E+01	9.14E-01	6.37E+01
SD021523	1.21E+02 U	2.68E+00	1.18E+02	1.49E+01	3.83E+01	4.18E+01	2.91E+03
SD021541	6.22E+03	4.20E+00	1.85E+02	2.33E+01	6.00E+01	1.27E+00	8.88E+01
SD021542	9.15E+02	4.50E+01	1.98E+03	2.50E+02	6.43E+02	9.28E+01	6.47E+03
SD021542	2.99E+04	3.80E+00	1.67E+02	2.11E+01	5.43E+01	2.40E-01	1.67E+01
SD021543	8.13E+03	9.29E+00	4.09E+02	5.16E+01	1.33E+02	2.16E+00	1.50E+02
SD021561	1.38E+02 U	2.14E+01	9.43E+02	1.19E+02	3.06E+02	2.93E+02	2.04E+04
SD021562	1.39E+04	5.64E+00	2.48E+02	3.13E+01	8.06E+01	7.66E-01	5.34E+01
SD021562	1.85E+03	5.37E+00	2.37E+02	2.98E+01	7.67E+01	5.48E+00	3.82E+02
SD021581	5.93E+03 U	1.68E+00	7.40E+01	9.33E+00	2.40E+01	5.35E-01	3.73E+01
SD021581	5.84E+03 U	3.42E+00	1.51E+02	1.90E+01	4.89E+01	1.10E+00	7.71E+01
SD021582	2.70E+02	1.00E+02	4.41E+03	5.56E+02	1.43E+03	6.99E+02	4.87E+04
SD021583	2.64E+03 U	2.72E-01 *	1.20E+01	1.51E+00	3.89E+00	1.94E-01	1.36E+01
SD021601	2.34E+04	5.66E+00	2.49E+02	3.14E+01	8.09E+01	4.56E-01	3.18E+01
SD021602	5.17E+03 U	3.43E+01	1.51E+03	1.91E+02	4.90E+02	1.25E+01	8.73E+02
SD021603	2.71E+03 U	2.13E+01	9.38E+02	1.18E+02	3.04E+02	1.48E+01	1.03E+03
SD021621	1.42E+03	1.50E+01	6.61E+02	8.33E+01	2.14E+02	1.99E+01	1.39E+03
SD021622	2.96E+03 U	2.67E-01 *	1.17E+01	1.48E+00	3.81E+00	1.70E-01	1.18E+01
SD021623	1.14E+02 U	3.10E+02	1.37E+04	1.72E+03	4.43E+03	5.13E+03	3.58E+05
SD021623	1.14E+02 U	2.81E-01 *	1.24E+01	1.56E+00	4.01E+00	4.65E+00	3.24E+02
SD021642	3.17E+02	5.10E+01	2.25E+03	2.83E+02	7.29E+02	3.04E+02	2.12E+04
SD021643	7.10E+02	9.36E+00	4.12E+02	5.20E+01	1.34E+02	2.49E+01	1.73E+03
SD021661	1.17E+02 U	1.38E+00	6.08E+01	7.67E+00	1.97E+01	2.23E+01	1.55E+03
SD021662	1.13E+02 U	7.36E+00	3.24E+02	4.09E+01	1.05E+02	1.23E+02	8.57E+03
SD021663	1.12E+02 U	2.49E+00	1.10E+02	1.38E+01	3.56E+01	4.19E+01	2.93E+03

Table 2

Comparison of Total PCB Concentrations to Sediment Guidelines

Location ID	Total Organic Carbon (mg/kg)		Total PCBs (mg/kg)		Hazard Quotient — NOTE: Hazard quotients represent the degree of exceedance				
					NOAA[a]		OMEE[b]		
					Effects Range-Low (ER-L)[c]	Effects Range-Median (ER-M)[d]	Lowest Effect Level (LEL)[e]	Severe Effect Level (SEL)[f]	SQG[g]
SD021681	2.74E+03		5.10E+00		2.25E+02	2.83E+01	7.29E+01	3.51E+00	2.45E+02
SD021681	2.39E+02		8.93E+00		3.93E+02	4.96E+01	1.28E+02	7.05E+01	4.92E+03
SD021682	9.55E+02		5.41E+00		2.38E+02	3.01E+01	7.73E+01	1.07E+01	7.45E+02
SD021683	1.14E+02	U	2.28E+00		1.00E+02	1.27E+01	3.26E+01	3.77E+01	2.63E+03
SD021701	7.83E+02		8.20E+01		3.61E+03	4.56E+02	1.17E+03	1.98E+02	1.38E+04
SD021702	4.27E+03	U	*6.44E-01*		*2.84E+01*	*3.58E+00*	*9.20E+00*	*2.85E-01*	*1.98E+01*
SD021703	4.85E+03	U	2.34E+00		1.03E+02	1.30E+01	3.34E+01	9.10E-01	6.35E+01
SD021721	4.54E+03	U	2.98E-01	*	1.31E+01	1.66E+00	4.26E+00	1.24E-01	8.64E+00
SD021722	4.33E+03	U	3.02E-01		1.33E+01	1.68E+00	4.31E+00	1.32E-01	9.18E+00
SD021723	4.36E+03	U	2.72E-01	*	1.20E+01	1.51E+00	3.89E+00	1.18E-01	8.21E+00
SD021741	4.38E+03	U	3.23E+00		1.42E+02	1.79E+01	4.61E+01	1.39E+00	9.70E+01
SD021742	1.24E+02	U	1.20E+00		5.29E+01	6.67E+00	1.71E+01	1.83E+01	1.27E+03
SD021742	1.26E+02	U	3.03E-01	*	1.33E+01	1.68E+00	4.32E+00	4.53E+00	3.16E+02
SD021761	4.46E+03	U	1.28E+01		5.64E+02	7.11E+01	1.83E+02	5.42E+00	3.78E+02
SD021762	4.85E+03	U	3.01E-01	*	1.33E+01	1.67E+00	4.30E+00	1.17E-01	8.17E+00
SD021763	5.58E+03		1.05E+00		4.63E+01	5.83E+00	1.50E+01	3.55E-01	2.48E+01
SD021781	4.62E+03	U	2.84E-01	*	1.25E+01	1.58E+00	4.06E+00	1.16E-01	8.09E+00
SD021782	4.31E+03	U	2.10E+01		9.25E+02	1.17E+02	3.00E+02	9.19E+00	6.41E+02
SD021782	NA		6.97E-01		3.07E+01	3.87E+00	9.96E+00	NA	NA
SD021783	4.32E+03	U	2.71E-01	*	1.19E+01	1.51E+00	3.87E+00	1.18E-01	8.25E+00
SD021801	4.54E+03	U	1.16E+00		5.11E+01	6.44E+00	1.66E+01	4.82E-01	3.36E+01
SD021802	7.61E+03		1.16E+00		5.11E+01	6.44E+00	1.66E+01	2.88E-01	2.01E+01
SD021803	7.17E+03		1.10E+00		4.85E+01	6.11E+00	1.57E+01	2.89E-01	2.02E+01
SD021821	5.06E+03	U	3.78E+00		1.67E+02	2.10E+01	5.40E+01	1.41E+00	9.83E+01
SD021821	NA		9.90E+00		4.36E+02	5.50E+01	1.41E+02	NA	NA
SD021822	4.29E+03	U	1.51E+01		6.65E+02	8.39E+01	2.16E+02	6.64E+00	4.63E+02
SD021822	4.27E+03	U	5.96E+01		2.63E+03	3.31E+02	8.51E+02	2.63E+01	1.84E+03
SD021823	4.59E+03	U	2.84E-01	*	1.25E+01	1.58E+00	4.05E+00	1.17E-01	8.13E+00
SD021841	4.80E+03	U	2.95E-01	*	1.30E+01	1.64E+00	4.21E+00	1.16E-01	8.09E+00
SD021842	4.36E+03	U	2.73E-01	*	1.20E+01	1.51E+00	3.89E+00	1.18E-01	8.22E+00
SD021843	1.19E+03		1.50E+00		6.61E+01	8.33E+00	2.14E+01	2.38E+00	1.66E+02
SD021861	2.84E+03		2.70E-01	*	1.19E+01	1.50E+00	3.85E+00	1.79E-01	1.25E+01
SD021862	4.50E+03	U	2.66E-01	*	1.17E+01	1.48E+00	3.80E+00	1.12E-01	7.78E+00
SD021863	1.02E+04		9.46E+00		4.17E+02	5.26E+01	1.35E+02	1.75E+00	1.22E+02
SD021881	4.78E+03	U	3.04E-01	*	1.34E+01	1.69E+00	4.34E+00	1.20E-01	8.35E+00
SD021881	4.73E+03	U	4.77E+01		2.10E+03	2.65E+02	6.81E+02	1.90E+01	1.33E+03
SD021882	3.65E+03		1.23E+01		5.42E+02	6.83E+01	1.76E+02	6.36E+00	4.43E+02
SD021883	2.06E+03		2.68E-01	*	1.18E+01	1.49E+00	3.82E+00	2.45E-01	1.71E+01
SD021901	5.01E+03		1.06E+00		4.67E+01	5.89E+00	1.51E+01	3.99E-01	2.78E+01
SD021902	3.08E+03		1.45E+00		6.39E+01	8.06E+00	2.07E+01	8.88E-01	6.19E+01

Table 2

Comparison of Total PCB Concentrations to Sediment Guidelines

Location ID	Total Organic Carbon (mg/kg)		Total PCBs (mg/kg)		Hazard Quotient				
					NOTE: Hazard quotients represent the degree of exceedance				
					NOAA[a]		OMEE[b]		
					Effects Range-Low (ER-L)[c]	Effects Range-Median (ER-M)[d]	Lowest Effect Level (LEL)[e]	Severe Effect Level (SEL)[f]	SQG[g]
SD021903	7.07E+02		4.65E+01		2.05E+03	2.58E+02	6.64E+02	1.24E+02	8.65E+03
SD021921	2.15E+03		5.02E+00		2.21E+02	2.79E+01	7.17E+01	4.41E+00	3.07E+02
SD021922	4.30E+03	U	7.41E-01		3.26E+01	4.12E+00	1.06E+01	3.25E-01	2.27E+01
SD021923	1.18E+03		4.46E+00		1.96E+02	2.48E+01	6.37E+01	7.13E+00	4.97E+02
SD021941	3.77E+03		4.53E+00		2.00E+02	2.52E+01	6.47E+01	2.27E+00	1.58E+02
SD021942	1.19E+04		6.89E+00		3.04E+02	3.83E+01	9.84E+01	1.09E+00	7.62E+01
SD021943	9.85E+02		2.87E-01	*	1.26E+01	1.59E+00	4.09E+00	5.49E-01	3.83E+01
SD021961	4.49E+03	U	2.48E+00		1.09E+02	1.38E+01	3.54E+01	1.04E+00	7.27E+01
SD021961	NA		2.40E+01		1.06E+03	1.33E+02	3.43E+02	NA	NA
SD021962	1.59E+03		2.77E-01	*	1.22E+01	1.54E+00	3.95E+00	3.28E-01	2.29E+01
SD021963	8.70E+02		2.98E-01	*	1.31E+01	1.66E+00	4.26E+00	6.46E-01	4.51E+01
SD021981	1.89E+03		1.48E+01		6.52E+02	8.22E+01	2.11E+02	1.48E+01	1.03E+03
SD021982	1.09E+02	U	3.35E+01		1.48E+03	1.86E+02	4.79E+02	5.80E+02	4.04E+04
SD021983	1.17E+02	U	9.35E-01		4.12E+01	5.19E+00	1.34E+01	1.51E+01	1.05E+03
SD022001	1.13E+04		7.62E+00		3.36E+02	4.23E+01	1.09E+02	1.27E+00	8.87E+01
SD022002	1.12E+02	U	2.79E-01	*	1.23E+01	1.55E+00	3.99E+00	4.70E+00	3.28E+02
SD022003	4.41E+03	U	4.63E+01		2.04E+03	2.57E+02	6.61E+02	1.98E+01	1.38E+03
SD022021	4.46E+03	U	6.05E-01		2.67E+01	3.36E+00	8.64E+00	2.56E-01	1.78E+01
SD022022	4.58E+03	U	2.95E+00		1.30E+02	1.64E+01	4.21E+01	1.22E+00	8.48E+01
SD022023	4.61E+03	U	2.95E-01	*	1.30E+01	1.64E+00	4.21E+00	1.21E-01	8.41E+00
SD022041	1.10E+02	U	6.60E-01		2.91E+01	3.67E+00	9.43E+00	1.13E+01	7.89E+02
SD022042	4.37E+03	U	2.71E-01	*	1.19E+01	1.51E+00	3.87E+00	1.17E-01	8.16E+00
SD022043	4.56E+03	U	1.63E+01		7.18E+02	9.06E+01	2.33E+02	6.74E+00	4.70E+02
SD022061	4.25E+03	U	2.54E+00		1.12E+02	1.41E+01	3.63E+01	1.13E+00	7.86E+01
SD022061	1.21E+04		1.87E+02		8.24E+03	1.04E+03	2.67E+03	2.92E+01	2.03E+03
SD022062	4.43E+03	U	2.80E-01	*	1.23E+01	1.56E+00	4.00E+00	1.19E-01	8.32E+00
SD022063	4.63E+03	U	3.00E-01	*	1.32E+01	1.67E+00	4.29E+00	1.22E-01	8.53E+00
SD022063	NA		5.00E+01		2.20E+03	2.78E+02	7.14E+02	NA	NA
SD022081	4.83E+03	U	4.74E-01		2.09E+01	2.63E+00	6.77E+00	1.85E-01	1.29E+01
SD022081	8.31E+03		7.25E+00		3.19E+02	4.03E+01	1.04E+02	1.65E+00	1.15E+02
SD022081	7.30E+02		3.00E+00		1.32E+02	1.67E+01	4.29E+01	7.75E+00	5.41E+02
SD022081	3.99E+03		9.00E+00		3.96E+02	5.00E+01	1.29E+02	4.26E+00	2.97E+02
SD022081	4.02E+04		1.60E+02		7.05E+03	8.89E+02	2.29E+03	7.51E+00	5.24E+02
SD022082	4.28E+03	U	3.92E-01		1.73E+01	2.18E+00	5.60E+00	1.73E-01	1.21E+01
SD022082	6.46E+03		3.12E+01		1.37E+03	1.73E+02	4.46E+02	9.11E+00	6.35E+02
SD022082	2.35E+03		7.20E+00		3.17E+02	4.00E+01	1.03E+02	5.78E+00	4.03E+02
SD022082	4.20E+03		6.60E+00		2.91E+02	3.67E+01	9.43E+01	2.96E+00	2.07E+02
SD022082	3.31E+04		7.40E+01		3.26E+03	4.11E+02	1.06E+03	4.22E+00	2.94E+02
SD022083	4.71E+03	U	2.92E-01	*	1.29E+01	1.62E+00	4.17E+00	1.17E-01	8.16E+00
SD022083	2.73E+03		2.35E+00		1.04E+02	1.31E+01	3.36E+01	1.62E+00	1.13E+02

Table 2

Comparison of Total PCB Concentrations to Sediment Guidelines

Location ID	Total Organic Carbon (mg/kg)		Total PCBs (mg/kg)		Hazard Quotient — NOTE: Hazard quotients represent the degree of exceedance				
					NOAA[a]		OMEE[b]		
					Effects Range-Low (ER-L)[c]	Effects Range-Median (ER-M)[d]	Lowest Effect Level (LEL)[e]	Severe Effect Level (SEL)[f]	SQG[g]
SD022083	1.24E+03		1.00E+00		4.41E+01	5.56E+00	1.43E+01	1.52E+00	1.06E+02
SD022083	4.49E+03		1.00E+01		4.41E+02	5.56E+01	1.43E+02	4.20E+00	2.93E+02
SD022083	4.31E+04		8.10E+01		3.57E+03	4.50E+02	1.16E+03	3.55E+00	2.47E+02
SD032101	4.48E+03	U	1.11E+00		4.89E+01	6.17E+00	1.59E+01	4.67E-01	3.26E+01
SD032102	4.48E+03	U	2.76E-01	*	1.21E+01	1.53E+00	3.94E+00	1.16E-01	8.09E+00
SD032103	5.03E+03	U	5.42E+00		2.39E+02	3.01E+01	7.74E+01	2.03E+00	1.42E+02
SD032121	1.21E+02	U	1.68E+00		7.40E+01	9.33E+00	2.40E+01	2.62E+01	1.83E+03
SD032122	1.12E+02	U	4.10E+00		1.81E+02	2.28E+01	5.86E+01	6.91E+01	4.82E+03
SD032123	3.92E+03		1.23E+00		5.42E+01	6.83E+00	1.76E+01	5.92E-01	4.13E+01

[a] Long et al., 1995.
[b] Persaud et al., 1993.
[c] ER-L (mg/kg DW) = 0.0227
[d] ER-M (mg/kg DW) = 0.18
[e] LEL (mg/kg DW) = 0.07
[f] SEL (mg/kg DW) = TOC dependent. SELs were converted to bulk sediment values by multiplying 530 mg PCB/kg OC by the sample-specific sediment FOC, to a maximum of 0.10.
[g] U.S. EPA, 1993. Bulk sediment SQGs were calculated using the approach defined in Table 1 and the sample-specific organic carbon content.
* Not detected. Sample was included at half the sample quantitation limit.
J = Estimated value.
NA = Not applicable.
U = Not detected. Value presented is the sample quantitation limit.

Appendix A to the NTCRA Approval Memorandum

GE-HOUSATONIC RIVER
1 1/2 MILE REACH
ADMINISTRATIVE RECORD FILE
NTCRA

2. REMOVAL RESPONSE

1. REPORT: PUBLIC INVOLVEMENT PLAN, REVISED.
   AUTHOR: MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
   DOC ID: 6784 04/01/1995 128 PAGES

2. MEMO : EVALUATION OF HUMAN HEALTH RISKS FROM EXPOSURE TO ELEVATED LEVELS OF PCBS IN HOUSATONIC RIVER SEDIMENT, BANK SOILS & FLOODPLAIN SOILS IN REACHES 1-3 TO 4-6 (NEWELL STREET TO THE CONFLUENCE OF THE EAST AND WEST BRANCHES).
   TO: ANNA G SYMINGTON, MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
   BRYAN OLSON, US EPA REGION 1
   AUTHOR: MARGARET HARVEY, MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
   MARY BALLEW, US EPA REGION 1
   DOC ID: 6038 05/14/1998 21 PAGES

3. MEMO : POTENTIAL HUMAN HEALTH RISKS FROM CONSUMING FISH FROM HOUSATONIC RIVER.
   TO: BRYAN OLSON, US EPA REGION 1
   AUTHOR: MARY BALLEW, US EPA REGION 1
   DOC ID: 6783 05/14/1998 17 PAGES

4. MEMO : REMOVAL ACTION & ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) APPROVAL MEMORANDUM.
   TO: PATRICIA L MEANEY, US EPA REGION 1
   AUTHOR: DEAN TAGLIAFERRO, US EPA REGION 1
   DOC ID: 6027 05/26/1998 25 PAGES

5. WORK PLAN: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) FINAL WORK PLAN.
   TO: US DOD/ARMY CORPS OF ENGINEERS
   AUTHOR: ROY F WESTON INC
   DOC ID: 6781 10/23/1998 72 PAGES

6. REPORT: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), FINAL DRAFT, VOL 1, TEXT.
   TO: US DOD/ARMY CORPS OF ENGINEERS
   AUTHOR: ROY F WESTON INC
   DOC ID: 6786 02/11/2000

7. REPORT: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), FINAL DRAFT, VOL 2, APPENDICES A-C.
   TO: US DOD/ARMY CORPS OF ENGINEERS
   AUTHOR: ROY F WESTON INC
   DOC ID: 6787 02/11/2000

8. REPORT: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), FINAL DRAFT, VOL 3, APPENDICES D-G.
   TO: US DOD/ARMY CORPS OF ENGINEERS
   AUTHOR: ROY F WESTON INC
   DOC ID: 6788 02/11/2000

2.REMOVAL RESPONSE (cont)

9. REPORT: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), FINAL DRAFT, VOL 4, APPENDICES H-I.
TO: US DOD/ARMY CORPS OF ENGINEERS
AUTHOR: ROY F WESTON INC
DOC ID: 6789 02/11/2000

10. REPORT: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), FINAL DRAFT, VOL 5, APPENDICES J-Q.
TO: US DOD/ARMY CORPS OF ENGINEERS
AUTHOR: ROY F WESTON INC
DOC ID: 6790 02/11/2000

11. REPORT: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA), VOL 1-5, FINAL DRAFT [AVAILABLE ON SEPARATE CD-ROM].
TO: US DOD/ARMY CORPS OF ENGINEERS
AUTHOR: ROY F WESTON INC
DOC ID: 8496 02/11/2000

12. LETTER: COMMENT ON ENGINEERING EVALUATION/COST ANALYSIS (EE/CA).
TO: BRYAN OLSON, US EPA REGION 1
AUTHOR: MICKEY FRIEDMAN, HOUSATONIC RIVER INITIATIVE
DOC ID: 6779 04/14/2000 5 PAGES

13. REPORT: COMMENT ON ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) [POSITION PAPER].
TO: US EPA/OFFICE OF SOLID WASTE & EMERGENCY RESPONSE
AUTHOR: GENERAL ELECTRIC CO/PITTSFIELD
DOC ID: 6780 04/14/2000 26 PAGES

14. LETTER: NOTICE OF RESPONSIBILITY & RESPONSE ACTION.
TO: ROBERT M ALLESSIO, BERKSHIRE GAS CO
AUTHOR: ROBERT BELL, MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
DOC ID: 6777 05/05/2000 7 PAGES

15. LETTER: COMMENT ON ENGINEERING EVALUATION/COST ANALYSIS, FINAL DRAFT.
TO: BRYAN OLSON, US EPA REGION 1
AUTHOR: ALAN WEINBERG, MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
DOC ID: 6776 05/09/2000 3 PAGES

16. WORK PLAN: ENGINEERING EVALUATION/COST ANALYSIS SUPPLEMENTAL WORK PLAN FOR 1 1/2 MILE REACH.
TO: US DOD/ARMY CORPS OF ENGINEERS
AUTHOR: ROY F WESTON INC
DOC ID: 6775 05/22/2000 66 PAGES

17. MEMO : NATIONAL REMEDY REVIEW BOARD ADVISORY RECOMMENDATIONS FOR PROPOSED NON-TIME CRITICAL REMOVAL ACTION.
TO: PATRICIA L MEANEY, US EPA REGION 1
AUTHOR: BRUCE K MEANS, US EPA/OFFICE OF SOLID WASTE & EMERGENCY RESPONSE
DOC ID: 6774 06/15/2000 3 PAGES

2.REMOVAL RESPONSE (cont)

18. MEMO : COMMENT ON THE NATIONAL REMEDY REVIEW BOARD'S 6/16/2000 RECOMMENDATIONS.
TO: BRUCE K MEANS, US EPA/OFFICE OF SOLID WASTE & EMERGENCY RESPONSE
AUTHOR: PATRICIA L MEANEY, US EPA REGION 1
DOC ID: 6799 07/10/2000 3 PAGES

19. LETTER: STATEMENT SUBMITTED AT THE PUBLIC HEARING REGARDING "PREFERRED ALTERNATIVES" ANALYZED IN JULY 2000 ENGINEERING EVALUATION/COST ANALYSIS (EE/CA).
AUTHOR: AUDREY COLE, HOUSATONIC ENVIRONMENTAL ACTION LEAGUE INC (HEAL)
DOC ID: 8541 08/15/2000 2 PAGES

20. LETTER: ENGINEERING EVALUATION/COST ANALYSIS FOR THE UPPER REACH OF THE HOUSATONIC RIVER, COMMENTS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: HOUSATONIC RIVER INITIATIVE
DOC ID: 8544 08/17/2000 8 PAGES

21. LETTER: ENGINEERING EVALUATION/COST ANAYSIS FOR THE UPPER REACH OF THE HOUSATONIC RIVER, COMMENTS.
TO: BRYAN OLSON, US EPA REGION 1
AUTHOR: J LYN CUTLER, MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
DOC ID: 8547 08/22/2000 5 PAGES

22. LETTER: COMMENTS ON PCB REMOVAL PLAN.
TO: US EPA REGION 1
AUTHOR: MILOS KROFTA, KROFTA ENGINEERING CORP
DOC ID: 8552 08/23/2000 2 PAGES

23. LETTER: ENGINEERING EVALUATION/COST ANALYSIS FOR THE UPPER REACH OF THE HOUSATONIC RIVER, COMMENTS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: RUTH MALINS, HOUSATONIC VALLEY ASSOCIATION (HVA)
DOC ID: 8543 08/25/2000 2 PAGES

24. LETTER: ENGINEERING EVALUATION/COST ANALYSIS FOR THE UPPER REACH OF THE HOUSATONIC RIVER, COMMENTS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: ROBERT L SMITH, CT DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 8546 08/27/2000 3 PAGES

25. LETTER: ENGINEERING EVALUATION/COST ANALYSIS FOR THE UPPER REACH OF THE HOUSATONIC RIVER, COMMENTS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: JESSE KLINGEBIEL, HOUSATONIC RIVER COMMISSION
DOC ID: 8551 08/28/2000 1 PAGE

26. LETTER: GE'S COMMENTS ON EPA'S EE/CA.
TO: US EPA REGION 1
AUTHOR: GENERAL ELECTRIC CO/PITTSFIELD
DOC ID: 8539 08/31/2000 74 PAGES

2.REMOVAL RESPONSE (cont)

27. LETTER: UPPER REACH OF THE HOUSATONIC RIVER: ENGINEERING EVALUATION/COST ANALYSIS FOR PCB CLEANUP, COMMENTS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: JOHN J CLARK, MASSACHUSETTS AUDUBON SOCIETY
DOC ID: 8545 08/31/2000 7 PAGES

28. REPORT: ADDENDUM TO THE ENGINEERING EVALUATION/COST ANALYSIS FOR THE UPPER REACH OF THE HOUSATONIC RIVER, FINAL [ALSO AVAILABLE ON CD-ROM].
TO: US DOD/ARMY CORPS OF ENGINEERS
AUTHOR: ROY F WESTON INC
DOC ID: 8566 10/04/2000

29. MEMO : REQUEST FOR REMOVAL ACTION HOUSATONIC RIVER 1 1/2 MILE REACH - ACTION MEMORANDUM & EXEMPTION FROM THE STATUTORY $2,000,000 & 12-MONTH LIMITS ON REMOVAL ACTIONS.
AUTHOR: MINDY LUBBER, US EPA REGION 1
DOC ID: 9483 11/21/2000

11. POTENTIALLY RESPONSIBLE PARTY

1. LETTER: REQUEST FOR INFORMATION.
TO: ROBERT M ALLESSIO, BERKSHIRE GAS CO
AUTHOR: ROBERT BELL, MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
DOC ID: 6778 05/05/2000 7 PAGES

2. LETTER: REQUEST FOR EXTENSION OF PUBLIC COMMENT PERIOD ON 1 1/2 MILE REACH REMOVAL ACTION ENGINEERING EVALUATION/COST ANALYSIS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: ANDREW T SILFER, GENERAL ELECTRIC CO/PITTSFIELD
DOC ID: 8563 07/24/2000 3 PAGES

3. LETTER: APPROVAL OF EXTENSION OF PUBLIC COMMENT PERIOD FOR 1 1/2 MILE REMOVAL ACTION ENGINEERING EVALUATION/COST ANALYSIS.
TO: ANDREW T SILFER, GENERAL ELECTRIC CO/PITTSFIELD
AUTHOR: BRYAN OLSON, US EPA REGION 1
DOC ID: 8564 07/27/2000 3 PAGES

13. COMMUNITY RELATIONS

1. PUBLIC MEETING RECORD: CLEANUP ALTERNATIVES FOR 1 1/2 MILE REACH, MEETING NOTICES FOR 5/23, 6/7, & 6/8.
AUTHOR: US EPA REGION 1
DOC ID: 6791 2 PAGES

2. PRESS RELEASE: CONSENT DECREE LODGED IN US DISTRICT COURT REQUIRING GENERAL ELECTRIC TO CLEANUP PCB CONTAMINATION.
AUTHOR: US EPA REGION 1
DOC ID: 6796 10/07/1999 3 PAGES

13.COMMUNITY RELATIONS (cont)

3. PRESS RELEASE: NOTICE THAT THE PUBLIC COMMENT PERIOD FOR THE GE CONSENT DECREE WILL RUN FROM 10/26/1999 TO 12/27/1999.
AUTHOR: US EPA REGION 1
DOC ID: 6797 10/28/1999 2 PAGES

4. PUBLIC MEETING RECORD: GE CONSENT DECREE & DRAFT RCRA PERMIT, MEETING NOTICES FOR 12/2/1999 & 12/9/1999.
AUTHOR: US EPA REGION 1
DOC ID: 6792 12/01/1999 2 PAGES

5. PRESS RELEASE: NOTICE OF PUBLIC MEETING, 01/04/2000 ON GE CONSENT DECREE.
AUTHOR: US EPA REGION 1
DOC ID: 6793 12/09/1999 1 PAGE

6. PRESS RELEASE: INFORMATION REGARDING REGIONAL ADMINISTRATOR LUBBER'S VISIT TO THE GE SITE.
AUTHOR: US EPA REGION 1
DOC ID: 6798 03/01/2000 3 PAGES

7. NEWS CLIPPING: CITIZEN GROUP HEARS OPTIONS FOR NEXT PHASE OF RIVER WORK.
AUTHOR: ERIK ARVIDSON, BERKSHIRE EAGLE
DOC ID: 9415 03/02/2000 2 PAGES

8. PRESS RELEASE: STATEMENT FROM REGIONAL ADMINISTRATOR LUBBER REGARDING HOUSATONIC RIVER INITIATIVE'S VOTE TO WITHDRAW A MOTION TO INTERVENE.
AUTHOR: US EPA REGION 1
DOC ID: 6794 04/10/2000 1 PAGE

9. FACT SHEET: OVERVIEW OF THE RESULTS AND RECOMMENDATIONS OF THE ENGINEERING EVALUATION/COST ANALYSIS (EE/CA).
AUTHOR: US EPA REGION 1
DOC ID: 6829 07/01/2000 6 PAGES

10. PRESS RELEASE: ANNOUNCEMENT OF AVAILABILITY OF THE ADMINISTRATIVE RECORD FILE, THE SCHEDULING OF A PUBLIC MEETING, AND A PUBLIC COMMENT PERIOD.
AUTHOR: US EPA REGION 1
DOC ID: 6804 07/13/2000 3 PAGES

11. PRESS RELEASE: EPA ANNOUNCES CLEANUP OPTION FOR 1 1/2 MILE SECTION OF HOUSATONIC RIVER.
AUTHOR: US EPA REGION 1
DOC ID: 6830 07/14/2000 5 PAGES

12. NEWS CLIPPING: EPA OUTLINES PLAN FOR PCB CLEANUP.
AUTHOR: ASSOCIATED PRESS
TELEGRAM & GAZETTE
DOC ID: 8553 07/15/2000 2 PAGES

13.COMMUNITY RELATIONS (cont)

13. NEWS CLIPPING: COMMENT PERIOD OPEN ON EPA'S PLAN TO CLEAN 1.5 MILES OF THE HOUSATONIC.
AUTHOR: JACK DEW, BERKSHIRE EAGLE
DOC ID: 8554 07/19/2000 2 PAGES

14. NEWS CLIPPING: EPA'S PLAN FOR HOUSATONIC RIVER CLEANUP NOW AVAILABLE FOR PUBLIC COMMENT.
AUTHOR: LAKEVILLE JOURNAL CO
DOC ID: 8555 07/20/2000 1 PAGE

15. NEWS CLIPPING: EPA CHOOSES 'PREFERRED' PLAN TO CLEAN HOUSATONIC IN PITTSFIELD.
AUTHOR: JENNIFER A PEYTON, LITCHFIELD COUNTY TIMES
DOC ID: 8556 07/21/2000 1 PAGE

16. LETTER: UPPER REACH OF THE HOUSATONIC ENGINEERING EVALUATION/COST ANALYSIS FACT SHEET, COMMENTS.
TO: CHESTER L JANOWSKI, US EPA REGION 1
AUTHOR: RONALD BELLORA, PITTSFIELD (MA) RESIDENT
DOC ID: 8549 07/25/2000 1 PAGE

17. NEWS CLIPPING: RESIDENTS BRIEFED ON HOUSATONIC CLEANUP.
AUTHOR: JACK DEW, BERKSHIRE EAGLE
DOC ID: 8557 07/27/2000 2 PAGES

18. PRESS RELEASE: EPA ANNOUNCES EXTENSION OF PUBLIC COMMENT PERIOD FOR CLEANUP OPTION FOR 1 1/2 MILE SECTION OF HOUSATONIC RIVER.
AUTHOR: US EPA REGION 1
DOC ID: 8565 07/31/2000 2 PAGES

19. NEWS CLIPPING: HOUSATONIC CLEANUP IN STATE SAID 3-5 YEARS AWAY.
AUTHOR: ROBERT MILLER, NEWS-TIMES
DOC ID: 8559 08/10/2000 1 PAGE

20. NEWS CLIPPING: PCB CLEANUP IN HOUSATONIC PUT TO PUBLIC.
AUTHOR: DAVID PARKER, REPUBLICAN-AMERICAN
DOC ID: 8558 08/10/2000 1 PAGE

21. NEWS CLIPPING: EPA TO HOLD PUBLIC HEARING ON HOUSATONIC CLEANUP PLAN.
AUTHOR: BERKSHIRE EAGLE
DOC ID: 8560 08/13/2000 1 PAGE

22. PUBLIC MEETING RECORD: PUBLIC HEARING FOR THE UPPER REACH OF THE HOUSATONIC RIVER PROJECT ENGINEERING EVALUATION/COST ANALYSIS.
AUTHOR: US EPA REGION 1
DOC ID: 8540 08/15/2000 39 PAGES

23. NEWS CLIPPING: PCB CLEANUP DEAL CRITICIZED AS TOO LAX.
AUTHOR: JACK DEW, BERKSHIRE EAGLE
DOC ID: 8561 08/16/2000 1 PAGE

13.COMMUNITY RELATIONS (cont)

24. NEWS CLIPPING: HOUSATONIC DEADLINE EXTENDED.
AUTHOR: JENNIFER A PEYTON, LITCHFIELD COUNTY TIMES
DOC ID: 8562 08/18/2000 1 PAGE

20. RECORDS MANAGEMENT

1. LIST : GUIDANCE DOCUMENTS FOR THE ENGINEERING EVALUATION/COST ANALYSIS (EE/CA).
AUTHOR: US EPA REGION 1
DOC ID: 8846 07/13/2000 1 PAGE

2. INDEX : ADMINISTRATIVE RECORD INDEX FOR THE ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) ADMINISTRATIVE RECORD.
AUTHOR: US EPA REGION 1
DOC ID: 6841 07/17/2000 9 PAGES

APPENDIX B: GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region I Superfund Records Center in Boston, Massachusetts.

TITLE
CONDUCTING NON-TIME-CRITICAL REMOVAL ACTIONS UNDER CERCLA.

DOCDATE	OSWER/EPA ID	DOCNUMBER
12/1/93	OSWER #9360.0-32FS	C188

TITLE
GUIDANCE ON EXERCISING CERCLA ENFORCEMENT DISCRETION IN ANTICIPATION OF FULL COST ACCOUNTING CONSISTENT WITH THE STATEMENT OF FEDERAL FINANCIAL ACCOUNTING STANDARDS NO. 4

DOCDATE	OSWER/EPA ID	DOCNUMBER
5/26/00		C522

TITLE
GUIDANCE ON REMEDIAL ACTIONS FOR SUPERFUND SITES WITH PCB CONTAMINATION

DOCDATE	OSWER/EPA ID	DOCNUMBER
8/1/90	OSWER #9355.4-01	2014

TITLE
GUIDANCE ON THE CONSIDERATION OF ARARS DURING REMOVAL ACTIONS

DOCDATE	OSWER/EPA ID	DOCNUMBER
8/23/91	OSWER #9360.3-02	C297

TITLE
IMPLEMENTING FY2000 APPROPRIATIONS REPORT LANGUAGE ON SEDIMENT DREDGING

DOCDATE	OSWER/EPA ID	DOCNUMBER
1/19/00		C521

TITLE
SUPERFUND INDIRECT COST RATES FOR FISCAL YEARS (FY) 1990 - 2001

DOCDATE	OSWER/EPA ID	DOCNUMBER
		C523

TITLE
SUPERFUND REMOVAL PROCEDURES ACTION MEMORANDUM GUIDANCE

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/1/90	OSWER #9360.3-01	C263

TITLE
SUPERFUND REMOVAL PROCEDURES: GUIDANCE ON THE CONSIDERATION OF ARARS DURING REMOVAL ACTIONS

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/1/91	EPA 540/P-91/011	C183

TITLE
TRANSMITTAL OF SUPERFUND REMOVAL PROCEDURES--PUBLIC PARTICIPATION GUIDANCE FOR ON-SCENE COORDINATORS: COMMUNITY RELATIONS AND THE ADMINISTRATIVE RECOR

DOCDATE	OSWER/EPA ID	DOCNUMBER
6/23/92	OSWER #9360.3-05	C285

APPENDIX C

RESPONSIVENESS SUMMARY

NON-TIME-CRITICAL REMOVAL ACTION ENGINEERING EVALUATION/COST ANALYSIS

1 ½ Mile Reach GENERAL ELECTRIC/HOUSATONIC RIVER SITE PITTSFIELD, MASSACHUSETTS

NOVEMBER 2000

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PREFACE

The U.S. Environmental Protection Agency (EPA) held a 45-day public comment period, from July 17, 2000 through September 1, 2000, to provide an opportunity for interested parties to comment on EPA's recommended cleanup alternative to address PCB contaminated sediments and soil along a 1 ½ Mile Reach of the Housatonic River in Pittsfield, Massachusetts. The 1 ½ Mile Reach begins at the Lyman Street Bridge and ends at the confluence of the East and West Branches of the Housatonic River. The recommended cleanup alternative is being implemented to remove a major source of contamination to and along the Housatonic River. The recommended cleanup alternative was selected after EPA developed an Engineering Evaluation/Cost Analysis (EE/CA) that scrutinized various options for addressing the contamination. EPA identified its recommended cleanup alternative in the final chapter of the EE/CA Report and in a Fact Sheet, both issued on July 17, 2000, at the start of the public comment period. On the evening of July 25, 2000 in Pittsfield, Massachusetts and again on the evening of August 9, 2000 in Kent, Connecticut, EPA conducted a public meeting to discuss the EE/CA Report and the recommended cleanup alternative. On August 15, 2000, EPA held a formal public hearing at which three commenters spoke. Nine commenters, including two commenters who read their comments at the public hearing, provided written comments during the public comment period.

The purpose of this responsiveness summary is to document EPA's responses to the comments and questions raised during the public comment period. EPA considered all of the comments summarized in this document before selecting the cleanup plan to address PCBs and other contaminants in the 1 ½ Mile Reach.

The EE/CA Report and the public involvement process were developed consistent with EPA's *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA 1993).*

The responsiveness summary is divided into the following sections:

Section 1. Overview. This section discusses the site history, outlines the objectives of the EE/CA Report and identifies the proposed cleanup alternative.

Section 2. Comment Response. This section presents the comments received during the Public Comment Period and EPA's Response to those comments.

ATTACHMENT A - This attachment is the transcript of the August 15, 2000 public hearing held in Pittsfield, Massachusetts.

SECTION 1 - OVERVIEW

The Housatonic River flowed through the City of Pittsfield in its natural state until the late 1930s/early 1940s when the U.S. Army Corps of Engineers (USACE) channelized the river within the City of Pittsfield, isolating oxbows from the main river channel. From the late 1940s until approximately the 1980s, these oxbows were backfilled with various materials, including materials from the GE facility.

In 1903, GE initiated operations at a site on the Housatonic River in Pittsfield. Three manufacturing divisions at the GE facility (Transformer, Ordnance, and Plastics) have used areas near the 1 ½ Mile Reach. Although GE conducted many activities at the Pittsfield facility throughout the years, the activities of the Transformer Division were the likely primary source of PCB contamination. GE manufactured and serviced electrical transformers containing PCBs at this facility from approximately 1932 through 1977. Releases of PCBs to the environment from the GE facility include suspected spills onto the ground, the use of contaminated fill at the facility and at off-facility areas, the collapse of a PCB storage tank near GE Building 68, the contamination of groundwater, and surface water runoff to Silver Lake and the river.

Numerous studies have been conducted on the Housatonic River including studies of sediment, soil, fish tissue, and benthic organisms collected from the river. These studies indicate that significant PCB contamination exists in the river from the Newell Street Bridge to the Massachusetts-Connecticut state line and beyond. The sources of contamination to the 1 ½ Mile Reach include the GE facility; the Upper ½ Mile Reach of river immediately upstream of the 1 ½ Mile Reach; Silver Lake, which discharges into the river in the 1 ½ Mile Reach; and former Oxbow areas A, B, and C, which abut the river in the 1 ½ Mile Reach. The EPA has determined that a removal action is needed to address unacceptable risks or threats to human health and ecological receptors in 1 ½ Mile Reach and the Upper ½ Mile Reach. This determination was documented in the 26 May 1998 Combined Action and EE/CA Approval Memorandum (Action Memorandum).

The following removal action objectives were established:

> Remove, treat, and/or manage PCB-contaminated river sediments and riverbank soils to prevent human and ecological exposures exceeding risk-based levels.
>
> Eliminate or mitigate existing riverbank soil and sediment sources of contamination to the 1 ½ Mile Reach, prevent recontamination of previously remediated areas, and prevent downstream migration of contaminated sediments and bank soils.
>
> Minimize long- and short-term impacts on wetland and floodplain areas and enhance habitat in a manner consistent with the above objectives.

Proposed Action

The Proposed Action consists of the excavation and disposal of approximately 95,000 cubic yards of contaminated sediment and riverbank soil. The excavated areas will be backfilled with clean material. The remediation will consist of Sheetpiling and Pump Bypass (modified Base Alternative 2 of the EE/CA). Disposal will consist of consolidation of 50,000 cubic yards of contaminated soil and sediment at the GE On Plant Consolidation Areas ("OPCAs"), which were approved pursuant to EPA's August 4, 1999 Action Memorandum, with off-site disposal of the excess material (Option A). The Proposed Action was chosen based on what the Region believes to be the most effective and efficient approach to remediation in the 1 ½ Mile Reach based on existing data. In addition to the Proposed Action, an excavation alternative is also recommended for the lower stretch of river below approximately Transect 168: pump bypass. The excavation alternative will allow EPA the flexibility to adjust field operations to take advantage of its contractor's capabilities and experiences as well as experiences gained in observing the removal action in the Upper ½ Mile Reach currently being performed by GE. The excavation alternative would be implemented in the instance where the contractor can show, after EPA approval, that the alternate excavation method is a more effective and efficient approach to remediation. In addition to the proposed excavation activities, the Proposed Action also includes activities to minimize potential contaminant migration into the river from surface water run-off, drainage swale erosion and riverbank erosion. These activities include, but are not limited to, the construction of settling basins, overflow weirs and the lining of drainage swales with rip rap.

The Proposed Action is a modified version of Base Alternative 2. Beginning at the Lyman Street Bridge, sheetpiling will be installed in the river to prevent water flow to the areas/cells to be excavated from Transect 64 and continuing downstream to approximately Transect 96 (Figure 2). Since sheeting cannot be installed under the Lyman Street Bridge, wet excavation, with in-stream diversion, is proposed only for excavation under the bridge. Sheetpiling is proposed for this section primarily because the river abuts Oxbows A, B and C. These Oxbows were filled with material, some of which came from GE, and are contaminated with PCBs. (GE is required under the Consent Decree to further characterize the extent of contamination in these Oxbows.) The Region believes that sheetpiling will provide better excavation control in the smaller cells if an isolated pocket of Non-Aqueous Phase Liquid ("NAPL") is found in this portion of the river.

Pump bypass will be used from approximately Transect 96 to approximately Transect 168, because it is the alternative that best accommodates the difficult conditions of this portion of the 1 ½ Mile Reach. From approximately Transect 96 down to the Elm Street Bridge, the eastern banks are very high and steep. Access along this bank is also limited due to the homes and businesses making it virtually impossible to install sheetpiling or excavate from the top of bank on this side. Although the bank on the west side of the river is lower with a more moderate slope, installation of sheetpiling on the west side will greatly impact an existing business (supermarket). Bedrock below the river bed also appears to be rising toward the surface in this section of the river which further complicates the use of sheetpiling. The section of river below the Elm Street Bridge to about Transect 154 is characterized by the abundant cobbles that cover the streambed (cobble reach). Flow in this section of the river is swift. The streambed elevation drops about 8 feet in this section compared to only 10 feet over the entire 1 ½ Mile Reach. Except for some deeper pockets, bedrock in this section is about 2 feet below the streambed. Because of the shallow depth to bedrock, sheetpiling this section is not possible. Water depths range from 1 - 4 feet and sediment thicknesses range from 0 - 2 feet, except in the deeper pockets where it can exceed 4 feet.

From Transect 154 to Transect 168, the river consists of residential properties on both sides. Sheetpiling is not recommended between these transects because of the limited access. Access requirements for pumping bypass are less than for sheetpiling and, therefore, will result in slightly less impact to the residents. Although wet excavation is possible for this section, this option presents a greater risk of allowing sediments to migrate downstream and is not recommended.

Sheetpiling is recommended from approximately Transect 168 to the confluence, except for under the Pomeroy Avenue Bridge where wet excavation will be used. Bypass pumping could also be used, as the alternative excavation technique in this section, including under the Pomeroy Avenue Bridge. However, the discharge for the bypass pump operation will have to be constructed below the confluence or in the West Branch of the Housatonic River. This will require careful design and operation of the discharge to avoid disturbance of contaminated sediments below the confluence.

As bank soil and sediment is excavated, the material will be staged, based on pre-construction and/or additional sampling data, as either non-Resource Conservation and Recovery Act ("RCRA") regulated hazardous waste (below 50 ppm PCB), Toxic Substances Control Act ("TSCA")-regulated (above 50 ppm PCB), or as RCRA regulated hazardous waste. All TSCA and RCRA regulated waste (approximately 15,000 to 25,000 yds^3) and approximately 25,000 to 35,000 yds^3 of non-RCRA/non-TSCA regulated waste will be disposed of at the GE On Plant Consolidation Areas. The remaining non-RCRA waste material will be sent to an off-site disposal facility. EPA will evaluate the feasibility of disposing of bank soils that are non-RCRA waste and have less than 2 ppm PCBs as landfill cover material as opposed to disposing of this material as solid waste. Sediments and soils that are significantly impacted by NAPL may require off-site disposal.

Habitat restoration is necessary to meet applicable and relevant and appropriate requirements (ARARs) as part of the response action and to meet the natural resource damage objectives in accordance with the Consent Decree. It is also necessary to stabilize the forces of erosion in the regraded riverbed and riverbank. The restoration objectives will be met through a combination of regrading, vegetation, bioengineering, and potential installation of habitat improvements (e.g., low-stage dams, current deflectors, and boulders). The placement of aquatic habitat improvements and regrading will be conducted such that the flood elevations in the river are not significantly affected and flood storage is not reduced.

SECTION II - COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSE TO THOSE COMMENTS

Response to Citizen Comments: The following comments were submitted to EPA either in writing or were read into the transcript during the public hearing held in Pittsfield, Massachusetts on August 15, 2000.

1) Comment: *Mr. Ronald Bellora submitted a written comment dated July 25, 2000 that states that he does not agree with the EPA's disposal recommendation "Option A". He would prefer options "B", "C" or "D". Further, Mr. Bellora would like Hill 78 removed.*

EPA Response: EPA evaluated four treatment/disposal options in the EE/CA Report. Option A is to dispose of up to 50,000 cubic yards of soil and sediment at the GE On Plant Consolidation Areas with the remaining soil and sediment transported to an Off-site Disposal Facility. Option B is to dispose of all soil and sediment at an Off-site Disposal Facility. Options C and D involve treating all soil and sediment at either an on-site thermal desorption unit or at an on-site solvent extraction unit. All four of the options evaluated in the EE/CA Report meet the statutory requirement for protectiveness. That is, EPA considers all four options to be protective of public health and the environment. The four options were then evaluated based on effectiveness, implementability and cost. All four options were found to be implementable and equally effective in maintaining protectiveness. Finally costs were considered. As explained in the EE/CA Report, Option B is more than twice the cost of Option A and Options C & D were three to four times more expensive than Option A. EPA chose Option A because it is protective of human health and the environment and it is the most cost-effective Option.

The use of Hill 78 and the other On-Plant Consolidation Areas on the GE Plant Area is protective of human health and the environment and consistent with EPA guidance. For EPA's position on this issue, see EPA's August 4, 1999 Action Memorandum (Appendix D to the Consent Decree), specifically pages 32-33 and 40-43, and the responses contained in Section III.B. of Exhibit 2 to the United States' Memorandum in Support of Motion to Enter Consent Decree.[1] Response Number 40 of Exhibit 2 specifically responds to a comment expressing concern that Hill 78 be allowed to remain in place without treatment of the wastes contained in Hill 78.

2) Comment: *At the Public Hearing held in Pittsfield, Massachusetts on August 15, 2000, Mr. Benno Friedman commented that Section 6.4.1.2 of the EE/CA states that EPA will be performing tests just upstream of the Elm Street Bridge located fifty feet apart and that an EPA representative has stated that test samples located fifty feet apart do not have the ability to delineate potential sources of contamination. Mr. Friedman also comments that EPA's approach in response to the newly discovered sources of contamination that are being currently*

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[1] See EPA's Website at WWW.epa.gov/region01/ge/cleanupagreement.html

discovered in the first ½ mile is a response after the fact rather than what would be probably better suited to this whole situation, which is working out and implementing a plan that anticipates these various undiscovered sources of contamination and actually makes sure that the contamination, even if it's not discovered on the first or second or third round, doesn't ever reach the river. Mr. Friedman also comments that he strongly supports and hopes that the EPA is willing to once again reconsider the approach that they've taken, namely, the sheetpiling, the attempted draining through recovery wells, of these additional sources of contamination, and once again consider a larger, more comprehensive approach such as a drainage or slurry ditch that would go along both sides of the river for the first half mile so that all of these pools of yet undiscovered materials, whether they be PCBs or coal tar, whatever substances they are, that are presently being discovered on a piecemeal basis be addressed in a much more comprehensive fashion.

EPA Response: The sampling and analysis frequencies and densities for the 1 ½ Mile Reach were developed by EPA based on an assessment of data needs to accomplish the removal action. This assessment was based on relevant Agency requirements and guidance, as well as site-specific riverine characteristics and the known distribution and types of contaminants. Sampling at 100-foot transects within the 1 ½ Mile Reach is reasonable because the river through this reach runs primarily through residential, open space, and commercial property as opposed to GE property in the Upper ½ Mile Reach. Sources of NAPL, as encountered in the Upper ½ Mile Reach, are not as likely in the 1 ½ Mile Reach. EPA believes that sampling at 100-foot transects in the 1 ½ Mile Reach will identify widespread NAPL problems, if they exist. In areas where the potential for encountering NAPL is higher, such as along the Oxbows or where previous sampling identified a coal tar source, additional sampling was conducted. The plans developed for the 1 ½ Mile Reach will also include contingencies in the event unidentified sources of NAPL are encountered.

As Mr. Friedman points out, his comments regarding source control are directed more toward issues in the ongoing Upper ½ Mile Reach removal action rather than the 1 ½ Mile Reach. The suggestion Mr. Friedman makes regarding installation of a trench along both sides of the river would be impractical in the 1 ½ Mile Reach. First the 1 ½ Mile Reach is substantially different from the Upper ½ Mile Reach in that the 1 ½ Mile Reach runs through numerous residential properties. Also, although a coal tar source has been identified below the Elm Street Bridge, the source is expected to be limited to a relatively short section of the river. The design of the cleanup will take into account this source and plans will be developed to address it during excavation. Based on the additional sampling conducted for the EE/CA Addendum, NAPL sources similar to those encountered in the Upper ½ Mile Reach are not expected.

3) Comment from Jesse Klingebiel. *Mr. Klingebiel provided an email message dated August 28, 2000 stating that he is in support of the proposed clean-up methods in the 1 ½ Mile Reach. His comments were made as an individual and not as chairman of the Housatonic River Commission.*

EPA Response: As Mr. Klingebiel agrees with EPA's recommended alternative, no further response is required.

Response to Comments from Local Organizations: The following comments were submitted to EPA in writing by organizations from both Massachusetts and Connecticut.

4) Comment from Ruth Malins, Housatonic Valley Association, Resource Center Director. *In a letter dated August 25, 2000, the Housatonic Valley Association (HVA) states that they are pleased with the removal action, treatment, and disposal technologies selected by EPA. HVA urges EPA to take every available opportunity to employ in-stream fish habitat improvements during restoration, such as those being done in the first ½ Mile Reach. Where rip-rap or similar materials will be employed, HVA advocates that natural vegetation be incorporated into the banks, in combination with the rip rap. HVA also recommends that studies of PCB contamination on the West Branch and Oxbows A, B, and C be completed before cleanup occurs on the 1 ½ Mile Reach. HVA also urges the EPA to remove sufficient quantities of PCBs during cleanup to eliminate or minimize concerns for future recontamination from any remaining PCBs. Finally, HVA states that the amount of PCB removal should be based on obtaining the greatest benefits to human health and the environment, and not on cost.*

EPA Response: The EE/CA Report outlines a general plan and direction for design and implementation of aquatic habitat enhancements. At the time of publication of the Final EE/CA Report, specific aquatic habitat restoration objectives had not been defined. The EPA, in concert with DEP and the natural resource trustees for Connecticut and Massachusetts, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (the "Natural Resource Trustees"), is currently in the process of defining specific aquatic habitat restoration objectives, based on a newly completed Aquatic Habitat Assessment in the 1 ½ Mile Reach. These objectives will address enhancement of fish habitat where feasible within the context of removal action requirements. This will in general involve the goal of increasing the diversity and variability of substrates and flow velocities. Successful improvements used in the Upper ½ Mile Reach will also be utilized in the 1 ½ Mile Reach. EPA will share the habitat restoration objectives with the Citizen Coordination Council to obtain their input. The use of natural vegetation in combination with rip-rap will also be evaluated.

The Consent Decree for the GE-Pittsfield/Housatonic River Site requires GE to submit investigation work plans eighteen months after the U.S. District Court approves the Consent Decree for the non-bank portions of Oxbow B and twenty-four months after approval for the non-bank portions of Oxbows A and C. The District Court approved the Consent Decree on October 27, 2000. Therefore, the due dates for the submission of investigation work plans are April 2002 for Oxbow B and October 2002 for Oxbows A and C. The actual studies of these oxbows will be completed some time after these initial due dates. The cleanup of the portion of the 1 ½ Mile Reach that abuts Oxbows A, B and C is expected to be underway in late 2000 or 2001 and therefore may precede the completion of the Consent Decree-required investigative activities for Oxbows A, B, and C.

As a result of the schedule contained in the Consent Decree, EPA performed additional investigative activities in Oxbows A, B and C in the summer of 2000. These studies focused on identifying contamination such as NAPLs (i.e., oils or pure product) that could have the potential to significantly affect the implementation and effectiveness of the cleanup of the 1 ½ Mile Reach in the short term. The results from these studies are included in the EE/CA Addendum and indicate that no significant impacts are expected from NAPL during cleanup actions along the Oxbows. However, the studies did indicate the potential of encountering pockets of NAPL during the cleanup. EPA will evaluate the need for additional engineering controls to address this NAPL during design. If significant quantities of NAPL are encountered during cleanup activities, EPA will implement appropriate response actions to minimize the impact and the potential for recontamination.

As stated above, GE is required to perform additional studies of the Oxbows pursuant to the schedule contained in the Consent Decree. Based on these investigations, GE may be required to implement cleanup actions that mitigate the threat of recontamination posed by potential sources in the Oxbows.

The removal action in the 1 ½ Mile Reach is within the East Branch of the Housatonic River and is completely above the confluence with the West Branch. Therefore, the removal action in the 1 ½ Mile Reach will not impact or influence the studies in the West Branch of the River. Likewise, the studies conducted in the West Branch, or any potential contamination present in the West Branch, will have no effect on the 1 ½ Mile Reach Removal Action.

Under the 1 ½ Mile Reach removal action, 2 to 3.5 feet of contaminated sediments and 1 to 3 feet of contaminated river bank soils will be excavated throughout the 1 ½ Mile Reach. This excavation, together with the replacement of clean backfill and restoration of the river and the riverbanks, is expected to minimize the threat of recontamination posed by any remaining PCBs present in subsurface sediments or bank soils.

With regard to disregarding cost as a basis to determine the amount of PCBs to be removed, EPA notes that Agency guidance specifically directs that the following criteria be used to select an action: effectiveness, implementability and cost. EPA must consider cost regardless of whether EPA or a responsible party is conducting a cleanup. See EPA "Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA" (August 1993).

Comment from Audrey Cole, President, Housatonic Environmental Action League (HEAL). *HEAL provided undated written comments to EPA which were also read into the transcript for the Public Hearing held in Pittsfield on August 15, 2000. HEAL provided the following comments:*

5) Comment: *HEAL states that they have been unable to obtain important documents that they believe will assist them in their conviction that a more credible and permanent solution to the containment, removal, and disposal of General Electric PCBs can be found. HEAL also states* *that cost is the overriding factor in the containment of Housatonic PCBs.*

EPA Response: Although HEAL does not provide any specifics on exactly how they have been trying to obtain information from the government, EPA believes that HEAL is referring to requests for information made to the Massachusetts Executive Office of Environmental Affairs ("EOEA") pursuant to the Commonwealth's public records statute. EPA understands that the EOEA has responded to these requests, which primarily concern natural resources damages in the entire GE site, including the Rest of the River, and not conditions in the 1 ½ Mile Reach.

As to EPA, the agency is unaware of any outstanding requests which HEAL has made to the EPA pursuant to the federal Freedom of Information Act ("FOIA"). EPA has made substantial efforts to provide documents to HEAL and all members of the public with an interest in the Site. Information has been furnished via the internet, five information repositories, and dissemination of information to persons/entities on the Site mailing list. Finally, EPA notes that in the HEAL comments to the Consent Decree, HEAL stated:

> "The Decree and its components are almost completely available on the EPA website. We applaud EPA for their efforts. Whatever appendices (i.e. maps) that could not be found were overnight mailed to HEAL members..."

As for HEAL's statement regarding costs, see EPA's Response to Comment 4.

6) Comment: *HEAL questions why the EE/CA Report did not analyze the alternatives reported in the October 7, 1998 Greenpeace study (ISBN 90-73361-47-8) entitled Technical Criteria for the Destruction of Stockpiled Persistent Organic Pollutants (POPs). HEAL asks for independent deep core studies to be performed in the Connecticut and lower Massachusetts regions of the river.*

EPA Response: In preparing the EE/CA Report, EPA conducted a thorough review of available technologies that have been proven capable of treating PCB contaminated material, or have shown promise in treating PCBs. This included a consideration and screening of the general categories of treatment that the technologies in the Greenpeace report fall under (Chemical Dechlorination and Thermal Treatment). For a removal action under CERCLA, the selected treatment technology must be proven and effective on a full scale basis, and if technologies meet the standard for protectiveness, then cost is also considered. The EE/CA analysis was conducted on this basis.

As described in the EE/CA Report and Action Memorandum, EPA has determined that removal of soil and sediment and placement in GE's on-plant consolidation areas (OPCAs) is a fully protective cleanup for the 1 ½ Mile Reach removal action. Although potentially promising in some cases, the technologies reviewed in the Greenpeace report are relatively unproven on a full scale, commercial basis, and in many cases may introduce other hazards to on-site workers and/or the community. Even if the technologies in the Greenpeace report could be considered as fully proven and established, their unit costs are not well defined, and appear to be generally high. As an example, for Gas-Phase Chemical Reduction, the Department of Energy has estimated unit costs of $400/ton. This translates into a present worth cost for treatment of the soil and sediment from the 1 ½ Mile Reach of about $60 million. This is considerably higher than the present worth treatment costs estimated for the proven treatment technologies evaluated as alternatives in the EE/CA (thermal desorption and solvent extraction).

As to HEAL's statement regarding deep core studies, such studies will be considered for the investigation of the Rest of the River below the 1 ½ Mile Reach.

*7) **Comment**: HEAL comments that they are outraged at the untimely switching of a public meeting in Kent, Connecticut from August 8, 2000 to August 9, 2000 on the EE/CA Report.*

EPA Response: EPA decided to switch the day of our meeting in Kent, Connecticut because we became aware of a second meeting regarding the Housatonic River which was scheduled for the same day. Although the two meetings were not directly related, both meetings included issues that were clearly important to river advocates. In EPA's judgement, the change in meeting days would allow those interested in attending both meetings the opportunity to do so. In fact, it is our understanding that many of HEAL members did attend both meetings. This would not have been possible if the two meetings were scheduled for the same time.

*8) **Comment**: HEAL states that "We are told as stakeholders in the 'rest of river' that we are not 'time-critical.' If that is indeed true, we (HEAL) continue to protest that there is no credible reason for us to be included in this most recent Consent Decree submitted in federal court which primarily impacts the Pittsfield, Massachusetts portion of the proposed PCB containment."*

EPA Response: The Federal District Court for the District of Massachusetts allowed HEAL's motion to intervene in the Consent Decree proceedings and allowed HEAL to file a motion opposing EPA's Motion to Enter the Consent Decree. The Court formally approved and entered the Consent Decree on October 27, 2000.

Although the 1 ½ Mile Reach presents health and environmental threats that need to be abated as soon as possible, EPA, as required by regulation, selected a "non-time critical" removal action for the 1 ½ Mile Reach because there was at least a six month period to plan the 1 ½ Mile Reach removal action while the ½ Mile Reach removal action was completed. See 40 C.F.R. § 300.415(b)(4). The term "non-time critical" refers to the availability of a six month planning period for a removal action, not the imminency of the threat posed by contaminants.

Comment from the Housatonic River Initiative. *HRI provided written comments to EPA dated August 17, 2000 which were also read into the transcript for the Public Hearing held in Pittsfield on August 15, 2000. HRI provided the following comments:*

*9) **Comment**: HRI states that while the contamination and source control problems within the 1*

½ Mile Reach may not be as intense as in the more industrial Upper ½ Mile Reach, nevertheless HRI renews its request that whenever possible samples be taken to determine non-detect levels.

EPA Response: The goal of the sampling plan for the 1 ½ Mile Reach was to obtain sufficient samples to accurately characterize the extent of contamination within the riverbanks and sediment. EPA, in consultation with the MA DEP, Army Corps of Engineers and Roy F. Weston, decided on a sampling frequency of every 100 feet with multiple sampling locations and depth intervals at each 100-ft transect. Factors that were considered in making this determination included the length of river that needed to be sampled, the data needs, number of samples to be collected, the time required to gather and analyze the samples, the characteristics of the river in relation to the extent of contamination distribution expected, and cost. In the case of the 1 ½ Mile Reach, the river runs through residential, commercial and recreational property where additional sources of contamination were unlikely except for along the Oxbows. As HRI points out, this is different from the Upper ½ Mile Reach where the river abuts industrial property and source control problems were expected. In many cases, the sampling results did show non-detect levels or levels that met the cleanup criteria. Where results still showed levels exceeding the cleanup criteria at depth, the additional sampling described in the EE/CA Addendum was conducted. EPA also conducted sampling to investigate sources of NAPL. EPA is confident that the sampling is sufficient to base remediation decisions.

*10) **Comment**: HRI requests that EPA conduct further sampling of river sediments in the 1 ½ Mile Reach at greater depths to provide the most accurate portrait of contamination levels and to best prepare the contractors for any additional discoveries of NAPL. HRI expresses concern over remediation decisions being made on insufficient sampling data.*

EPA Response: As explained in the previous response, in cases where additional samples were needed to better characterize the extent of contamination, EPA had those samples collected. During the Summer of 2000, EPA implemented a supplemental sampling and analysis program in the 1 ½ Mile Reach to further characterize the distribution of NAPL, obtain geotechnical data, and to obtain deeper sediment analytical data in aggrading bars and in selected other areas. The results of this investigation have suggested the need for deeper excavation (approximately 6 feet below river bottom) in a number of aggrading bar areas to remove PCBs. The additional excavated sediment volume associated with these aggrading bars is approximately 1,834 cubic yards. The results of the sampling conducted in the Summer of 2000 are described in Section 3.0 of the EE/CA Addendum.

*11) **Comment**: HRI expresses concern that the cleanup criterion of 10 ppm in the top foot on recreational property may pose a threat to the river in the event of flooding. HRI does, however, support the 1 ppm cleanup criteria for river sediments.*

EPA Response: The riverbanks on recreational property will be excavated to a depth of 1 to 3 feet and replaced with clean backfill material. The cleanup criterion of 10 ppm in the top three feet on recreational property together with the excavation and replacement with clean backfill is protective and is not expected to pose a significant threat of recontamination of the river. The EE/CA Report includes a conceptual design for bank restoration and stabilization that in general involves placing armor stone on the lower bank up to the approximate 2 year storm flow elevation (6-7 feet up the bank). Above the armor stone, the bank would have a slope of 2.25H:1V or shallower, and would be stabilized using bio-engineered material and/or grass and plantings This conceptual design addresses the dual requirements of 1) constructing a stable bank able to withstand a wide range of conditions, including flooding, without sustaining significant erosion, and 2) re-establishing healthy vegetation and riparian habitat. EPA recognizes the importance of maintaining the integrity of the banks for the long term, and is making this a particular focus of the design for the 1 ½ Mile Reach.

12) ***Comment**: HRI does not agree with the residential cleanup criterion of 10 ppm below three feet on the riverbanks for two reasons. The first consideration involves the ever changing nature of human activity such as mowing lawns, gardening, recreational activities, or actions of children or young adults. The second reason for not agreeing with the 10 ppm cleanup criterion is due to the ever changing nature of the river and its banks. HRI believes that leaving 10 ppm in soil below three feet could pose a threat of recontamination to the river through erosion. In its comment letter dated April 14, 2000, HRI questions whether EPA's additional sampling on residential property is sufficient and suggests that residential property owners be consulted regarding the sampling.*

EPA Response: As presented in Chapter 6 of the EE/CA Report and the Action Memorandum, EPA believes that the cleanup criterion of 10 ppm below three feet on residential property is protective. Existing wetland and floodplain laws and regulations severely restrict activities that can occur in the riverbanks within the 1 ½ Mile Reach. The 10 ppm criterion for soil below three feet was chosen specifically for the types of infrequent and isolated human activities that HRI lists. In response to HRI's concern regarding erosion of the soil below three feet, all residential banks not subject to previous remediation will be excavated to a minimum of three feet and replaced with clean backfill. Although EPA does not believe that 10 ppm in soil represents a significant threat of recontaminating the river, the addition of three feet of clean material above the 10 ppm and the bank restoration described in the previous response further isolates the material from possible erosion.

Regarding sampling on residential properties, see EPA Response to Comment 57.

13) ***Comment**: HRI renews its concerns regarding landfilling of contaminated soil and sediment at the GE On Plant Consolidation Areas. HRI points out EPA's preference for treatment as stated in CERCLA §9621(b) and urges EPA to choose Treatment/Disposal Option C - Thermal Desorption.*

EPA Response: The disposal of soil and sediment from the 1 ½ Mile Reach at the GE On Plant Consolidation Areas (OPCA) is fully protective of human health and the environment and is consistent with EPA's guidance. The issue of land filling soil and sediment on GE property has been discussed in detail within the context of the Consent Decree and EPA's response to comments. For EPA's position on this issue, see EPA's August 4, 1999 Action Memorandum (Appendix D to the Consent Decree), specifically pages 32-33 and 40-43, and the responses contained in Section III.B. of Exhibit 2 to the United States' Memorandum in Support of Motion to Enter Consent Decree.

Regarding EPA's preference for treatment referenced in CERCLA § 9621(b), EPA first notes that the cited statutory language applies to remedial actions, not removal actions such as the 1 ½ Mile Reach cleanup. Furthermore, the preference for treatment applies to "principal threat" wastes, which are defined to include liquids, high concentrations of toxic compounds, and highly mobile materials. Non-principal threat wastes, which present relatively low, long-term threats, are addressed using a combination of engineering controls (e.g., capping) and institutional controls (e.g. deeded environmental restrictions and easements). For more detail on EPA's position on this issue, see EPA's August 4, 1999 Action Memorandum and the above-cited portions of Exhibit 2 to the United States' Memorandum and 40 C.F.R. § 300.430(a)(1)(iii).

In the case of the 1 ½ Mile Reach, no principal threat wastes will be disposed of at the GE OPCAs. The soil and sediment from the 1 ½ Mile Reach are non-principal threat wastes as they are not highly contaminated, and PCBs are not highly mobile. Accordingly, consolidation of these wastes in the OPCAs is appropriate. Wastes such as NAPL from the 1 ½ Mile Reach are not allowed in the OPCAs and will be disposed of appropriately off-site, either through treatment or through another method that complies with appropriate disposal regulations.

As to the cost of treatment, in evaluating alternatives, EPA must consider cost without regard to who will be performing the remediation. See EPA Response to Comments 1 and 4 and EPA Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA (EPA 540-R-93-057, August 1993), pg. 43. The cost of Option C, thermal desorption, is approximately four times greater than the cost for Option A, disposal at the GE OPCAs. EPA rejects Option C due to the high cost compared to Option A.

Response to Comments from the Massachusetts Audubon Society: *The following comments were submitted to EPA in writing in a letter dated August 31, 2000:*

***14) Comment**: The cleanup should proceed in a manner that adequately protects water quality, aquatic life, wildlife habitat, and other public values of the river.*

EPA Response: EPA is also interested in ensuring that the cleanup process is performed in a manner that is protective of water quality, aquatic life, and wildlife habitat. Design plans for the 1 ½ Mile Reach will include measures to protect water quality and aquatic life during construction. These measures may include use of silt curtains and rock check dams to capture suspended solids before they migrate from the excavation area, and turbidity monitoring to assess the presence of increased suspended solids downstream attributable to the excavation. In addition, areas of open excavation will be minimized by restoring the riverbed as soon as possible following excavation. Following excavation, the riverbed and riverbanks will be restored to enhance wildlife and aquatic habitat and to improve the public values of the river in the 1 ½ Mile Reach. The restoration, as conceptually designed, is described in Appendix L to the EE/CA Report. EPA, in concert with the MA DEP and the Natural Resource Trustees, is currently in the process of defining specific aquatic habitat restoration objectives, based on a newly completed Aquatic Habitat Assessment in the 1 ½ Mile Reach. These objectives will address enhancement of aquatic habitat where feasible. EPA will share the habitat restoration with the Citizens Coordination Council to obtain their input.

*15) **Comment:** The final plan should be carefully designed to minimize construction period impacts, avoid mobilization of contaminants to downstream areas, restore the riverbed and banks, and, as much as possible, avoid the need for further additional remediation work along this reach of the river. This cleanup should include excavation to a sufficient depth to remove all oil from the riverbanks and identify oil plumes that may be present but not yet discovered.*

EPA Response: EPA shares the Massachusetts Audubon Society's goal that the cleanup minimize construction impacts, prevent mobilization of contamination, restore the riverbed and riverbanks, and avoid the need for further remediation work in the 1 ½ Mile Reach. These goals were identified in the EE/CA Report, are reiterated in the Action Memorandum and form part of the basis for the cleanup of the 1 ½ Mile Reach. As discussed in the above response to Comment 14, measures will be taken during excavation to minimize mobilization of contaminated sediments. These measures will be further detailed in the design documents as will the plans for restoring the riverbed and riverbanks.

Regarding the comment concerning excavation to remove all oil from the riverbanks, see EPA Response to Comment 4.

16) Comment:** **The ultimate choice of the methodologies to be implemented should be based primarily on effectiveness for protecting human health and the environment. Cost should only be a consideration if two or more alternative methods provide the same level of environmental protection with different costs for implementation.

EPA Response: All the alternatives evaluated in the EE/CA Report meet the statutory requirement of protectiveness. Each alternative was then evaluated on the basis of Effectiveness, Implementability and Cost as required by EPA Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA (EPA 540-R-93-057, August 1993). The chosen alternative is not the most expensive of the alternatives evaluated. However, EPA believes it provides better control during excavation and is protective of human health and the environment. The other alternatives evaluated either do not provide the same level of control during excavation or are significantly more expensive while providing equivalent levels of protectiveness. Also see EPA Response to Comments 1 and 4 above for discussion on cost.

*17) **Comment:** It is unclear whether the full extent of contamination is sufficiently understood.*

For example, coal tar was recently found in a location where PCB cleanup activities may disturb the coal tar contamination. Unknown or poorly documented areas of contamination might remain in place following cleanup, leading to the need to return in the future and conduct additional cleanup. This would result in further disturbances to the riverine ecosystem, as well as the potential for gradual recontamination of cleaned portions of the river from such unidentified contamination areas. The PCB cleanup plan should include built-in safeguards and contingency procedures that will ensure rapid identification and immediate containment of unanticipated contamination sites, including hot spots, encountered during excavation of river banks and riverbed sediments.

EPA Response: Although EPA believes that the characterization of the river performed under the EE/CA is a sufficient basis on which to make the cleanup decision, EPA understands that pockets of unidentified contamination areas could still exist and be encountered during implementation of the remedy. The design plans will include contingency procedures in the event that these pockets of contamination are encountered.

At this point, there is only one limited area where coal tar oil is known to be present in the riverbank soils. This area is on the west bank of the river below the Elm Street Bridge. The design plans will include special precautions for excavation in this area. Investigations to further define and characterize the extent of this coal tar oil are also being conducted by Berkshire Gas Company under MA DEP oversight. The cleanup of this coal tar oil will be sufficient to protect the riverbanks and the river. The design plans will also include contingencies in the event other unidentified NAPL is encountered during the cleanup process.

Also see EPA Response to Comments 2, 9, and 10 regarding the sampling density in the 1 ½ Mile Reach.

18) Comment: *The cleanup program should include extensive chemical and biological monitoring protocols to document the effects of the cleanup activities, to be continued several years beyond construction.*

EPA Response: EPA will develop long-term chemical and biological monitoring protocols during the design of the 1 ½ Mile Reach removal action that will be used to assess and document the effects of the removal action. These monitoring protocols will be part of post-removal site control activities. The Consent Decree (Paragraph 21.b) requires that GE perform all post-removal site activities. Therefore GE, will be required to implement these monitoring protocols.

19) Comment: *The primary emphasis for bank stabilization should be focused on planting of native vegetation appropriate to this riverine setting. Riprap and other "hard" methods of stabilizing the banks should be avoided. Follow-up monitoring should be conducted to survey invasive non-native plants. Provisions should be made for early identification and removal of invasive plants.*

EPA Response: Restoration of the riverbed and riverbanks and improvements to the habitat are goals identified in the EE/CA Report (See EPA Response to Comment 11). Re-vegetation will use species native to the area. Inspection and monitoring following restoration will include a survey and potential removal of invasive non-native plants. An additional goal of riverbank restoration is to prevent erosion with emphasis given to re-vegetation followed by bioengineering and finally hard structures, such as riprap, where other techniques will not work due to steepness of the riverbank.

20) Comment: *Costs should not be the primary factor in selecting a preferred disposal option. Further review of disposal option should be conducted.*

EPA Response: Cost is not a primary factor in selecting a disposal option, but a factor that EPA must consider (See EPA Response to Comments 1, 4, and 16 above).

21) Comment: *EPA is urged to continue investigations and to cleanup the entire river to a level that enables humans and wildlife to utilize this valuable natural resource without undue health risks.*

EPA Response: The Rest of River Investigations are ongoing. The Consent Decree details the process that must be followed to reach a cleanup decision for the Rest of River following the completion of the investigations, with the goal of reaching a decision that is protective of human health and wildlife.

Response to Comments from Krofta Technologies:

22) Comment: ***Dr. Krofta, of Krofta Technologies, commented in a letter dated August 23, 2000 that his company has developed a new process using air flotation clarifiers and electro-flocculation for removing PCBs from water and that the process is available for demonstration or a pilot plant study.***

EPA Response: **Dr. Krofta proposes a new PCB cleanup process that must first be evaluated by EPA to ensure it is applicable to remediation of contaminated soil and sediments within the 1 ½ Mile Reach. It would then have to be demonstrated through an EPA-supervised pilot plant study conducted to determine its effectiveness. EPA has documented the need to begin cleanup of the 1 ½ Mile Reach as soon as practicable. Delays in designing and implementing the remedy while pilot tests are performed are unacceptable. Information provided by Dr. Krofta on his new process will be forwarded to the appropriate EPA personnel for consideration for the Rest of River cleanup evaluation.**

Response to Comments from the Connecticut Department of Environmental Protection: *The following comments were submitted to EPA in writing in a letter dated August 31, 2000:*

23) ***Comment:*** *The CT DEP expresses concern that portions of the proposed action are conditional and do not present any detailed engineering plans. CT DEP is also concerned that the EE/CA allows the actual removal action that is implemented to include a combination of alternatives on a subreach basis.*

EPA Response: The EE/CA Report is tailored to the scope, goals, and objectives of the removal action and is intended to contain the data necessary to support the selection of a response action. The EE/CA Report provides information on the nature and extent of contamination at the 1 ½ Mile Reach and includes an evaluation of a number of appropriate cleanup alternatives. Now that EPA has selected an alternative, formal design documents will be prepared that will provide the greater detail that the CT DEP is requesting.

The flexibility that the EE/CA allows regarding the removal method is limited. EPA has selected sheetpiling from the beginning of the 1 ½ Mile Reach (except for wet excavation under the Lyman Street Bridge) to Transect 96, from Transect 96 to 168 pump bypass will be used, and sheetpiling is the chosen method below Transect 168 to the confluence. The only subreaches where an alternate excavation method applies is for pump bypass (instead of sheeting) below Transect 168. Except for the Lyman Street Bridge and the Pomeroy Avenue Bridge (unless pump bypass is used instead of sheetpiling), wet excavation is neither a final nor an alternative excavation alternative.

24) ***Comment:*** *The CT DEP urges EPA to provide for an ongoing agency review process during implementation and recommends that the agency review process include preparation and distribution of monthly progress reports similar to those currently being done during GE's remediation of the ½ Mile Reach.*

EPA Response: As detailed remediation plans are developed for the 1 ½ Mile Reach, EPA will work closely with CT DEP staff and provide opportunities for review of the plans. EPA intends to produce and distribute monthly progress reports and will make sure copies of the reports are provided to the CT DEP.

25) ***Comment:*** *The CT DEP states that EPA failed to evaluate the pump bypass alternative for the Lyman Street and Pomeroy Avenue bridges and recommends that EPA use pump bypass for those two bridges. The CT DEP also requests that EPA eliminate Wet Excavation as an alternative for all other subreaches below Transect 96 in the 1 ½ Mile Reach.*

EPA Response: Pump Bypass was evaluated for the subreaches from the Lyman Street Bridge to Transect 96 but rejected because EPA determined that Sheetpiling along Oxbows A, B, & C will provide better control and containment if an unexpected pocket of NAPL is encountered.

Pump Bypass below Transect 168 is still a viable option and will be further evaluated during design. If Pump Bypass is ultimately chosen for the subreaches below Transect 168 to the confluence, then wet excavation beneath the Pomeroy Avenue Bridge will not be used. Also see EPA Response to Comment 23.

The proposed use of the wet excavation technique under the Lyman Street and potentially the Pomeroy Avenue bridges was based on the consideration of a number of factors. First, in the vicinity of these locations, the recommended alternative will use sheetpile diversion to conduct dry excavation. Based on considerations of cost and implementability, use of a pumped bypass for such a small area beneath the bridges was not considered preferable to a limited area of wet excavation. In implementing wet excavation within these limited areas under the bridges, a number of methods could be employed to reduce sediment resuspension, and to minimize the migration downstream of material that may be resuspended. These methods will be further defined during design and may include the following:

- Creation of a low flow, low velocity condition within the excavation area through the use of flow deflection devices.
- Use of silt curtains to capture suspended solids before they migrate from the excavation area.
- Turbidity monitoring conducted on a regular basis to assess the presence of increased suspended solids downstream attributable to the excavation.
- If necessary, additional, more intensive measures such as rock check dams could be implemented.

26) Comment: *The CT DEP believes that the EE/CA Report does not present sufficient information to demonstrate the implementability of Pump Bypass and Dry Excavation. The concerns relate to the capacity of the river bypass; the management of other sources of inflow; and dewatering of the excavation cells.*

EPA Response: EPA is aware that the capacity of the proposed pump bypass diversion system as described in the EE/CA Report is exceeded by the one-year storm flow in the river. As described in the EE/CA Report, historical data indicates that the maximum flow of the pump bypass system of 120 cfs is exceeded on average 30% of the time in this stretch of river. This maximum flow was selected based on the estimated maximum feasible capacity of such a system and an acceptable downtime estimate. In developing a construction schedule and timeline, as well as associated costs, EPA assumed 30% downtime for the pumped bypass method. It is likely that the work schedule will be structured to take advantage of low water periods (June, July and August) by working at an accelerated pace for extended hours and work weeks during which downtime is expected to be less than 30%. Conversely, work will be avoided in historically wet months (e.g. April) during which the downtime would likely exceed 30%.

Measures will be taken to mitigate the possibility of downstream migration of contamination during overtopping events for the pump bypass system. First, the area of open excavation will be minimized by restoring the riverbed as soon as possible following excavation. At areas where the excavation extends to the bedrock surface, the opportunity for mobilization of contaminated sediments will be minimal. Rock check dams and silt curtains can be installed in the pump bypass section to slow velocities and allow settling of mobilized sediments. Rip-rap may be used on the downstream side of the upstream dam so that as the barrier overtops, energy from excessive velocities at the overtopping will be dissipated, reducing scour and resuspension. Although the possibility exists that some contaminated sediments will be mobilized during storm events that result in overtopping of the pump bypass system, EPA believes that, due to the engineering controls, the amount of sediment will not differ significantly from what currently occurs during a storm. The long-term result from the cleanup will be reduced impacts to fish and wildlife. The long-term benefits of removing contaminated sediment far outweighs the potential of mobilizing some sediment during a storm event while performing the cleanup.

EPA is aware that inflow from storm water outfalls, wastewater discharges, and/or tributary streams will be encountered at certain locations along the 1 ½ Mile Reach. These flow sources have been generally taken into account in the EE/CA due to the fact that historical river flow information, which would include contributions from these sources, has been used in the analysis.

Plans for relocation and redirection of utilities, as well as control of run-on and tributary stream inflow, will be developed in detail as part of the final design for the 1 ½ Mile Reach removal action.

Section 5.3.1.4 of the EE/CA Report describes the general procedures EPA will follow for dewatering the excavation cells. These procedures are applicable with either sheetpiling or pump bypass. Water in each cell will be pumped down. A treatment system with an estimated 300 gpm capacity will be used to treat the water. Treated water will then be discharged back to the river. For additional information regarding dewatering see EPA Response to Comment 40.

27) Comment: *CT DEP requests that EPA's project monitoring include a commitment to continue trend monitoring of PCB levels in biota in Connecticut.*

EPA Response: Monitoring of biota in the river in Connecticut is now being done pursuant to a cooperative agreement between GE and the CT DEP. The cooperative agreement expires in 2004. A decision of whether to continue this monitoring will be made in the remedy decision (the Statement of Basis) for the Rest of River.

28) Comment: *The CT DEP is not clear from the EE/CA Report what entity will be responsible for executing the plan for monitoring the streambank vegetation and streambank restoration and what funding source will be dedicated to this monitoring.*

EPA Response: In accordance with the Consent Decree, GE is responsible for inspections, monitoring and maintenance of the remediation within the 1 ½ Mile Reach following EPA's completion of construction activities. Inspection, monitoring and maintenance will be performed according to an EPA-approved inspection, monitoring and maintenance plan. GE's cost of conducting such inspections, monitoring and maintenance are subject to cost-sharing with EPA pursuant to the Consent Decree.

29) Comment: *The CT DEP requests continuing opportunities to review more detailed remediation plans as they are developed, and progress reports as the work moves forward.*

EPA Response: EPA agrees to provide the CT DEP with opportunities to review more detailed plans as they become available and to provide the CT DEP with monthly progress reports as work progresses. Also see EPA Response to Comment 24 above.

Response to Comments from the Massachusetts Department of Environmental Protection:

30) Comment: *In a letter dated August 22, 2000, the MA DEP resubmitted its letter in support of EPA's actions originally submitted to the National Remedy Review Board.*

EPA Response: As the MA DEP agrees with EPA's recommended alternative, no further response is required.

Responses to GE Comments dated August 31, 2000.

GE's Comment package contained six sections along with five attachments. The following responses are provided in the format presented in the GE Comment package.

Section 1 - Introduction and Summary

31) Comment: *Page 1-2, Section 1, Paragraph 3. "There are several alternatives to EPA's proposed program that have less severe impacts and are fully protective of human health and the environment in the 1 ½ Mile Reach. The EE/CA fails to give adequate consideration to these alternatives. EPA has a duty under the National Contingency Plan ("NCP") to give further consideration to these alternatives. GE urges EPA to do so prior to selecting a final Removal Action for the 1 ½ Mile Reach."*

EPA Response: EPA responds below to the specific alternatives proposed by GE but not considered in the EE/CA (see Sections 3, 4 and 5). In addition, the EE/CA considered a wide range of alternatives (see Chapter 5 of the EE/CA Report) in selecting a recommended alternative. With regard to the duties of EPA under the NCP, the Agency notes that the NCP does require EPA to respond to significant comments submitted during the public comment period. 40 C.F.R. Section 300.820(a)(2). However, the NCP does not require EPA to consider any particular type of alternative for a non-time critical removal action. Section 300.415(b)(4) of the NCP merely provides that "(4) [w]henever a planning period of at least six months exists before on-site activities must be initiated, and the lead agency determines, based on a site evaluation, that a [non-time critical] removal action is appropriate: (1) The lead agency shall conduct an engineering evaluation/cost analysis (EE/CA) or its equivalent. The EE/CA is an analysis of removal alternatives for a site..." The NCP only requires that the removal action "...abate, prevent, minimize, stabilize, mitigate, or eliminate a threat to public heath or the environment." 40 C.F.R. Section 800.415(b)(3). EPA has developed guidance which clarifies how to conduct a non-time critical removal action, but this is not part of the NCP. See EPA "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA" (August 1993). In preparing the EE/CA Report and the Action Memorandum, EPA followed this guidance as well as the NCP.

*32) **Comment:** Page 1-2, Section 1, Paragraph 4. "Moreover, EPA has collected and is continuing to collect a significant amount of additional sediment and bank soil investigation data (including sampling and analytical data, data on the presence of non-aqueous phase liquid (NAPL), and geotechnical data), which the EE/CA states will be reported in an Addendum to the EE/CA in September. Since those data could affect the implementability, effectiveness, removal volumes, cost, and impacts of the Removal Action, EPA should also take account of those data in reevaluating the alternatives for this Removal Action."*

EPA Response: EPA has taken into account the new data collected as stated in the Action Memorandum and has determined that the implementability, effectiveness or cost (evaluation criteria for the EE/CA according to EPA guidance) of the alternatives evaluated are not significantly changed from what is reported in the EE/CA Report. The increase in sediment excavation at the aggrading bars (approximately 1,834 yds^3), with its associated cost, is a minor increase and is applicable to all the alternatives evaluated and would therefore affect the cost of all alternatives similarly. Results of the other data collected for the EE/CA Addendum had no effect on the excavation volume or associated costs on any of the alternatives.

Section 2 - Description and Impacts of EPA's Proposed Removal Action

33) Comment:** **Page 2-1, Section 2.1, Paragraph 2. GE states that EPA generally proposes to remove and replace all sediment or soil from subreaches found to exceed applicable cleanup criterion. GE alleges that EPA has not given any detailed consideration to other alternatives to such large-scale removal such as focused removal to attain cleanup criterion or partial removal and containment.

EPA Response: The statement that EPA has not given any consideration to alternatives other than large-scale removal is not accurate. The extent of required riverbank soil excavation was evaluated both laterally (on a subreach, 300-ft subarea, and "hotspot" basis) and vertically (in 1-ft increments). The extent of sediment removal was evaluated vertically in 0.5-ft increments. Evaluation of the lateral extent of sediment excavation was considered, but because no discernable pattern of lateral PCB distribution could be determined, this evaluation was not included in the EE/CA Report. Section 3.4 of the EE/CA Report describes in detail the procedures used to evaluate and refine the extent of the riverbank soil and sediment excavation. The results of EPA's evaluations are presented in Figures 3.4-1 and 3.4-3 of the EE/CA Report for sediments and riverbank soils, respectively. Figure 3.4-2 is a flow chart illustrating how the evaluation process was conducted.

Figure 3.4-1 shows sediment excavation depths that vary from 2.0 ft to 3.5 ft depending on the location. Sediments were first evaluated on a subreach basis in one-foot increments (0 to 1 ft, 1 to 2 ft, and so on) by comparing the 95% UCL to the cleanup standard. The deepest one-foot increments exceeding the cleanup standard were then evaluated by adjusting the next one foot increment by six inches (resulting in intervals of 2 to 2.5, 2.5 to 3.5 ft, and >3.5 ft) at specific subreaches. This analysis resulted in altering the one-foot increment excavation depths at subreaches 4-5B and 4-6 to 2.5 ft. For the last 100 feet of subreach 4-6, an excavation depth of 3.5 ft was determined. A reduction in excavation volume was realized as a result of this analysis.

Figure 3.4-3 shows various bank excavation depths of 0, 1, 2, and 3 ft, depending on the subreach and individual subarea analyzed. These depths were determined using a three-tiered process (shown as a flow chart in Figure 3.4-2). First, bank soils were evaluated on a subreach basis. Next, subareas less likely to exceed the cleanup goals were identified and evaluated in the same manner in an effort to identify areas not requiring excavation. Finally, subreaches with less than 25% of the samples exceeding the cleanup goals were evaluated for hotspot removal in an effort to minimize excavation volumes. A reduction in excavation volume was realized as a result of this analysis.

*34) **Comment:** Page 2-2, Section 2.1, Paragraph 4, Bullet 1. GE states that excavation of the river bottom from bank-to-bank will result in the complete destruction of the existing aquatic habitat.*

EPA Response: GE is correct in pointing out that excavation of 2 to 3.5 feet of sediments from the entire 1 ½ Mile Reach will impact the existing habitat. However, EPA has shown in the EE/CA Report that the existing habitat is already severely impacted due to PCB contamination and historic channelization and will remain severely impacted until the removal action is implemented. The destruction of the existing aquatic habitat is a short term impact since habitat restoration is an important component of the Removal Action. The restoration, as conceptually designed, is described in Appendix L of the EE/CA Report. Once the removal action and habitat restoration is complete, a much improved aquatic habitat should quickly reestablish. It should be noted that GE's proposed sediment excavation for the 1 ½ Mile Reach would result in similar destruction of aquatic habitat.

*35) **Comment:** Page 2-2, Section 2.1, Paragraph 4, Bullet 2. GE states that banks of the river will likewise be removed from both sides of the 1 ½ Mile Reach, largely to a minimum depth of 3 feet, and in some areas up to 6 feet.*

EPA Response: All residential banks, not the subject of previous removal activities, will be excavated to a minimum of 3 feet and in some cases deeper. Recreational banks will be excavated to between 1 and 3 feet. As presented in the EE/CA Report, all banks will be restored using clean backfill. Stone armoring will also be used on the lower portion of the banks to protect against erosion. Above the erosion protection, the banks will be re-vegetated using native trees and shrubs. The end result will be riverbanks that are returned to full usefulness and no longer pose a threat to human health or the environment from PCB contamination.

36) ***Comment:*** *Page 2-2, Section 2.1, Paragraph 4, Bullet 3. GE points out that all mature trees and other vegetation on the banks of the entire 1 ½ Mile Reach will be destroyed, causing lasting devastation on the natural beauty and habitat of the area.*

EPA Response: GE is correct that all mature trees and vegetation along the banks where excavation will take place will be lost. However, EPA is convinced that excavation of the bank soils as recommended in the EE/CA Report is the most appropriate way to eliminate threats posed by the PCBs in the soil, to ensure the protection of human health and the environment, and to provide for minimal long-term maintenance. Restoration of the riverbanks, with improved erosion control and planting of native species is expected to, in the long term, improve the overall habitat and beauty along the 1 ½ Mile Reach. Appendix L of the EE/CA Report describes the various restoration techniques and shows how the restoration areas are expected to look immediately following construction, after 5 years and after 20 years. In general, shrubs and grasses will begin growing and filling in excavated areas almost immediately. This is evidenced by the restoration GE has conducted along the Upper ½ Mile Reach. Restoration improvements will be most apparent within the first 5 years following excavation and will then continue to improve gradually as the trees become more mature. EPA expects, based on experience at other sites and at the Upper ½ Mile Reach, that the native wildlife, displaced during excavation activities, will quickly re-populate the area following bank restoration. The impacts to vegetation are described in the EE/CA Report and have been discussed with property owners along the river during the various public meetings held prior to and during the comment period as well as during neighborhood meetings held in May and June, 2000.

37) ***Comment:*** ***Page 2-2, Section 2.1, Paragraph 4, Bullet 4. GE believes that the Removal Action will cause substantial disruption and adverse impacts to the community due to the construction of access roads and soil/sediment stockpiles along the 1 ½ Mile Reach.***

EPA Response: EPA has acknowledged in the EE/CA Report that there is the potential for substantial disruption to certain segments of the community during the implementation of the removal action (see Effectiveness and Implementability evaluations in Section 5). Access roads and stockpile areas will have to be constructed in the areas where construction will occur. EPA will attempt to minimize the effects of the disruptions during the design and implementation process. As part of this effort, EPA will discuss and solicit input from property owners, residents and City officials throughout the removal action and factor this input into design and construction activities. Although there may be some localized areas where substantial disruption will occur, EPA does not believe that overall this removal action will be any more disruptive than other major construction projects that periodically occur throughout the City (e.g., GE's residential fill remediation projects, the Merrill Road reconstruction, Allendale School remediation, and the reconstruction of Route 7). Once construction in a particular area is complete, the access roads and stockpile areas will be removed and the area returned to its original or an improved condition.

38) Comment: *Page 2-2, Section 2.1, Paragraph 4, Bullet 5. GE believes that the Removal Action will cause an increase in truck traffic over the life of the project of at least 12,500 round trips on residential streets that were not designed to absorb that level and type of use. GE also states that noise from sheetpile hammers, dump trucks, diesel pumps, backhoes, cranes and other equipment will impact residential streets.*

EPA Response: EPA acknowledges that there will be an increase in truck traffic over the life of the project of approximately 12,500 round trips. The EE/CA Report identifies this as an issue (see Effectiveness and Implementability evaluations in section 5). Truck trips though residential areas will be minimized by using residential streets to the minimum extent necessary to provide access to main roads which are designed to handle truck traffic. Furthermore, the EE/CA Report recognizes that limited restoration of roadways may be necessary. The EE/CA cost estimates include costs to restore pavement.

For comparison purposes, the truck traffic for 1 ½ Mile Reach is expected to be similar to both the Allendale School Remediation and Residential Fill Property Remediation Program, both of which were performed by GE. For the Allendale School Project, GE transported to the school approximately 40,000 cubic yards of backfill, through a residential neighborhood, in less than four months. For the Residential Fill Property Remediation Program, GE has reported that over the last three years, they have removed approximately 94,000 cubic yards of material from residential properties and subsequently backfilled an additional 94,000 cubic yards of material back into these residential properties. Clearly, GE had to transport this material over residential streets similar to those likely to used by EPA in implementing the 1 ½ Mile Reach removal action.

EPA acknowledges that the noise from the construction activities will adversely impact residential areas (see Effectiveness and Implementability evaluations in section 5). EPA will attempt to minimize the noise impacts through engineering controls where practical. For activities where noise can not be controlled by engineering controls, EPA will discuss the expected impacts with affected property owners and evaluate options to minimize the impacts.

39) Comment: *Page 2-3, and 2-4, Section 2.2, Paragraph 1, Bullets 1-5. GE again states that the Removal Action will cause substantial disruption and adverse impacts to the community due to the construction of access roads and soil/sediment stockpiles along the 1 ½ Mile Reach and indicates that more than 10 acres will be needed for access roads not including laydown areas; construction easements will be located on residential properties; stabilized staging/storage areas* *will be located on residential properties; use of a City park as a staging area will preclude its use for recreational purposes; and access issues may require EPA to modify/revisit its construction design.*

EPA Response: EPA acknowledges that activities such as the potential construction of access roads and staging areas on residential properties will temporarily cause disruptions to property owners (See Section 5.3 of the EE/CA Report). EPA will attempt to minimize the size of access roads and staging areas on residential properties as much as possible. Prior to finalizing the design of access roads and staging areas, EPA will meet with each affected property owner to discuss siting options and solicit property owner input. Similarly, EPA will discuss the proposed use of the City park with City officials. Also see EPA Response to Comment 37.

Finally, in response to GE's concerns about access issues that could arise, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq. ("CERCLA" or "Superfund") and its implementing regulations (the "NCP") grant EPA broad access authority to address a release/threat of release of a hazardous substance. EPA generally attempts to obtain access to property on a voluntary basis and will continue working with affected property owners to achieve this. However, occasionally EPA must resort to administrative or judicial enforcement actions in order to obtain access. Although this is very unlikely at this site, obtaining access through administrative or judicial enforcement actions may result in some delay to the removal action. If such delay occurs, EPA does not anticipate needing to modify or revisit its construction design in response to a refusal to grant access.

40) Comment: *Page 2-4, Section 2.2, Paragraph 1. GE states that EPA has ignored the space requirements for the proposed water treatment system. GE also states that the activities required to set up, operate, and tear down the water treatment system will disrupt the community. Finally, GE states that EPA may be significantly underestimating the necessary treatment plant capacity and components required, and therefore the space requirements of the water treatment system.*

EPA Response: EPA did not ignore the space requirements for the water treatment system in preparing the EE/CA Report. Water treatment will be required during the entire construction process to treat water generated from de-watering the excavation areas. Figures 2.16A - 2.16D of the EE/CA Report identify potential layout and staging areas for construction elements. As part of the EE/CA Report, water treatment needs were evaluated and incorporated into the conceptual development of staging area requirements. Siting of the water treatment facility would ideally be at the mid-point of the stretch of river being remediated, as has been done in the ½ Mile Reach. The most significant siting challenge will likely be in the middle reach of the 1 ½ Mile Reach, where a pumped bypass diversion method is to be used.

Space constraints are a significant concern for the work. An important part of the design will be developing ways to conduct the work effectively with as little disruption as possible; however, EPA does not view these concerns as insurmountable obstacles. EPA will take measures to reduce any disruption caused by the setup, operation, and teardown of the water treatment system.

EPA has not altered the current assumption of a treatment plant capacity of 300 gpm and does not believe that this is a low estimate of overall required capacity for the treatment plant. EPA has considered recent information received from the ½ Mile Reach removal action and believes current estimates of the treatment plant capacity are consistent with the ½ Mile Reach data. However, EPA will continue to evaluate the treatment plant options during design and will modify the system as appropriate. Although space is limited along the entire 1 ½ Mile Reach, EPA believes it will be feasible to locate a water treatment system with sufficient capacity to meet the needs of the proposed removal action. Furthermore, engineering controls can be implemented to minimize the disruption to the nearby community.

Regarding NAPL, recent Oxbow investigations did not show significant areas of NAPL. Therefore, no changes have been proposed for the treatment systems; however, EPA recognizes the need for contingency plans for NAPL based on its presence in the ½ Mile Reach and potential presence in the 1 ½ Mile Reach.

41) Comment: *Page 2-4, Section 2.2, Paragraph 2. GE points out that the pump bypass technique, which is proposed for use for sediment removal between Transect 96 and Transect 168 (approximately 3,600 linear feet of river), will cause other substantial impacts to adjacent property owners.*

EPA Response: EPA will work to minimize disruptions associated with siting and operating a pump bypass system in a residential area, including the potential need for use of residential streets and residential properties. In the removal action design, EPA will be evaluating alternatives to the diesel pump option discussed in the EE/CA Report, including electric pumps to minimize the noise and exhaust disruptions. In general, the design will be developed to minimize disruptions to the residential community.

There is no question that working in the area between Transects 96 and 168 presents challenges due to the high, steep banks in some areas, and the number of residences and businesses. The EE/CA Report evaluated a conceptual pump bypass system involving a pump system placed in the river channel, covering an approximate 100 X 35-foot area. Figures 2.16A - 2.15D of the EE/CA Report identify potential laying and staging areas for construction elements, including the pump bypass in the upper and lower portions of this stretch. The second location, in the middle of the stretch, will likely be the most difficult, as the banks will be the highest and steepest. During the design, EPA will evaluate a number of methods of siting the system here, including the possibility of placing some equipment on the banks or at the top of the banks. Other options may include siting the system on both sides of the river or readjusting the configuration.

Despite the expected disruptions to area property owners, and the significant logistical and engineering challenges, the EE/CA evaluated these concerns and concluded that the proposed project is feasible, and the adverse affects can be minimized by proper planning, engineering controls and coordination with area residents. Furthermore, the proposed removal action is necessary to mitigate the human health and environmental threats posed by the high levels of PCBs present in the 1 ½ Mile Reach.

42) Comment: *Page 2-4, Section 2.2, Paragraph 3. GE points out that extra truck traffic (12,500 round trips) will increase noise, vibration, dust, and vehicle fumes and will pose an increased risk of accidents, as well as the potential release of contaminated material.*

EPA Response: Regarding impacts from increased truck traffic, see EPA Response to Comment 38. All vehicles used to transport material over public roads must meet applicable State standards for exhaust emissions, noise, and dust control. These impacts are not expected to be any greater than typical construction work that occurs throughout the City. Residents adjacent to the immediate work area will be the most impacted. However, these impacts will be temporary and will subside as work progresses down the river. The impacts and risks expected from this project will be similar to those experienced during the residential cleanups and the Allendale School cleanup performed by GE.

43) Comment: *Page 2-5, Section 2.3, Paragraph 1. GE states that the proposed activities will completely destroy the existing habitat along the 1 ½ Mile Reach and will take decades before the full revegetation of the banks can occur. GE also states that the natural vista will be dramatically altered and native wildlife will be displaced.*

EPA Response: See EPA Response to Comments 34 and 36 .

44) Comment: *Page 2-5 and 2-6, Section 2.4, Paragraph 1. GE claims that EPA's pump bypass approach for the river stretch between Transect 96 and 168 will present a substantial risk of resuspension of PCB-affected sediments and downstream transport of PCBs beyond the 1 ½ Mile Reach due to overtopping.*

EPA Response: Measures will be taken to mitigate the possibility of downstream migration of contamination during overtopping events for the pump bypass system. First, the area of open excavation will be minimized by restoring the riverbed as soon as possible following excavation. At areas where the excavation extends to the bedrock surface, the opportunity for mobilization of contaminated sediments will be minimal. Rock check dams, silt curtains, and other engineering controls can be installed in the pump bypass section to slow velocities and allow settling of mobilized sediments. Rip-rap may be used on the downstream side of the upstream dam so that as the barrier overtops, energy from excessive velocities at the overtopping will be dissipated, reducing scour and resuspension. Although the possibility exists that some contaminated sediments will be mobilized during storm events that result in overtopping of the pump bypass system, EPA believes that, due to the engineering controls, the amount of mobilized sediment will not differ significantly from what currently occurs during a storm. The long-term result from the cleanup will be reduced impacts to fish and wildlife. The long-term benefits of removing contaminated sediment far outweighs the potential of mobilizing some sediment during a storm event while performing the cleanup.

*45) **Comment:** Page 2-6, Section 2.4, Paragraph 2. GE states that for the Building 68 and Upper ½ Mile Removal Actions protection against a one-year storm has been a minimum requirement by EPA. GE further asserts that the one-year storm flow is 440 cfs in an upstream location - more than three times the capacity of the pump bypass system.*

EPA Response: GE is misinterpreting EPA's approval of GE's excavation plan for the Building 68 and the Upper ½ Mile Reach removal actions as an EPA requirement for protection against the one- year storm. EPA made no such requirement of GE. For both the Building 68 and the Upper ½-Mile Reach removal actions, GE proposed dry excavation with sheetpiling set at elevations sufficient to withstand river flows of 440 cfs. EPA's approval of GE's proposed approach does not preclude or imply that other remediation techniques are unacceptable, including wet excavation, dredging, and variations of sheetpiling, especially in situations where the physical characteristics of the 1 ½ Mile Reach are significantly different than those present in Upper ½ Mile Reach and the Building 68 sites.

EPA is aware that the capacity of the conceptual pump bypass diversion system as described in the EE/CA Report is exceeded by the one-year storm flow in the river. As described in the EE/CA Report, historical data indicates that the maximum flow of the pump bypass system of 120 cfs is exceeded on average 30% of the time in this stretch of river. This maximum flow was selected based on the estimated maximum feasible capacity of such a system and an acceptable downtime estimate. In developing a construction schedule and timeline, as well as associated costs, EPA assumed 30% downtime for the pumped bypass method. It is likely that the work schedule will be structured to take advantage of low water periods (June, July and August) by working at an accelerated pace for extended hours and work weeks during which downtime is expected to be less than 30%. Conversely, work will be avoided in historically wet months (e.g. April) during which the downtime would likely exceed 30%.

*46) **Comment:** Page 2-6 and 2-7, Section 2.4, Paragraph 3. GE claims that the EE/CA fails to account for the significant delays when the river flow will over top the bypass structure and flood the excavation. GE states that downstream transport will increase PCB concentrations in fish and wildlife.*

EPA Response: As stated above, it is recognized that a pump bypass system capable of pumping 120 cfs will be overtopped approximately 30 percent of the time on an annual basis. Furthermore, this flow is likely to be exceeded for significant periods of time during the wetter months. During this time, little work would be accomplished. Conversely, during the dryer months, this flow will not be exceeded and work is expected to occur for extended periods with extended work weeks and hours. The EE/CA Report takes into account this loss of productivity by including a downtime factor of 30% in estimated durations and cost estimates. As to the increase in PCB concentrations in fish and wildlife, see EPA Response to Comment 44.

*47) **Comment:** Page 2-6, GE Footnote 1. GE questions the method in which EPA proposes to anchor the pump bypass piping.*

EPA Response: EPA recognizes the engineering complexities of installing a pump bypass pipeline and will carefully consider the appropriate thrust loading parameters to be used in the design. These complexities will be considered during the design and construction process; however, it is not anticipated that the construction is so complicated that estimates of the project completion schedule are overly optimistic. Disruption to the community is discussed in the effectiveness evaluations of the each of the alternatives and is not anticipated to be more disruptive than the installation of sheetpiling.

*48) **Comment:** Page 2-7, Section 2.4, Paragraph 4. GE points out the EPA admits (EE/CA Pg. 5-65) that, with pumping bypass, there would be heavy use of diesel fuel near the river, creating a further potential risk of releases.*

EPA Response: EPA did point out in the EE/CA Report that the heavy use of diesel pumps for the pumping bypass operation in proximity to the river creates a risk of releases. However, EPA does not believe this to be an overriding reason to dismiss the use of pumping bypass as an alternative. Rather, it is an added risk that will be adjusted for in design. During actual operation proper precautions will be taken. It should be noted that most construction equipment, including the equipment used by GE for the Upper ½ Mile Reach removal action, is also diesel powered.

*49) **Comment:** Page 2-7, Section 2.4, Paragraph 5. GE states that resuspension and downstream transport of PCB-containing sediments and potential risks from diesel fuel would occur with wet excavation, which EPA proposes to use under the Lyman Street and Pomeroy Avenue bridges.*

EPA Response: EPA agrees that there may be potential risks associated with wet excavation beneath the Lyman Street and Pomeroy Avenue bridges. Implementation of wet excavation will require appropriate precautions, to be detailed in the design documents, to minimize the risks from resuspension of sediments and prevent the release of fuel. EPA believes that implementing the appropriate precautions during wet excavation will effectively minimize PCB transport downstream. It should also be noted that GE also originally proposed, prior to deciding to remove the footbridge, wet excavation for beneath the GE footbridge in the Upper ½ Mile Reach. Also see EPA Response to Comment 25.

*50) **Comment:** Page 2-7, Section 2.5. GE claims that the proposed removal action will almost certainly take longer than the 3-5 years that EPA estimates.*

EPA Response: The Draft EE/CA Report estimated a project duration of approximately 3 years. However, the Final EE/CA Report predicts an estimated project duration of 3-5 years. This change was based in part on the observed excavation rates at the Upper ½ Mile Reach removal action. Therefore, EPA agrees with the statement that excavation rates of sediment may be lower; closer to the 130 cubic yards per day rate GE is experiencing in the Upper ½ Mile Reach, especially for sheetpiled areas. It should be noted, however, that GE has experienced significant delays due to encountering NAPL. EPA believes that the potential for encountering NAPL in the 1 ½ Mile Reach is substantially less than for the Upper ½ Mile Reach. EPA's general approach to excavating sediments should also allow for a slightly greater excavation rate than GE is experiencing. The excavation production rate assumed in the Action Memorandum (125 - 150 cubic yards per day) includes a 50% reduction of the production rate used in the EE/CA Report. Using the reduced production rate results in a project duration of approximately 4 years. Therefore, an estimated project duration of 3-5 years is reasonable.

51) Comment: *Page 2-9, Section 2.6, Paragraph 2. GE states that the results of the additional investigations reported in the EE/CA Addendum could significantly affect the implementability and effectiveness of the proposed removal activities, could result in an increase in the volume of materials to be excavated, and could thus increase the disruption, environmental impacts, duration, and cost of the Removal Action. Therefore, EPA should consider the investigative data prior to making a removal decision. GE also states that the additional data should be made available for public comment prior to the selection of a removal action by EPA.*

EPA Response: See EPA Response to Comments Section 1 - Comment 1, Section 2 - Comments 4, 10, 31, 32, 34, 36, 37, 38, 39, 41, 42, 43, 53, and 70.

52) Comment: *Page 2-9 and 2-10, Section 2.6, Paragraph 3. GE expresses concern that some significant errors exist in EPA's removal volume calculations.*

EPA Response: See EPA Response to Comment 59 below, and EPA Response to Comments 71-79.

53) Comment: *Page 2-10, Section 2.7: GE states that "...it is incumbent upon EPA, under the NCP, to evaluate other alternatives that can achieve protection of human health and the environment more quickly and cost-effectively and with less disruptions and adverse impacts." GE states that EPA should take into account EPA's additional data in its reevaluation of alternatives for the 1 ½ Mile Reach. GE also states that "EPA's reevaluation, as well as the additional investigative data being collected by EPA and EPA's responses to the questions and comments listed in Attachment A, should be made available for public comment."*

EPA Response: For a discussion of EPA's duties under the NCP with regard to consideration of alternatives, see EPA Response to Comment 31.

Regarding EPA's consideration of the additional data, as described in the Action Memorandum, EPA did take into account the additional EE/CA Addendum data in selecting a remedy. Except for the additional excavation in the aggrading bars, the EE/CA Addendum data did not affect the

Recommended Alternative. Also see EPA Response to Comment 32.

As far as renewed public comment is concerned, EPA rejects GE's contention that the Agency is required to make available for public comment EPA's reevaluation of the proposed action based on recent data and EPA's response to Attachment A of the GE comments. To begin, EPA is releasing an EE/CA Addendum with this Action Memorandum. Although the analysis contained in the EE/CA Addendum did cause EPA to reevaluate its proposed action slightly, the information did not dramatically alter EPA's proposed action, therefore EPA maintains that it is not necessary to reopen public comment.

Although the 1 ½ Mile cleanup is a removal action, the requirements for reopening public comment periods under the remedial program provide some guidance as to when, if at all, an EE/CA public comment period should be reopened. In the remedial program, EPA issues a proposed plan for public comment (which is similar to the EE/CA Fact Sheet), reviews public comment and any new information, and selects a cleanup alternative in a document called a Record of Decision ("ROD"). In the remedial program, if EPA receives public comments or new information that causes it to reevaluate a preferred alternative, EPA is only required to reissue a revised proposed plan for pubic comment if the new information significantly changes the basic features of the remedy and the public could not reasonably anticipate these changes based upon information presented in the proposed plan and the administrative record. See Section 4.3.2 of *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents,* July 1999, OSWER 9200.1-23.P. Minor changes and significant changes to a proposed remedy that could be reasonably anticipated by the public do not require renewed public comment. Id.

EPA believes that the changes to the proposed action resulting from evaluation of the additional EE/CA Addendum data (i.e. the increased aggrading bar excavation) and the other changes based upon new information (i.e., the increase in cost due to decreased production rates and the increase in sheetpiling length) are similar to a "minor change," which, under the remedial program, would not require public comment. Although there is some increase in the cost of the preferred alternative, there is no significant or fundamental change in the scope, performance, and/or cost of the proposed action (excavation and disposal). These changes also do not significantly affect the cost differential between alternatives. Therefore, EPA is not required to provide a public comment period for the changes to the proposed action. An additional comment period would delay commencement of this removal action in face of documented threats to human health and the environment. This conclusion is supported by the fact that, unlike the remedial regulations, the removal regulations at 40 C.F.R. § 300.415 do not contain a requirement to reissue an EE/CA based upon changes to a preferred alternative. Contrast 40 C.F.R. § 300.430(f)(3)(ii) with 40 C.F.R. §§ 300.415(b)(4) and (n)(4). Also see Section VI.B. (Estimated Costs) of the Action Memorandum for EPA's discussion of costs.

As for providing a public comment period on EPA's response to Attachment A of the GE comments, EPA notes that neither CERCLA nor the NCP require this extra step. Furthermore, if

EPA continuously provided an opportunity for public comment on EPA's response to public comments there would likely be a significant delay commencing the cleanup. EPA's response to Attachment A is set forth below. Nothing contained in Attachment A requires a change to EPA's preferred alternative.

Section 3 Alternatives for Bank Soils

54) Comment: *Pages 3-1, Section 3.1, Paragraphs 1 and 2. GE states that the cleanup criterion of 10 ppm below 3 feet on residential property is overly conservative because some banks are not readily accessible. GE asserts that cleanup criterion should be based on the current and reasonable foreseeable types of uses of such banks. GE also states that there is no justification for assuming recreational-type exposure to soil below three feet on banks of residential properties or for establishing a recreational cleanup criterion (10 ppm) for them.*

EPA Response: EPA believes that all residential banks in the 1 ½ Mile Reach are readily accessible and therefore the 2 ppm cleanup criterion is applicable to all residential banks. In addition, EPA disagrees with GE's position that there is no justification for the cleanup criterion of 10 ppm below 3 feet on residential property. The MADEP's default (Method 1) cleanup standard for residential and industrial soils is 2 ppm down to a depth of 15 feet, which was the cleanup criterion identified for the residential banks in the Draft EE/CA. However, as GE notes, based on a recommendation made by EPA's National Remedy Review Board, the 2 ppm cleanup criterion was reevaluated. EPA, in discussion with the MA DEP, agreed that applying the 2 ppm criterion to a depth of 15 feet in residential banks may be overly conservative based on the limited potential for exposure due to existing wetland regulations restricting excavation of riverbanks. However, given the potential for exposure to soil below 3 feet, EPA determined that a cleanup criterion for soil below three feet is necessary. EPA, with concurrence from MA DEP, made a risk management decision that the 10 ppm cleanup criterion for residential soils below 3 feet in the riverbank is protective and reasonable.

55) Comment: ***Page 3-2, Section 3.1, Paragraph 3. GE does not agree with EPA's selection of a cleanup criterion of 10 ppm for the top 3 feet for banks on non-residential property. GE believes that EPA should have used the same criteria of 10 ppm for the top foot and 15 ppm for the 1 to 3 foot depth increment as selected for the Upper ½ Mile Removal Action and other recreational areas covered by the Consent Decree.***

EPA Response: EPA's cleanup criterion of 10 ppm for the top 3 feet of banks on non-residential property supports the Removal Action Objectives for the 1 ½ Mile Reach (see Section 3.3 of the EE/CA) and is consistent with the Consent Decree (See Consent Decree Paragraph 34.c.iii.)

In responding to GE's comment, EPA reviewed Table 2.3-2 in the EE/CA Report to see what effect changing the criterion to be consistent with the Upper ½ Mile Reach removal action would have on bank excavation volumes. Based upon this review, there would be no change in the excavation volume whether the criteria is 10 ppm in the top 3 feet or 10 ppm in the top foot and 15 ppm in the 1 - 3 foot depth increment.

56) Comment: *Pages 3-2 through 3-6, Section 3.2.1, and Attachment B: GE contends that EPA's use of the 95% Upper Confidence Limit ("UCL")/maximum concentration approach is inappropriate and will result in the removal of a large volume of bank soil that is not necessary to achieve the cleanup criteria. GE points out that the use of the H-statistic in calculating the 95% UCL can and often does greatly distort exposure point concentrations and produce concentrations far higher than the true mean. GE also contends that problems associated with use of the H-statistic are not solved by using the maximum concentration in a subreach where the 95% UCL exceeds the maximum. Instead, GE believes EPA should have used the spatial average approach that was used in the Upper ½ Mile Removal Reach. However, if EPA rejects the spatial average approach, then GE believes that EPA should use a statistical method other than the H-statistic, specifically the "spatial bootstrapping" approach to calculate the 95% UCL. To support their position, GE includes Attachment B - "A Comparison of Alternative Methods for Calculating Exposure Point Concentrations." Finally, GE believes that EPA should take account of the non-detect concentrations in the backfill when recalculating the concentrations, after selective removal/replacement of particular polygons to determine the necessary amount of removal to achieve the cleanup criteria.*

EPA Response: Attachment B "A Comparison of Alternate Methods for Calculating Exposure Point Concentrations" provides a discussion of several statistical methodologies that can be used to calculate Exposure Point Concentrations (EPCs). The attachment was prepared by GE for consideration in the *Supplemental Investigation Work Plan for the Lower Housatonic River* and not the Draft Final EE/CA Report.

Calculation of EPCs for the EE/CA Report was conducted in accordance with current EPA guidance, specifically the *Supplemental Guidance to RAGS: Calculating the Concentration Term* (USEPA, 1992). This document specifies that EPCs should be based on the 95% Upper Confidence Limit of the arithmetic mean (95% UCL). The guidance explains that the 95% UCL should be calculated using the Student-t statistic if the data is normally distributed or Land's H-statistic if the data set is lognormally distributed (H-UCL), and acknowledges that most contaminant concentration data sets from environmental sites are lognormally distributed. The attached Figures 1 and 2 show the approximate distribution of riverbank soil and sediment total PCB data for the 1 ½ Mile Reach based on over 1000 samples. Although not an exact lognormal distribution, the graphs clearly show a strong lognormal tendency. Based on this evidence, EPA believes use of the H-UCL is appropriate for the EE/CA Reach. Although Attachment B cites an EPA document in support of its argument that the H-UCL should not be used, the *Supplemental Guidance to RAGS* is still the current EPA guidance, and EPA calculated the EPC's in accordance with that guidance. Also, given the elevated level of contamination in the 1 ½ Mile Reach, EPA does not require additional statistical analysis and/or sampling in order to select a cleanup alternative.

Attachment B contends that "the H-statistic is likely to substantially overestimate the 95% UCL, particularly when the data set is small". The 95% UCL approach is relied upon to provide an additional margin of safety when proceeding with site remediation. The 95% UCL was selected to represent the EPC because it provides a high level of confidence that the EPC value represents the true arithmetic mean. The H-statistic method of calculating the 95% UCL was selected because it is conservative and likely over-predicts the true mean especially when the data set is small. The H-statistic conservatism is intended to offset uncertainties related to sample collection and handling techniques, laboratory methodologies, site contaminant distribution, and non-homogeneous media (especially important for soils and sediment samples). These uncertainties become even more pronounced as the size of the data set decreases, thus the importance of a statistical method that becomes more conservative as the size of the data set decreases. As the size of the data set increases the H-UCL approaches the true arithmetic mean. Similarly, as the variation of the data set decreases (as illustrated by a lower standard deviation), the overestimation of the H-UCL (degree of conservatism) decreases.

The spatial averaging approach that GE advocates is inappropriate given the size of the data set available for the 1 ½ Mile Reach and the variability in sample data. Spatial averaging of contaminant concentrations in soil to estimate the concentration to which a person is exposed over time is only an acceptable method if sufficient data exists. If insufficient data exists, the spatial average may not adequately represent an estimate of the mean concentration; it may estimate either a mean that is too high or too low. Compared to the Upper ½ Mile Reach, spatial averaging is inappropriate for the 1 ½ Mile Reach because the 1 ½ Mile Reach data set is much smaller than the Upper ½ Mile Reach data set, given the relative sizes of the two reaches. The Upper ½ Mile Reach generally used 50 foot sampling transects as opposed to 100 foot sampling transects in the 1 ½ Mile Reach. The EPA approved spatial averaging for some of the areas covered by the Consent Decree based upon defined sampling grids which provide an adequate sample size, and a requirement to incorporate one of the following: "not-to-exceed" concentrations, a maximum size for averaging areas, or a proposed averaging area that appropriately defines an exposure area.

In sum, use of the H-UCL, including the use of the maximum concentration when the UCL is greater than the maximum concentration, for the 1 ½ Mile Reach is appropriate and in accordance with current EPA guidance.

Necessary conservative assumptions regarding contaminant concentrations, future potential exposure areas, and the heterogeneous nature of the contamination in the 1 ½ Mile Reach severely limit the practical application of using non-detect PCB concentrations in the backfill for recalculating the concentrations to determine the necessary amount of removal to achieve the cleanup criteria for the 1 ½ Mile Reach.

57) Comment: *Pages 3-6 through 3-7, Section 3.2.2. GE disagrees with EPA's application of the 10 ppm criterion to residential bank soils below three feet, but indicates that if this criterion is applied, the use of averaging is appropriate. However, GE does not agree that the horizontal* *extent of impacted soil should be determined based on one sample per parcel. In addition, GE questions EPA use of a 0.6 ppm non-detect concentration in the backfill as too high for recalculating the averages. Rather, GE states that EPA should use the non-detect concentration of 0.0375 approved for use in the Upper ½ Mile Removal Reach.*

EPA Response: The use of one PCB sample below 3 feet per residential parcel is intended to provide a general indication of where PCB contamination exists at that depth and to allow for a reasonable estimation of additional excavation that may be needed. As explained in Chapter 6 of the Final EE/CA Report, the location of the additional sample was chosen based on where the highest PCB concentration at the 3 foot depth was recorded. The PCB concentration was then assumed along the entire property and an additional excavation volume was calculated. Although GE claims to have calculated a volume that is twice EPA's estimate, the calculation was not provided so EPA is unable to comment. EPA agrees that relying upon one sample to represent an entire parcel is not sufficient to determine the extent of additional excavation but believes that the estimate provided in the EE/CA Report is reasonable for estimating volumes. During design, EPA will evaluate the need for, and extent of, additional soil samples below 3-feet. EPA agrees that the default PCB concentration for clean backfill would be 0.0375 ppm, or one-half the laboratory detection limit based on the assumed use of a fixed, off-site laboratory.

58) Comment: *Pages 3-7 through 3-8, Section 3.3. GE points out that EPA's approach to evaluating Appendix IX data to determine if areas not subject to excavation based on PCB concentration would require excavation for Appendix IX exceedances is not consistent with the approach used in the Consent Decree for other areas of the overall site.*

EPA Response: Of the 122 Appendix IX samples which were collected along the 1 ½ Mile Reach, 23 samples were collected from areas and/or depths that do not require excavation due to PCB contamination. Based on the evaluation of these 23 samples, three subreaches (4-2 West Bank, 4-3 East Bank, and 4-5B East Bank) were identified where Appendix IX exceedances were present in areas where excavation for PCB removal was not required. However, due to the relatively sparse nature of Appendix IX data, an Appendix IX exceedance was conservatively assumed to require excavation for the full bank height for the subreach and to the depth where the exceedance was located, unless additional data points were present showing no Appendix IX exceedance for a given depth interval and bank area within that subreach. EPA's approach differs from the approach in the Consent Decree in that under the Consent Decree average and median Appendix IX concentrations are calculated rather than using individual samples to form the basis for excavation. EPA believes that its approach is reasonable based on the limited number of Appendix IX samples. As design focuses on the affected subreaches, EPA will assess the need for collecting additional Appendix IX samples and re-evaluate the proposed excavation volumes.

59) Comment: *Page 3-8, Section 3.4, and Attachment C. GE believes that deep cuts in bank soil will flatten the banks beyond existing contours and result in unnecessary soil removal. GE points out that EPA proposes to achieve final slopes of 2.25H:1V or flatter and for areas where* *the slope cannot be achieved consistent with the objective, maintain the existing crest of the slope by using retaining structures. GE believes that this approach will require up to an additional 55,000 cubic yards of excavation, and that many of the existing banks have slopes steeper than 2.25H:1V, including 1H:1V slopes up to 20 feet high which GE argues have been acceptable to the government agencies for decades. GE points out that they are unaware of any substantial erosion control measures that have been implemented to address slope instability for the slopes in the straightened section of the river that were designed and constructed in the 1940's. GE also points out that steep banks in the ½ Mile Reach have been successfully excavated without failure and that EPA has approved bank restoration to final slopes up to 1H:1V, with appropriate use of reinforcing techniques.*

EPA Response: A preliminary geotechnical investigation and analysis was conducted for the EE/CA in an effort to estimate riverbank stability. The geotechnical investigation consisted of a total of 8 borings to cover 3 miles of bank length (1-1/2 miles on each bank). The results of the investigation (geotechnical data) are presented in Appendix N of the EE/CA along with reduction of the geotechnical data. The subsurface conditions are described on page N-2 (EE/CA, Appendix N) as consisting primarily of granular soils (silty clayey coarse to fine sand and gravel) with interbedded fine-grained soil layers. These interbeds average approximately 5 ft in thickness.

For the stability analysis, due to limited geotechnical data collected for the EE/CA Report, the presence of the fine-grained interbeds was not taken into account and the "native soil" was characterized as having a density of 120 pounds/cubic foot, cohesive shear strength of 30 pounds/square foot, and an internal friction angle of 32 degrees. The generalized cross section for the stability analyses is shown in Figure N-1 of Appendix N.

The stability analysis was conducted using conventional methods (Modified Bishop Method of Slices) and conventional factors of safety. The method of analysis and factors of safety used for the EE/CA were reviewed and accepted by USACE for application to this investigation. The stability analysis concluded that the slope inclination (bank slope angle) should be no steeper than 2.25 horizontal to 1.0 vertical (2.25H:1V) for the vegetated earthen slope scenario (no reinforcement). The stability analysis further concluded that the slope inclination should be no steeper than 2.0H:1V for the armored slope scenario (18 inches of stone and 6 inches of sand/gravel bedding placed as a veneer over the slope). Stability analysis of the slope during construction (bare slope) found that the slope inclination should be no steeper than 2.0H:1V, except for short durations as discussed in the Excavation Volume Section below.

For the most part, and particularly for residential property, existing banks will not be cut back and flattened as result of riverbank excavation. The EE/CA Report (Section 5.2.1.7) states that wherever possible, slopes steeper than 2.25H:1V will be regraded to no steeper than 2.25H:1V while maintaining the existing top of slope location. Appendix N - Bank Stability Evaluation (Section N.8), further explains that in cases where the projected top of slope approaches existing structures, infrastructure, or "pushes" the existing top of slope more than 5-feet back, earth retaining structures are proposed.

It is noted in the EE/CA Report (page N-18) that the analysis conducted for the EE/CA Report is preliminary and that a detailed geotechnical investigation and design program is recommended. The additional geotechnical investigation was completed this summer and the results of this investigation are reported in the EE/CA Addendum.

GE's position is that bank slopes in the EE/CA Reach exist up to 1H:1V without failing; GE has successfully prepared final bank slopes up to 1H:1V in the Upper ½ Mile Reach; and in-situ soil reinforcing techniques should be investigated for slope stability. GE's concern is that substantial over-excavation of bank soils will result in the flattening of the banks beyond existing contours if the existing banks are cut back to 2.25H:1V.

Excavation Volume: The volume calculations presented in Appendix O of the EE/CA Report include excavation of riverbank soil to the cleanup criteria and additional excavation for bank stability. Furthermore, an additional 10% increase in volume is included to account for the potential over-excavation that will likely occur in order to ensure that the minimum excavation requirements are met. This anticipated over-excavation is due to the inherent limitations in excavating exact removal depths (e.g., exactly one foot or three feet) along a sloped riverbank with highly variable topography. The total volume of riverbank excavation is estimated to be 46,507 cubic yards.

The basis for GE's calculation that an additional 55,000 cy of material would need to be excavated for bank stability is assumed to be related to their misinterpretation of the proposed EPA bank excavation as illustrated in their Figure A-1. The lowest excavation line on GE's figure indicates a 2.25H:1V temporary "safe" excavation slope extending from the back of the retaining wall up to the existing ground surface. The starting point of this excavation line is correct, however it extends upwards at too shallow of a slope.

If an excavation was determined to extend beyond the limit of the top of slope and could adversely impact existing utilities, infrastructure, or structures, the use of temporary stabilization methods and earth retaining structures was considered necessary to protect the existing utilities, infrastructure or structures. Earth retaining structures were then plotted onto the cross section to develop a stable final slope that did not impact the limit of the top of slope and protected the utilities, infrastructure, and structures. The volume estimate assumed that the retaining structures would be constructed of either gabions, steel sheetpile, metal-bin cribs, concrete, cemented masonry, or modular blocks. The actual wall type would be selected during design to minimize excavation as limited by required wall height and site-specific conditions. To account for the excavation required to install a retaining wall, a wedge of soil five feet thick with a temporarily stabilized cut slope of 0.5H:1V was assumed. This 5-foot width at a slope of 0.5H:1V is significantly different than extending a 2.25H:1V slope all the way to the top of the slope as depicted in GE's Figure A-1. Also see EPA Response to Comments 71-79.

Existing Banks at 1H:1V: It is acknowledged that in some locations the existing riverbanks are up to 20 ft tall on a 1H:1V slope. These banks are heavily vegetated or have debris (concrete slab, block, and downed trees) on and within the slope. The vegetation and debris provide added strength to the existing slope allowing the slope to appear stable at the 1H:1V inclination. The existing factor of safety of the bank with respect to slope stability (ratio of forces resisting slope movement versus the forces that cause slope movement) is therefore greater than 1 (stable slope) but is not necessarily greater than conventional geotechnical minimum factors of safety. The analysis in the EE/CA Report used these conventional factors of safety for long-term, long-term dynamic (earthquake), and short-term slope stability (1.5, 1.0, and 1.3 respectively).

The removal of riverbank soil to the EE/CA Report cleanup criteria will also remove the existing vegetation and debris. The slope must therefore be stable without the benefit of this material.

The bank slopes are not subject to existing requirements of government agencies and therefore have not been evaluated for "acceptance" by the agencies. A slope that may appear stable to the casual observer may in fact have failed at some time in the recent past or may fail in the near future. This is significant when the design life of the 1 ½ Mile Reach slope stabilization is considered. The long-term stability of the 1 ½ Mile Reach slopes are now subject to applicable requirements of the agencies and the judgement of the design professional involved.

Available information regarding the straightening of the river in the 1940's was reviewed in preparation of the EE/CA Report. This information gives little insight as to the proposed final bank slopes and their anticipated stability. The banks of the 1 ½ Mile Reach currently show signs of erosion, repairs, and filling of the riverbank. The need for bank repair (past and present) is an indication steep slopes approaching 1H:1V may not be appropriate. Also, the filling of partially vegetated riverbanks after the straightening project may have resulted in the steep slopes observed today.

Stability of 1H:1V Slopes in the Upper ½ Mile Reach: EPA acknowledges that some post-removal slopes in the Upper ½ Mile Reach do approach 1H:1V. However it must be noted that the banks in the Upper ½ Mile Reach are typically less than 10 ft in height. Additionally there are few structures, utilities, private property, or other constraints on the top of bank that would either load the slope or require preservation after soil is removed.

It should also be noted that there have been areas in the Upper ½ Mile with slopes approaching 1H:1V that have failed. These slopes were subsequently cut back to lesser inclinations approaching 1.5H:1V or shallower. It is noted that these failures that resulted in the need for further cutbacks in the Upper ½ Mile Reach occurred quickly and in the absence of adverse flow conditions in the river. This supports the need for shallower slopes as recommended in the EE/CA Report, particularly in light of the need to maintain the integrity of the banks to prevent movement of residual PCBs into the river system.

The banks of the 1 ½ Mile Reach are subject to erosion and will receive erosion protection similar to that installed in the Upper ½ Mile Reach. The EE/CA Report is based on this protection being provided by stone (riprap). The USACE Engineering Design Manual EM 1110-2-1601 recommends that side slopes (banks) should ordinarily be no steeper than 1.5H:1V. The EE/CA Report recommends using a slightly more conservative bank slope (less steep) of 2H:1V where riprap is proposed.

In-Situ Soil Reinforcing Techniques: There are many available in-situ soil reinforcing techniques that may be applicable to banks of the 1 ½ Mile Reach. Site-specific geotechnical information available for the EE/CA Report was limited as described in Appendix N. This limitation did not allow for beneficial evaluation of soil reinforcement techniques for the EE/CA Report.

It is noted in the EE/CA Report (page N-18) that the analysis conducted as part of that study is preliminary and that a detailed geotechnical investigation and design program is recommended. A work plan for this detailed geotechnical investigation is being prepared as part of pre-design activities for the removal action in the EE/CA Reach. This evaluation will include soil reinforcement as an alternative.

In conclusion, EPA believes its approach to the bank slopes is both justified and necessary.

Section 4 Alternatives for Sediments

60) Comment: *Page 4-1, Section 4.1., Bullet #1. The cleanup criterion of 1 ppm is based on a memorandum dated February 7, 2000. GE states that this conclusion is not scientifically defensible, because:... "**It relies exclusively on a comparison of sediment PCB concentrations with a number of generic sediment quality guidelines developed by EPA, the National Oceanic and Atmospheric Administration (NOAA), and the Ontario Ministry of the Environment, and does not take into account any site-specific data regarding actual ecological receptors in the 1 ½ Mile Reach.**"*

EPA Response: The sediment cleanup goal was established considering the need to protect both human health and the environment. To be protective of the environment, EPA established a sediment risk-based goal to protect aquatic life and piscivorous mammals and birds. The conclusion is scientifically defensible. In reaching the conclusion, EPA took into account site-specific data regarding actual ecological receptors within the 1 ½ Mile Reach. In the "Upper Reach - Housatonic River Ecological Risk Assessment" (ERA)(Weston, 1998), the presence of a benthic community and a fish community within the reach was established, as was the presence of suitable habitat for both piscivorous birds and mammals. In fact, field surveys conducted from 1998 through the winter, 2000, produced observations within the 1 ½ Mile Reach of piscivorous birds including great blue heron and belted kingfisher feeding. In addition, two of the only four observations of mink and otter within the entire 10 mile Rest of River primary study area were made right at the end of the 1 ½ Mile stretch, in the vicinity of the confluence. A mink was sighted in March of 1999, and otter sign (latrine and tracks) were observed over a six week period in early February, mid-March of 2000.

61) Comment: *Page 4-1, Section 4.1., Bullet #2. "As shown in Attachment D, the sediment guidelines used were not intended to predict adverse effects. Rather, they were developed, using highly conservative assumptions, solely for use as screening-level values, and the guidelines themselves acknowledge that they should be used only for such screening purposes."*

EPA Response: The citations provided by GE in Attachment D regarding the use of sediment quality guidelines (SQGs) are correct, and they reflected the authors' thinking at the time (1995, 1996). Since that time however, significant effort has been made to evaluate the differences among the numeric SQGs for PCBs and the questions regarding SQGs and bioavailability, effects of covarying contaminants, ecological relevance, and determination of causality, in an attempt to establish consensus sediment effect concentrations (SECs). This effort is summarized in a paper (MacDonald et al., 2000) which establishes consensus SECs for PCBs, and evaluates the capability of these SECs to be predictive of adverse effects from PCBs. The authors of this paper include many of the original authors of the SQGs used in the establishment of the sediment goal for the 1 ½ Mile Reach.

A comparison of the SQGs used in the Region's evaluation with the consensus SECs and their predictive capability is provided below, demonstrating that the 1 ppm goal is not overly conservative and has a high likelihood of representing a concentration at which PCB effects to the benthic community can be predicted.

CONSENSUS SEC	Range of tPCB concentrations (mg/kg DW)	SQGs used by the Region	tPCB concentration (mg/kg DW)	Predictive capability of the SEC
< TEC	0.00 - 0.04	ER - L	0.0227	84.4 %
TEC - MEC	> 0.04 - 0.40	LEL	0.07	NA
> MEC - EEC	> 0.40 - 1.7			NA
> MEC	> 0.4	ER - M	0.18	68.3%
> EEC	> 1.7	SEL	5.72[a]	82.5%

TEC = Threshold effects concentration
MEC = Moderate effects concentration
EEC = Extreme effects concentration
ER-L = Effects range - low
ER-M = Effects range - median
LEL = Lowest effect level
SEL = Severe effect level
a = adjusted to site-specific organic carbon as required by the method

Neither the SQGs or the SECs use "highly conservative" assumptions. In fact, both methods use actual observations of effects on biota measured in field sediments of varying organic carbon concentration and grain size distributions. No assumptions were included in the process.

In addition, the goal of 1 ppm was established taking into account the EPA draft Sediment Quality Guidelines methodology of predicting bioavailability using the equilibrium partitioning approach. This approach has been well documented throughout the literature as an acceptable method for predicting pore water concentrations for nonpolar hydrophobic contaminants in sediment. The endpoint used in establishing the EPA Chronic Ambient Water Quality Concentration (AWQC) for aquatic life is the reproductive impairment of mink caused through dietary intake of PCBs obtained through the food chain. As mink are considered to be one of if not the most sensitive wildlife species to PCB toxicity and are a relevant ecological receptor (as documented in the previous response) for evaluation in the 1 ½ Mile Reach, this in fact represents an appropriate and realistic use of this tool for predicting risk for piscivorous birds and mammals. The site-specific SQG using this method and site-derived total organic carbon data is 0.08 ppm. The high PCB concentrations and low organic carbon composition of these sediments, coupled with the evaluation of tissue residue values collected in the river in areas with similar sediment types and PCB concentrations suggest, in fact that the PCBs may be quite bioavailable.

The Region believes that the selection of a 1 ppm goal for PCBs for protection of aquatic life and piscivorous birds and mammals appropriately reflects the weight of these factors and the uncertainties which exist for the various approaches, and in fact does not represent a conservative interpretation of the information, but a realistic one. This goal serves as a tool for use in the design and evaluation of removal alternatives in the EE/CA, coupling the removal of contaminated sediment with the placement of clean backfill, and results in the most important risk management objective, removing the opportunity for receptors to be exposed to contaminated sediment.

***62) Comment:** Page 4-1, Section 4.1., Bullet #3. "As further shown in Attachment D, EPA's own guidance documents on ecological risk assessments make clear that cleanup decisions should <u>not</u> be based on such screening-level assessments, but rather on site-specific data."*

EPA Response: The decision that a removal action is appropriate for the 1 ½ Mile Reach is documented in an Action Memorandum dated May 26, 1998. The decision was based, in part, upon the finding of ecological baseline risk made in the "Upper Reach - Housatonic River Ecological Risk Assessment" (ERA)(Weston, 1998). The ERA was more than a screening level assessment. The ERA utilized many endpoints and techniques to evaluate multiple lines of evidence, an approach that goes far beyond that usually found in a screening level assessment. In addition, selected site-specific data were available for use in this assessment, a condition not typical when conducting a screening level risk assessment, and these site-specific data were used in the appropriate context in the ERA. The ERA did employ many of the techniques that may be used in a screening level risk assessment due to the requirement for rapid assessment of ecological risks in evaluating the need for a removal action at the Upper Reach. It should be noted that the techniques used in the ERA for the Upper Reach are also typically included in the evaluation of the weight of evidence in a full blown ERA to support the finding of baseline risk in a remedial assessment. While some of the ERA's techniques may be considered "conservative", they are standard ecological risk assessment methods, and are designed to be conservative in areas where there is uncertainty in the parameter in question. The techniques used in the ERA were performed in accordance with the Ecological Risk Assessment Guidance for Superfund (EPA, 1997). Some of the parameters are codified in EPA guidance, in particular the Wildlife Exposure Factors Handbook (EPA, 1993), which evaluates and summarizes many of the exposure factors for ecological receptors.

Further, for an EE/CA, EPA only requires a streamlined risk evaluation and not a conventional baseline risk assessment normally conducted for remedial actions. *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA,* OSWER 9360.0.32, August, 1993, p. 29. Also according to the EE/CA guidance, cleanup levels may be set according to a number of methods, such as applying federal or state applicable or relevant and appropriate requirements, requesting support from ATSDR, or consulting a regional risk assessor. EE/CA Guidance, p. 32. In this case, the sediment cleanup goal was decided upon after an evaluation of site data and characteristics and consultation with a regional ecological risk assessor. See, *Memorandum* dated February 7, 2000 from Susan Svirsky.

63) Comment: *Page 4-2, Section 4.1, Paragraph 1. ... "EPA should adopt an approach such as that used in the CD to define sediment removal limits for the Upper 1 ½ Mile Reach..."*

EPA Response: The Agency believes that the approach taken here is in many ways consistent with the approach that was approved in the Upper ½ Mile Reach removal action. In the 1 ½ Mile Reach, the approach is to insure that exposure is eliminated, and the 1 ppm goal is used to guide the engineering evaluation of the various response alternatives, as well as other factors, to achieve this objective.

64) Comment: ***Page 4-2, Section 4.1, Paragraph 2. Even if the Region did adopt a specific PCB cleanup criterion, it should not have applied that criterion to the sediments using the 95% UCL of the data or the maximum concentration for each subreach and depth increment...spatial averaging would provide a more justifiable and representative approach.***

EPA Response: The Region disagrees that spatial averaging would provide a more justifiable and representative approach for representing PCB contamination in the sediments in the 1 ½ Mile Reach. Evaluation of EPA's data for both the 1 ½ Mile Reach and the upper section of the Rest of River (currently under investigation), both of which have similar sediment types, shows that a single data point in space and time is a poor long-term representation of the PCB contamination in sediment at that location. The data indicate that the PCB concentrations in the sediments in this section of the river appear to vary highly, both spatially and temporally. The mechanism that is governing this variability is being investigated as part of the Rest of River study.

If the Region were to use a spatial weighting scheme such as that suggested by GE, the likelihood that any given concentration could be replicated in a given polygon is very low. Therefore, application of the UCL takes into account the subreach concentrations which are more likely to represent the hydrodynamic equilibrium and distribution of contamination in the subreach over space and time than a computer generated Thiessen polygon. The hydrodynamics of the Housatonic River are totally different than the processes at the other EPA sites at which GE cites EPA's application of a spatial averaging approach for sediments, therefore the comparison is not relevant.

65) Comment: *Page 4-3, Section 4.2. To the extent that EPA reevaluates the PCB-related excavations and/or conducts additional Appendix IX sediment sampling, it should not use the OME LELs as sediment cleanup criteria for the same reasons discussed in Section 4.1 and Attachment D.*

EPA Response: See above EPA Responses to Comments 60 and 61. In addition, based on results from the additional sampling in the 1 ½ Mile Reach, no additional sediment excavation is required to address Appendix IX contamination.

66) Comment: *Page 4-3 through 4-6, Section 4.3; and, Attachment E. GE states that EPA should rely on an approach that incorporates the use of capping, such as that used for the Upper ½ Mile Reach. GE states that EPA incorrectly concludes that a 2.5 to 3-foot cap is necessary. GE further asserts that additional elements added in the EE/CA for the 1 ½ Mile Reach cap are based on a number of incorrect and inappropriate assumptions: Flood velocities presented in the EE/CA's Appendix M are allegedly grossly over estimated because they are based on an overstated slope for the river surface during flood conditions and an assessment of river cross-section data in isolation, ignoring backwater effects. Additionally, GE believes that the 6-inch sand and gravel bedding layer is unnecessary. GE goes on to state that to the extent that EPA, in selecting the thicker cap, has relied on the need to minimize future monitoring and maintenance, that is not adequate reason because monitoring and maintenance is GE's responsibility under the Consent Decree.*

EPA Response: The EE/CA Report evaluated in-situ capping as a containment technology with potential application on the 1 ½ Mile Reach. An in-situ cap as defined in the EE/CA Report would be composed of an 18-inch erosion protection layer, a 6-inch sand and gravel bedding layer, and a 6- or 12-inch sorptive soil layer. The thickness of the sorptive soil layer in the EE/CA Report is consistent with the Upper ½ Mile Reach. Geotextiles would be placed above and below the sorptive soil layer to contain and protect the sorptive soil.

GE contends that the thickness of the cap as defined in the EE/CA Report is thicker overall than is necessary to be protective. GE goes on to state that the overall cap thickness in the Upper ½

Mile Reach is 18 to 24 inches. Specifically, GE indicates that the erosion protection layer and sand/gravel bedding layer (24 inches thick when combined) is over-designed and does not need to be this thick. However, the thickness of the sorptive soil layer in the EE/CA Report is consistent with the Upper ½ Mile Reach. GE states that the hydraulic analysis used to design the erosion protection layer is flawed and that a synthetic bedding layer could be used in place of the proposed sand/gravel bedding layer and, in fact, may not be needed at all.

Calculation of Flow Characteristics: Flow velocities in the EE/CA Report were calculated using Manning's Equation as presented in Appendix M and a flow rate of 6,000 cfs or, if 6,000 cfs topped the riverbanks, water depth was estimated using the top of bank elevation.

The bedslope used in the EE/CA Report was 0.01 ft/ft and was intended to capture the worst case (highest velocity) condition in the 1 ½ Mile Reach. The topography developed for the EE/CA Report (Figures 2.1-6A through D) indicate a 0.0016 ft/ft slope over the length of the 1 ½ Mile Reach and 0.002 from Elm Street to Dawes Avenue. These bedslopes are consistent with GE's Figure E-1. The EE/CA Report topography indicates short runs of the 1 ½ Mile Reach with bedslopes as steep as 0.01 to 0.02 ft/ft. In the opinion of the design professionals, the use of a bedslope of 0.01 ft/ft is therefore appropriate for the EE/CA Report design.

It is noted in the EE/CA Report (page M.1-1) that the analysis conducted for the EE/CA Report is preliminary and that detailed hydrologic and hydraulic calculations be performed to determine the final size of the erosion protection. The detailed calculations must take into account surveyed river cross sections and projected future restored river cross sections, composition of the restored riverbed, effects of bends, bridges, channel transitions and other restrictions to flows, and the effects of local storm sewer outfalls to the river.

Erosion Protection Design: The erosion protection layer selected for the EE/CA Report (Appendix M) was designed consistent with the EPA ARCS Program Guidance for the In Situ Subaqueous Capping of Contaminated Sediments. Appendix A of the Guidance states that sites having flow velocities typically found in flood control channels should follow USACE Engineering and Design Manual EM 1110-2-1601, Hydraulic Design of Flood Control Channels, to determine the size of the erosion protection stone required to protect the cap. Using the flow velocities determined for the EE/CA Report (reference the previous discussion) and the referenced design procedures, a median stone diameter of 6 inches was calculated for the majority of the 1 ½ Mile Reach.

The thickness of the erosion protection layer should be no less than the maximum stone size (12 inches in this case). Further, Appendix F, Page F-7 of EM 1110-2-1610 states that the thickness of the erosion protection layer "should not be less than 12 inches for practical placement." Therefore, under any circumstance, 12 inches is the thinnest layer of riprap that should be placed. This is a minimum, not a maximum.

The ARCS Guidance also states that the design of the erosion protection layer must take into account the erosive effects of ice and debris impact. The Housatonic River has iced up in the past and large trees occasionally fall in the river. Several large trees are currently lying in the riverbed of the 1 ½ Mile Reach. The erosion protection layer of the cap therefore must include an allowance for ice and debris impact. The referenced "rule of thumb" from EM 110-2-1601 recommends a 6- to 12-inch increase in erosion protection layer thickness "accompanied by appropriate increase in stone size subject to attack by large floating debris." The complete statement supports the need for an 18-inch thick erosion protection layer composed of 6-inch median diameter stone.

The 1 ½ Mile Reach passes through a densely populated area. As stated in the EE/CA Report (page M-13) and EM 1110-2-1601, "vandalism and/or theft of the stones is a serious problem in urban areas where small riprap has been placed. A W50 (min) of 80 lb. should help prevent theft and vandalism." This size recommendation equates to a median stone diameter of approximately 12 inches and a maximum stone diameter of 18 inches. Relative to this highly relevant recommendation, the proposed 18-inch riprap layer is not only justified, but is necessary.

GE states that a 12-inch thickness of 3-inch diameter (average) stone would be appropriate for the 1 ½ Mile Reach. This is based upon the flow velocities that GE would use in the selection of stone size and neglecting impact of large debris on the erosion protection layer. GE's stone size selection also neglects the stability of such small diameter stone when placed on bank slopes as steep as 1H:1V, which GE stated the EE/CA Report should consider when discussing bank slope angles. EM 1110-2-1601 states that side slopes (banks) "should ordinarily be no steeper than 1.5H:1V except in special cases where it may be economical to use larger hand-placed stone keyed well into the bank." EM 1110-2-1601 further states that "the stone size required to resist the erosive forces of channel flow increases when the side slope angle approaches the angle of repose of a riprap slope protection." The angle of repose for riprap is commonly cited as 40 degrees or 1.2H:1V.

Sand and Gravel Layer: The EE/CA Report does utilize a 6-inch sand and gravel layer to bed the overlying erosion protection layer and to protect the geotextile in the sorptive soil layer. USACE concurs with the use of the sand and gravel layer in this situation. The ARCS Program Guidance states that "filters provide an interface between the riprap layer and the protected material and are an essential element for protecting contaminated sediments." While filters may either be geotextile, granular (sand and gravel), or a combination of the two, granular filters have a long proven performance.

The sand and gravel layer also protects the underlying geotextile (the uppermost part of the sorptive soil component of the cap) from damage during the placement of riprap over the sorptive soil layer. The geotextile also acts as a filter layer to contain the sorptive soil. Should the geotextile be damaged during riprap placement (or as a result of a debris impact) the sorptive soil layer would be subject to erosion and subsequent failure.

The thickness of the sand and gravel layer is set in the EE/CA Report at 6 inches based primarily on the limited ability to place sand and gravel in a thinner lift over a geotextile without damaging the geotextile. GE contends that the sand and gravel protection layer can be completely eliminated by the use smaller riprap in the erosion protection layer, higher strength geotextiles, or by a combination of geotextile and GeoGrid. EPA believes that the combination of a granular filter and geotextile is consistent with USACE guidance, necessary to minimize inspection and maintenance, and appropriate for the cap design evaluated in the EE/CA Report.

GE's position that EPA should rely on a cap design similar to the design GE is using in the Upper ½ Mile Reach is not consistent with EPA's desire to minimize further disruptions in the 1 ½ Mile Reach. The situation in the Upper ½ Mile Reach is substantially different. GE's property abuts the river in the Upper ½ Mile Reach, so inspection and maintenance of the banks in this reach will not be nearly as disruptive. Because the 1 ½ Mile Reach is made up of many individual properties, long-term maintenance following the removal action will involve significant access issues. It should be noted that EPA's position regarding cap thickness primarily is based on existing guidance but is also consistent with EPA's goal of minimizing future maintenance and disruptions. The fact that GE is responsible for inspection and maintenance following construction is not relevant in the cap design. Regardless of who is implementing the inspection and maintenance, the reality is that any significant maintenance activities of a proposed in-river cap would potentially cause significant disruption to numerous properties along the 1 ½ Mile Reach.

*67) **Comment:** Page 4-6, Section 4.4. GE suggests that for areas where a cap is unnecessary because excavation to a depth of 18- 24 inches will remove all sediments that exceed the cleanup criterion – there is no need to backfill the excavation to the original grade.*

EPA Response: The 1 ppm cleanup goal for removal of contaminated sediments is protective when coupled with placement of clean backfill material. This is a primary removal action goal for the sediments in the 1 ½ Mile Reach. In addition, apart from habitat restoration objectives, one of the other goals of this removal action is to maintain the existing hydraulic capacity of the river. EPA will consider partial backfill replacement, as suggested by GE, when evaluating habitat improvements and restoration provided the goal of attaining 1 ppm PCBs in sediments with adequate isolation can be maintained and the hydraulic capacity of the river is also maintained.

*68) **Comment:** Page 4-7, Section 4.5. GE suggests that an additional alternative that should be considered for some stretches between Elm Street and Dawes Avenue is reliance on natural armoring, with removal of certain exposed sediment pockets where necessary.*

EPA Response: EPA rejects the "natural armoring" alternative suggested by GE. The "cobble reach" between Elm Street and Dawes Avenue is made up of primarily three subreaches (4-1, 4-2 & 4-3). Although the cobble reach is characterized by the abundance of cobbles (>2-inch stone), these subreaches also have a significant volume of finer grained material with PCB contamination. Table 2.3-3 of the EE/CA Report estimates that the mass of PCBs in the cobble reach is 610 kg. This mass represents approximately 36% of the total mass of PCBs in sediments in the 1 ½ Mile Reach. The finer grained material, contaminated with PCB's, is intermixed with the larger cobbles. Since the finer grained/PCB material is present at the sediment surface, there is no armoring effect from the cobbles. No action in this area will not achieve EPA's objective of attaining a 1 ppm or less level in surficial sediments with adequate isolation of any residual PCBs.

Section 5 Disposal/Treatment Alternatives

69) Comment: *GE agrees with EPA's decision to dispose of up to 50,000 cubic yards of excavated material at the GE On Plant Consolidation Areas with the remaining material sent to an Off-Site disposal facility.*

EPA Response: As GE agrees with EPA's recommended alternative, no further response is required.

Section 6 Conclusions

70) Comment: *Page 6-1. GE suggests that EPA should reevaluate its current proposed Removal Action, using less stringent criteria or applying its cleanup criteria less conservatively, taking into account the alternatives suggested by GE, and considering the additional data being collected. EPA should then develop a revised Removal Action and propose that revised Removal Action for public comment.*

EPA Response: As explained in the above response to comments, EPA does not believe that the data presented in the EE/CA Addendum alters the evaluation presented in the EE/CA Report or the Recommended Alternative to the extent that additional public comment is required. EPA also maintains that it is not bound to consider any particular alternatives, although EPA did consider and reject the alternatives presented in the GE comments. Finally, EPA believes that the appropriate cleanup criteria was used and was not applied in an overly-conservative manner. Therefore, there is no reason to revise the selected removal action or to re-open the public comment period.

Attachment A - Questions and Comments Pertaining to EPA's Soil Removal Volume Calculations

71) Comment: Question 1. *How and where are the upper and lower limits of excavation defined?*

EPA Response: The limits of excavation were defined by the following:

- Results of the statistical analysis of the results of environmental sampling (95% UCL) as described in Section 3.4.1 of the EE/CA Report.
- Preliminary slope stability analysis conducted in EE/CA Report Appendix N.

- Topography and the location of the top of bank. Relocation of the top of bank was to be minimized.
- The presence of utilities, infrastructure, and structures at the top of bank.

As described in EE/CA Report, Appendix O, cross sections of the Housatonic River were generated using survey information collected by the USACE at 50-ft intervals. The depth of required excavation to achieve the cleanup criteria (Section 3.4.1 of the EE/CA Report) was then plotted on each cross section to define the limit of "cleanup excavation."

The resulting "cleanup excavation" grades were then reviewed for stability as determined in the EE/CA Report Appendix N. If the "cleanup excavation" was determined to be stable, the excavation cross section was complete.

If the "cleanup excavation" slope was determined to not be stable, the stable slope from EE/CA Report Appendix N was projected onto the "cleanup excavation." This "stability excavation" was then reviewed for impact to the limit of top of slope, utilities, infrastructure, or structures. If there were no impacts, the excavation cross section was complete.

If the "stability excavation" was determined to impact the limit of top of slope, utilities, infrastructure, or structures, the use of temporary stabilization methods and earth retaining structures was considered necessary. Earth retaining structures were then plotted onto the cross section to develop a stable final slope that did not impact the limit of the top of slope, utilities, infrastructure, and structures. The volume estimate assumed that the earth retaining structures would be constructed of either gabions, steel sheetpile, metal-bin cribs, concrete, cemented masonry, or modular blocks. The actual wall type will be selected during design to minimize excavation as limited by required wall height and site-specific conditions.

72) Comment: Question 2. *How does the top of bank sampling relate to EPA bank soil sample locations, and to the limit and depth of excavation?*

EPA Response: The attached Table 1 provides information relative to the spatial relationship between the "top of bank" as defined by the limit of work on Figures 2.1 - 6A through D of the EE/CA and the top of bank sample. The table generally includes "top of bank" samples collected at 100-foot transects. However, the table does not include all the residential samples collected by the Weston Start Team, some of which could potentially be included as top-of-bank samples. These additional residential samples will be evaluated during the design. The table also provides the surveyed elevation of the top of bank sample, and a surveyed or estimated top of bank (limit of work) elevation. From the table, it can be seen that the horizontal and vertical distance between the top of bank sample and the estimated limit of work varies, depending on the steepness and height of the bank. Between Transects 64 and 96, the distance between the two points is generally relatively small (less than 10 feet horizontal and vertical). Between transects 96 and 168 (generally the Cobble Reach), where the banks reach their greatest height and steepness, there are several instances where the difference in elevation between the top of bank sample and the estimated limit of work is greater than 20 feet. Between Transects 168 and 212, the difference is generally smaller again due to shorter, more gently sloped banks (less than 10 feet horizontal and vertical).

During design, EPA will evaluate the areas where the limit of work is considerably higher than the top of bank sample and determine if additional sampling is appropriate. This evaluation will take into consideration the following factors: the distance between the top of bank and the top of bank sample location, the analytical results for the current "top of bank" samples, the currently proposed excavation limits, the analytical results from adjacent floodplain samples (e.g., oxbow and residential properties), and the relative steepness and stability of the banks. During this evaluation, if EPA determines that additional sampling will not likely result in reduced excavation limits, then no further sampling will be performed. If, however, EPA determines that additional sampling could provide information that may result in reduction to the excavation limits and depths, then additional sampling will be performed.

EPA believes the characterization of the top of banks was sufficient to meet the objectives of the EE/CA. Any subsequent data gathered based on the proposed sampling identified above or any subsequent revisions to the proposed excavation limits and quantities would only decrease excavation volumes and would not alter the evaluation of the proposed removal alternatives or remedy selection.

*73) **Comment: Question 3, Bullet 1.** Are the cross-sections available for review by GE and/or incorporated into the Addendum to the EE/CA?*

EPA Response: The cross-sections consist of between 140 and 150, 11X17-inch draft working sheets containing hand written comments. The cross-sections were used to estimate excavation volumes but will be further refined and finalized during design. As these cross-sections are finalized during design, GE will be provided copies.

74) Comment: Question 3, Bullet 2. What inaccuracies exist in the cross-sections, and what information was used to modify the cross-sections to provide better accuracy if it was not collected during the survey?

EPA Response: As described in EE/CA Report Appendix O, USACE surveyed the river cross sections at approximately 50-ft intervals for the length of the 1 ½ Mile Reach. This information was used to develop a computer-generated topographic map of the 1 ½ Mile Reach. The cross sections used for slope stability analysis (EE/CA Report Appendix N) and volume estimates (EE/CA Report Appendix O) were then "cut" and plotted by computer.

The USACE survey information was not collected with the intention to be used to generate topography. It therefore did not include information on bends in the river, structures (such as bridges and buildings) or slope break-lines that the computer would use to develop topography. As a result some local areas of the topography (as indicated by the cross sections generated) did not account for bends, structures, and breaks in slope.

The entire topography and each cross section were evaluated for consistency to observed conditions in the river. In local areas where the computer generated information did not appear representative of observed conditions, information from cross sections immediately upstream and downstream were used to "revise" the cross section in question. For additional information on volume calculations see EPA Response to Comment 59.

*75) **Comment:** **Question 3, Bullet 3**. GE notes that in some instances, EPA's topographic data do not extend up to the proposed limit of excavation. How were the cross-sections and ultimately the volumes developed on these cases?*

EPA Response: There are very few areas along the 1 ½ Mile Reach where the topographic information does not extend to the limit of excavation. For these locations the cross sections were extended horizontally at the top of bank (surveyed by USACE) based on observations made of these areas. The resulting existing grade was then complete and the "excavation grade" finalized.

*76) **Comment:** **Question 4, Bullet 1**. In the EE/CA (p. 5-9), EPA states that temporary excavation slopes for constructing the retaining walls will be 2.25 H:1V or flatter. Appendix L (p. L-13) also suggests that the retaining structures will be founded 3 feet below the bottom of the thalweg (deepest part of the river). Further, the proposed geogrid reinforced wall typically requires a minimum reinforcement length of 6 feet (see Attachment C). The combination of these constraints on the wall geometry and temporary slope will require that the toe of the temporary slope be located significantly below and behind the toe of the existing slope. The resulting temporary slope will extend significantly beyond the current crest of the slope, and also will extend further back than a 2.25H:1V permanent slope that commences from the current slope.*

EPA Response: Page 5-9 of the EE/CA Report states that "Along some lengths of the riverbank, sufficient area is available to cut the banks back temporarily to a 2.25H:1V slope." The Report goes on to state that in "areas where a 2.25H:1V [slope] cannot be achieved, such as in areas where there are existing structures, roads, or utilities, a temporary slope of 2H:1V will be considered when excavation and restoration can be completed in the same day." Further, "if a 2H:1V slope cannot be maintained, temporary structural stabilization of the bank will be required to prevent bank failure. Final restoration in these areas would include construction of retaining wall structures." Therefore, temporary slopes will not extend significantly beyond the current crest of slope where existing structures, roads or utilities must be maintained during construction.

The volume estimate assumed that the retaining structures would be constructed of either gabions, steel sheetpile, metal-bin cribs, concrete, cemented masonry, or modular blocks. The actual wall type would be selected during design to minimize excavation as limited by required wall height and site-specific conditions. To account for the excavation required to install a retaining wall, a wedge of soil five feet thick with a temporarily stabilized cut slope of 0.5H:1V was assumed. Also see EPA Response to Comment 59.

77) Comment: Question 4, Bullet 2. *While the temporary slopes for the retaining structures will extend much further back than the existing crest of the slope, the face of the wall will be much steeper than the existing slope (i.e., will become vertical). Unless even more excavation is planned to move the retaining structure back into the bank, the steeper wall face will reduce the river's cross-sectional area, and thus the flood storage capacity.*

EPA Response: Additional excavation to locate retaining structures (and establish final restoration grades) is necessary to ensure that the river's current cross sectional areas is maintained after restoration. This was accounted for in the excavation cross sections developed for the volume estimates.

78) Comment: Question 4, Bullet 3. *It should be noted that the actual location of the proposed walls is not well-defined in the EE/CA. Drawings 2.1 6A through D show the walls may be located in various sections at the toe, middle, or crest of the slope, but Drawing L-3 of Appendix L indicates they will be constructed at the toe. It is unclear which wall locations were assumed during calculation of volumes. Obviously, the selection of these locations will have a significant impact on the removal volume.*

EPA Response: In the EE/CA Report the retaining walls were typically located at or near the toe of the riverbank slope. The actual location, height, and extent (length) of the proposed retaining walls will be determined during final design. The retaining walls will be constructed of gabions, steel sheetpile, metal-bin cribs, concrete, cemented masonry, or modular blocks. The actual wall type will be selected during design to minimize excavation as limited by required wall height and site-specific conditions.

79) Comment: *GE concludes its comments to Attachment A by asking how the additional volumes associated with these issues are accounted for?*

EPA Response: EPA disagrees with GE's assertion that the volume estimates in the EE/CA Report are incorrect. See EPA Response to Comments 59 and 71-79.

Responses to comments in Attachments B, C, D, & E have been provided previously in this Responsiveness Summary.

Figure 1 to Comment 56
Distribution of Total PCB Results in Riverbank Soils
EECA Reach of the Housatonic River
Pittsfield, Massachusetts

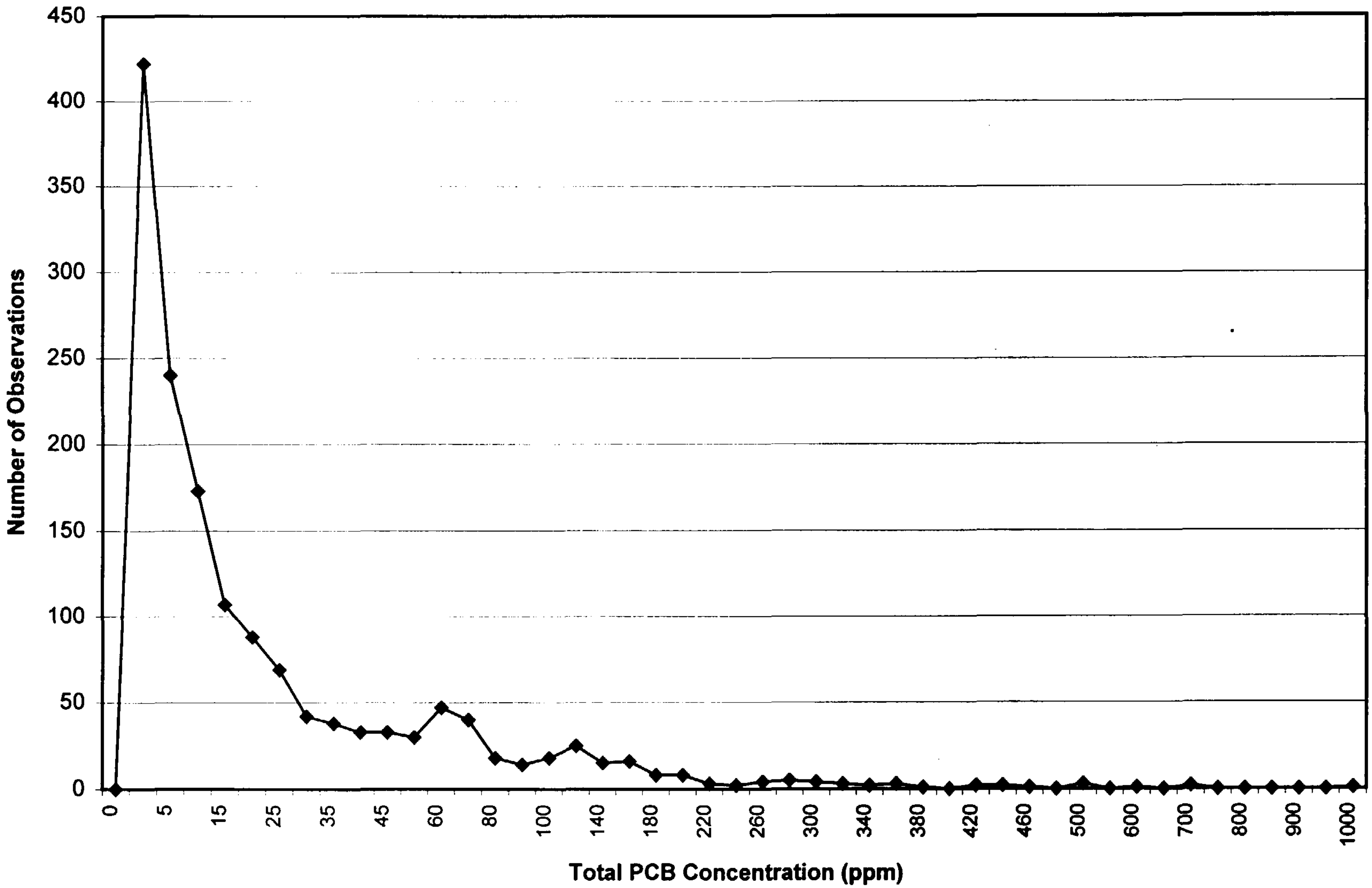

Figure 2 to Comment 56
Distribution of Total PCB Results in Sediment Soils
EECA Reach of the Housatonic River
Pittsfield, Massachusetts

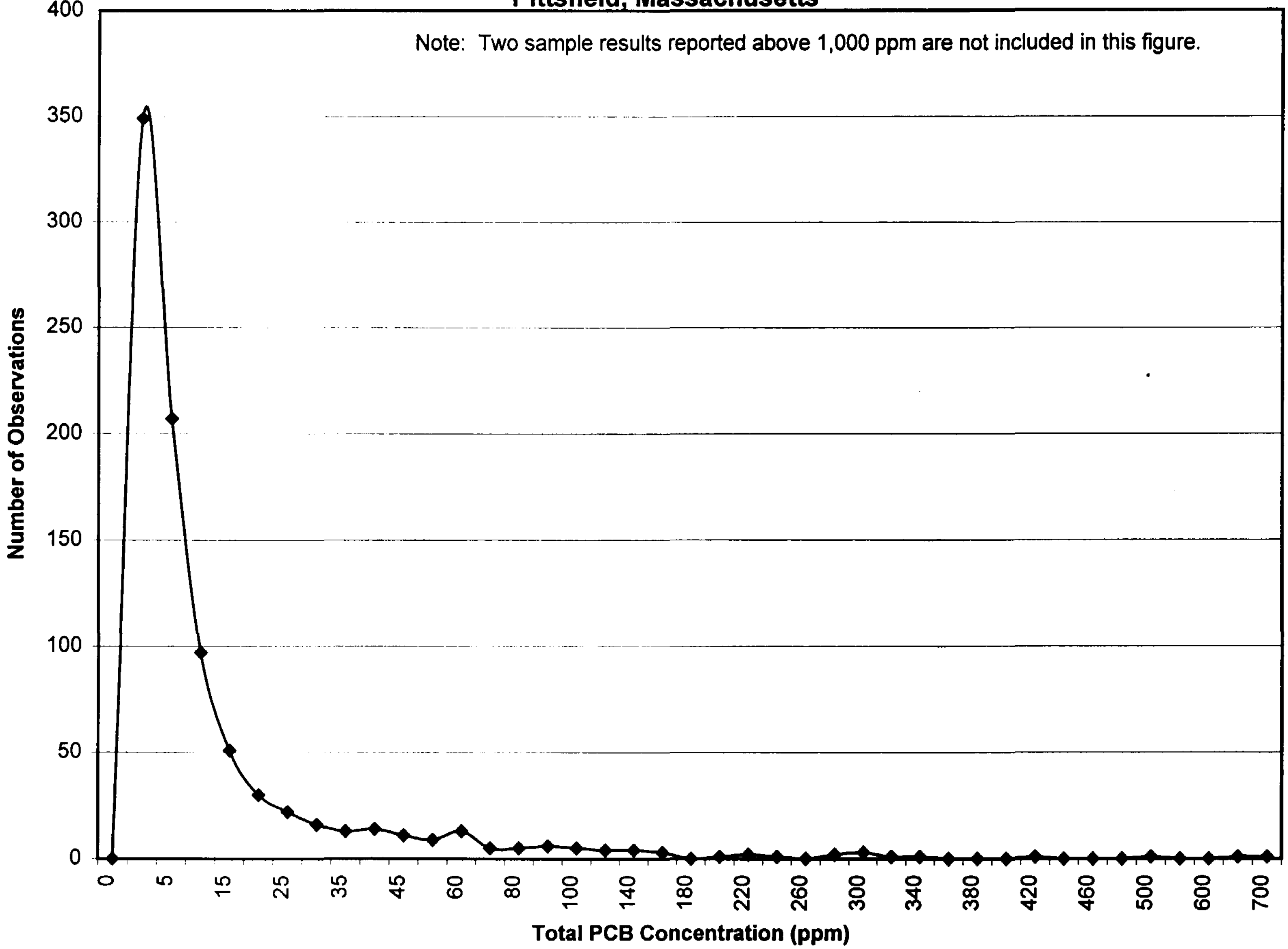

Table 1 to Comment 72
1 1/2 Mile Reach Top of Bank Survey Information

SIDE	TRANSECT	LOCATION ID	Sample Point Elevation	Corresponding Top of Bank Survey Elev.[3]	Elev. Diff Between Top Sample and Top of Bank	Horiz. Dist. - Top sample to Top of Bank Survey Elevation[2]	Elev. Of Estimated Limit of Work (LOW)[1]	Hor. Dist. - Top sample to Estimated LOW	Notes
W	064	NS			0.00				4
E	064	NS			0.00				4
W	066	RB010661	981.13	981.13	0.00	0	981.13	0	
E	066	NS			0.00				4
W	068	RB010681	975.83	979.43	3.60	10	979.43	10	
E	068	NS			0.00				4
W	070	RB010701	979.03	979.03	0.00	0	979.03	0	
E	070	RB010706	976.23	976.23	0.00	0	982	20	
W	072	RB010721	978.55	980.75	2.20	4	981	9	
E	072	NS			0.00				4
W	074	RB010741	976.55	981.15	4.60	8	981.5	14	
E	074	RB010746	981.05	981.05	0.00	0	982.5	17	
W	076	RB010761	978.75	978.75	0.00	0	980	8	
E	076	RB010766	973.45	982.35	8.90	12	982.5	17	
W	078	RB010781	978.45	978.45	0.00	0	980	14	
E	078	RB010786	977.55	977.55	0.00	0	980	15	
W	080	RB010801	978.58	978.58	0.00	0	980	15	
E	080	RB010806	975.28	980.28	5.00	22	982	27	
W	082	RB010821	978.78	978.78	0.00	0	980	13	
E	082	RB010826	973.98	982.38	8.40	35	983	42	
W	084	RB010841	978.48	978.48	0.00	0	980	18	
E	084	RB010846	978	981.98	3.98	10	983	30	6
W	086	RB010861	978.64	978.64	0.00	0	980	12	
E	086	RB010866	977	982.94	5.94	27	983	41	6
W	088	NS			0.00				4
E	088	RB010886	979.34	979.34	0.00	0	983	17	
W	090	RB010901		980.14			981		5
E	090	RB010906	979.14	981.84	2.70	12	984	22	
W	092	RB010921		981.06			981.5		5
E	092	RB010926	976.66	984.76	8.10	27	985	40	
W	094	RB010941		980.36			981		5

Table 1 to Comment 72
1 1/2 Mile Reach Top of Bank Survey Information

SIDE	TRANSECT	LOCATION ID	Sample Point Elevation	Corresponding Top of Bank Survey Elev.[3]	Elev. Diff Between Top Sample and Top of Bank	Horiz. Dist. - Top sample to Top of Bank Survey Elevation[2]	Elev. Of Estimated Limit of Work (LOW)[1]	Hor. Dist. - Top sample to Estimated LOW	Notes
E	094	RB020946	978.16	985.76	7.60	11	986	15	
W	096	RB010961		980.66			981		5
E	096	RB020966	980.16	988.66	8.50	12	989	19	
W	098	RB010981		982.37			983		5
E	098	RB020986	980.02	989.32	9.30	11	989.5	19	
W	100	RB011001		983.91			984		5
E	100	RB021006	978.31	982.21	3.90	10	982.21	0	7
W	102	RB011021		984.71			985		5
E	102	RB021026	980.81	986.71	5.90	13	986.5	20	
W	104	RB011041		983.81			988		5
E	104	RB021046	979.01	987.01	8.00	15	988	23	
W	106	RB021061		989.98			990		5
E	106	RB021066	976.28	989.48	13.20	22	990	31	
W	108	RB021081	979.88	990.28	10.40	15	990.28	15	
E	108	NS			0.00				4
W	110	RB021101	978.34	988.24	9.90	19	988.24	19	
E	110	RB021106	974.14	988.74	14.60	10	988.74	10	
W	112	RB021121	975.64	988.44	12.80	30	988.44	30	
E	112	NS			0.00				4
W	114	RB021141	974.74	989.34	14.60	40	989.34	40	
E	114	NS			0.00				4
W	116	RB021161	974.74	990.54	15.80	33	990.54	33	
E	116	RB021166	974	987.44	13.44	27	987.44	27	6
W	118	RB021181	973.15	991.45	18.30	32	991.45	32	
E	118	RB021186	972	986.95	14.95	27	986.95	27	6
W	120	RB021201	968.85	993.25	24.40	39	993.25	39	
E	120	RB021206	972	985.15	13.15	31	986	35	6
	122	RB021221	971.15	994.95	23.80	50	994.95	50	
E	122	RB021226	965.75	983.65	17.90	30	984	35	
W	124	RB021241	972.68	994.08	21.40	40	994.08	40	
E	124	RB021246	971.83	978.13	6.30	10	978.5	12	10

Table 1 to Comment 72
1 1/2 Mile Reach Top of Bank Survey Information

SIDE	TRANSECT	LOCATION ID	Sample Point Elevation	Corresponding Top of Bank Survey Elev.[3]	Elev. Diff Between Top Sample and Top of Bank	Horiz. Dist. - Top sample to Top of Bank Survey Elevation[2]	Elev. Of Estimated Limit of Work (LOW)[1]	Hor. Dist. - Top sample to Estimated LOW	Notes
W	126	RB021261	973.23	990.41	17.18	35	991	39	
E	126	RB021266	971.33	976.76	5.43	6	977	12	10
W	128	RB021281	969.98	975.81	5.83	20	975	15	7
E	128	RB021286	967.91	977.87	9.96	32	977.87	32	10
W	130	RB021301	966.63	975.89	9.26	35	976.5	37	
E	130	RB021306	973.53	985.71	12.18	35	982	27	7
W	132	NS			0.00				4
E	132	RB021326	971.55	986.8	15.25	33	986.8	33	
W	134	NS			0.00				4
E	134	RB021346	971.12	985.52	14.40	29	985.52	29	
W	136	NS			0.00				4
E	136	RB021366	970.64	984.66	14.02	29	984.66	29	
W	138	NS			0.00				4
E	138	RB021386	971.25	982.99	11.74	20	984	26	
W	140	NS			0.00				4
E	140	RB021406	972.52	981.29	8.77	19	981.21	19	
W	142	RB021421	977.52	980.39	2.87	5	981	8	
E	142	RB021426	967.61	980.37	12.76	21	980.37	21	
W	144	RB021441	968.12	973.18	5.06	8	980	29	
E	144	RB021446	968.09	977.3	9.21	18	976	14	7
W	146	RB021461	966.76	980.13	13.37	25	980.13	25	
E	146	RB021466	968.8	976.63	7.83	18	976.63	18	
W	148	RB021481	965.79	977.86	12.07	26	977.86	26	
E	148	RB021486	971.9	976.69	4.79	9	974	1	7
W	150	NS							4
E	150	RB021505	971.49	971.49	0.00	0	974	13	
W	152	RB021523	961.57	972.34	10.77	19	973	26	
E	152	RB021524	961.42	974.21	12.79	30	974.21	30	
W	154	RB021541	969.73	969.73	0.00	0	969.73	0	
E	154	RB021546	965.37	972.5	7.13	15	972.5	15	
W	156	RB021562	965.39	968.92	3.53	15	968.92	15	

Table 1 to Comment 72
1 1/2 Mile Reach Top of Bank Survey Information

SIDE	TRANSECT	LOCATION ID	Sample Point Elevation	Corresponding Top of Bank Survey Elev.[3]	Elev. Diff Between Top Sample and Top of Bank	Horiz. Dist. - Top sample to Top of Bank Survey Elevation[2]	Elev. Of Estimated Limit of Work (LOW)[1]	Hor. Dist. - Top sample to Estimated LOW	Notes
E	156	RB021565	968.69	968.58	-0.11	4	968.58	4	
W	158	RB021583	960.21	965.54	5.33	14	968	23	
E	158	RB021584	961.94	967.79	5.85	8	967.79	8	
W	160	RB021602	963.53	967.07	3.54	5	967.07	5	
E	160	RB021605	963.74	966.7	2.96	8	966.7	8	
W	162	RB021621	970.04	973.98	3.94	5	970.04	0	7
E	162	RB021626	964.61	964.61	0.00	0	965	5	
W	164	RB021642	967.2	973.35	6.15	6	973.35	6	
E	164	RB021644	960.6	965.62	5.02	4	965.62	4	
W	166	RB021663	961.04	974.14	13.10	13	975	17	
E	166	RB021665	963.01	966.66	3.65	2	968	5	
W	168	RB021681	968.75	974.32	5.57	17	973.5	14	7
E	168	RB021686	965.69	973.43	7.74	21	973.43	21	
W	170	RB021702	963.57	967.19	3.62	6	967.19	6	
E	170	RB021705	964.01	973.77	9.76	25	973.77	25	
W	172	RB021723	960.31	966.97	6.66	9	967	15	
E	172	RB021724	961.22	973.91	12.69	13	972	10	7
W	174	NS			0.00				4
E	174	RB021745	964.12	976.65	12.53	26	974	20	7
W	176	RB021762	965.97	965.97	0.00	0	965.97	0	
E	176	RB021766	966.97	967.03	0.06	9	967	6	7
W	178	RB021781	966.18	966.18	0.00	0	966.18	0	
E	178	RB021785	963.14	966.17	3.03	4	967	7	
W	180	RB021802	962.82	967.27	4.45	5	967.27	5	
E	180	NS			0.00				4
W	182	RB021823	959.76	967.15	7.39	5	967.15	5	
E	182	NS			0.00				4
W	184	RB021841	962.87	962.87	0.00	0	962.87	0	
E	184	RB021844	959.79	962.63	2.84	5	967	15	
W	186	RB021861	963.6	966.42	2.82	9	966.42	9	
E	186	RB021865	964.16	976.86	12.70	29	970	7	7

Table 1 to Comment 72
1 1/2 Mile Reach Top of Bank Survey Information

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W	188	RB021881	967.25	967.25	0.00	0	966	15	9
E	188	RB021884	961.16	976.08	14.92	28	974	24	7
W	190	RB021901	965.98	965.98	0.00	0	965.98	0	
E	190	RB021906	973.72	973.72	0.00	0	973.72	0	
W	192	RB021921	967.49	967.29	-0.20	5	966	14	9
E	192	NS			0.00				4
W	194	RB021941	965.4	966.48	1.08	3	966.48	3	
E	194	NS			0.00				4
W	196	RB021961	965.74	965.74	0.00	0	965.74	0	
E	196	RB021966	966.83	966.83	0.00	0	966.83	0	
W	198	RB021981	966.17	971.27	5.10	15	971.27	15	
E	198	RB021986	965.71	968.69	2.98	8	968	13	
W	200	RB022001	970.21	978.11	7.90	17	978.11	17	
E	200	RB022006	963.92	966.58	2.66	13	966.58	13	
W	202	RB022021	978.96	978.96	0.00	0	978.96	0	
E	202	RB022026	964.89	966.31	1.42	6	966.31	6	
W	204	RB022041	965.79	968.41	2.62	8	968.41	8	
E	204	RB022046	966.45	966.45	0.00	0	966.45	0	
W	206	RB022061	967.38	967.38	0.00	0	967.38	0	
E	206	RB022066	965.94	965.94	0.00	0	965.94	0	
W	208	RB022081	964.91	966.22	1.31	11	966	8	7
E	208	RB022086	966.95	966.95	0.00	0	966.95	0	
W	210	RB032101	965.13	965.13	0.00	0	965.13	0	8
E	210	RB032106	966.03	966.03	0.00	0	966.03	0	8
W	212	RB032121	964.23	964.23	0.00	0	964.23	0	8
E	212	RB032126	965.44	965.44	0.00	0	965.44	0	8
Notes:									

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1	Elevation of the Limits of Work is estimated from the topographic contours provided on Figures 2.1-6A through 2.1-6D of the Final EE/CA report. The Limit of Work is defined as the line title "Limit of EE/CA Removal." In general the elevation was estimated based on the contours, however, in some cases an exact elevation was provided because a topographic survey shot was available at that point.								
2	This distance was measured as a horizontal distance approximately parallel to the corresponding transect line between the top sample location and the top of bank survey point.								
3	This elevation is the top of bank survey elevation as defined by the U.S Army Corps of Engineers survey performed in 1998.								
4	NS = No samples collected. No samples were collected along this transect and side of river due to lack of access, the area was previously remediated, inaccessability, or sample collection equipment refusal.								
5	Survey of sample point not available as of 10/2000. Survey expected to be available 11/2000.								
6	Elevation of the sample point was estimated. The elevation estimate was based on available information including GPS coordinates, location of the transect, other survey points, and topographic contours.								
7	Top of Bank as interpreted by field survey work is located inside "limit of EE/CA removal" line.								
8	The limit of EE/CA removal line is not shown on Figure 2.1-6D at these transects; however, for purposes of volume calculations, the cross-section at Transect 208 was projected for the remainder of the EE/CA reach through Transect 212. Actual conditions are expected to vary from those tabulated here.								
9	Limit of EE/CA Removal line shown on Drawings is inside top sample location as surveyed.								
10	Two "tops" of bank were noted in the survey. The lower of the two was selected in this analysis.								

DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL ELECTRIC/HOUSATONIC RIVER PROJECT)
)
UPPER REACH OF THE HOUSATONIC RIVER)
ENGINEERING EVALUATION/COST ANALYSIS)

Public Hearing

Berkshire Athenaeum Public Library Auditorium

1 Wendell Avenue

Pittsfield, Massachusetts

August 15, 2000

7:00 p.m.

HEARING OFFICER: JOHN W. KILBORN, ESQ.

BOARDMAN REPORTING SERVICE, INC.
P.O. Box 4451
Pittsfield, Massachusetts 01202
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(7:04 p.m., hearing commenced.)

MR. KILBORN: Good evening. My name is John Kilborn. I'm senior enforcement counsel, Superfund Legal Office with EPA's Region 1 Boston office. I'm the hearing officer for tonight's hearing on the Engineering Evaluation/Cost Analysis, or EE/CA, for the Mile-and-a-half Reach of the Housatonic River for the GE/Housatonic River site.

The purpose of this hearing is to formally accept oral comments on the EE/CA and EPA's recommended cleanup alternative. We will not be responding to comments tonight, but we will respond to them in writing after September 1st, 2000, which is the close of the comment period on the EE/CA.

The comment period was extended for 15 days at the request of the General Electric Company.

A draft of the EE/CA without the recommended cleanup alternative was discussed with the citizens' coordinating counsel on March 1, 2000. EPA held meetings with landowners abutting that Mile-and-a-half Reach on May 23rd and June 7th and 8th. EPA held public information meetings on the EE/CA on July 25th in Pittsfield and on August 9th in Kent, Connecticut.

At those meetings, information concerning the recommended alternative was presented, and EPA responded to questions about the EE/CA and the site.

I'll now describe the format for this hearing.

First, Chet Janowski -- and also with me here is Brian Olsen. Chet Janowski, who is the project manager for the Mile-and-a-half Reach, will give a brief overview for the cleanup plan for the site. Following Chet's presentation we will accept oral comments for the record.

Those of you wishing to comment should have indicated your desire to do so by signing a list with Angela or Rose. But if you haven't done so and would like to speak, please let either Angela or Rose know and make sure you have an opportunity to speak.

We also have copies of a fact sheet regarding the EE/CA right up in one of the yellow chairs there. They're available for anybody who wants one.

I would call on anybody wishing to speak in the order in which people signed up. And when you come up to speak, please state your name and address or your affiliation. Come up to the front of the room. I guess I'll keep it informal and won't use the microphone.

And I ask at the -- initially to limit comments to 5 minutes and to make sure that everybody who has -- who wants to has a chance to comment. And if people need an additional time, we can give people additional time to comment.

But if you also have a text of your comments, please feel free, an extra copy of that text, to give those to us as well. That will help the court stenographer.

After all the comments have been heard, I will close the formal hearing. If you wish to submit written comments, you can hand them to me tonight. You can mail them or e-mail them to our Boston office at the address listed in the fact sheet.

At the conclusion of the hearing, please see any of the EPA representatives if you have any questions on how to submit comments.

All oral comments received tonight and the written comments received during the comment period will be addressed in the responsiveness summary -- that's a response to people's comments -- and become part of the administrative record for the site.

The response to comments, which is called the responsiveness summary, will also be included with the action memo for the site.

Are there any questions?

Chet will -- before we hear the public -- open the floor to public comments, Chet's going to give a brief overview of the EE/CA.

MR. JANOWSKI: Thanks, John.

I'm just going to go very briefly over EPA's recommended alternative for the Mile-and-a-half. As John said, I am EPA's project manager for the Mile-and-a-half cleanup, and that's running from -- beginning at Lyman Street bridge and running down to the confluence.

In order to meet the cleanup goals that EPA had established for sediments and soils along this Reach, we're proposing that the sediments be excavated for the entire Mile-and-a-half to a depth of between -- generally between 2 to 3 feet. That's again for the entire Mile-and-a-half. That comes out to just about 43,000 cubic yards of sediments to be removed.

Concurrently with removal of the sediments, we're proposing that the bank soils also be excavated. Those bank soils on residential properties will be excavated to a minimum of 3 feet, in some cases a little bit deeper. The bank soils on all other properties, be they commercial or recreational or open space, will be excavated to between 1 to 3 feet. That total excavation will account for approximately 50,000 cubic yards of material.

So in total we're proposing that approximately 93,000 cubic yards of material will be excavated from both the sediments and the river banks.

Now, as far as the recommended alternative for dealing with those, for getting those materials out and then dealing with those once we do have them out, EPA is proposing a combination of steel sheetpiling, similar to what GE is doing in the first half mile of the river, and pump bypass in other sections of the river.

For the first 15, 1600 feet of the river, beginning at Lyman Street and running down to approximately 500 feet above the Elm Street bridge, we're proposing that the river be excavated using steel sheetpiling. Again, the banks would also be excavated at the same time.

For the next 3200 feet, running down to

just about the end of Loudon Street or about 600 feet upstream of Pomeroy Avenue, we're proposing to use a pump bypass system. This is because bedrock in this area is very close to the surface, which eliminates the use of steel sheetpiling through this area.

The final section of river down to the confluence, about 2200 feet, we're again proposing to use steel sheetpiling. However, we will allow the contractor to use a pump bypass again if it's shown to be more effective and more efficient.

The disposal of this material, we are proposing to dispose of 50,000 cubic yards of this material at the GE on plant consolidation areas as allotted for under the Consent Decree. The remaining 43,000 cubic yards of material or whatever is left over at that point would be taken to an off-site disposal facility.

The total cost for this remedy is estimated at approximately $41 million. We will begin work as soon as GE has finished their work in the first half mile, and this work will take approximately three to five years to complete.

That basically gets us through that -- the entire recommended alternative in very quick fashion. So I'll turn it back to John.

MR. KILBORN: We'll now open it up to public comments in the order they signed up. First is Audrey Cole.

You can either use the microphone or not as you wish.

MS. COLE: Good evening. My name is Audrey Cole. I'm president of the Housatonic Environmental Action League which is based in Cornwall, Connecticut.

Along with my comments I wanted to submit a November 1999 volume 13, number 1, Physicians for Social Responsibility, PSR, Monitor regarding the international effort to phase out 12 toxins which includes PCBs, and the International POPs Elimination Network Summary statement. I don't believe there's a date on it. But it's regarding the Persistent Organic Pollution, otherwise known as POPs. So I'm going to submit these two, okay?

My statement: The Housatonic Environmental Action League based in Cornwall, Connecticut, exists to aggressively monitor the failed cleanup of General Electric's release of toxic polychlorinated biphenyls in the Housatonic River.

It has been 23 years since the use and indiscriminate dumping of PCBs was banned by our public officials, but it has also been 23 years of arrogant dissembling and delay. Meanwhile, the General Electric Corporation has prospered and our river has suffered.

Turn on any television or radio station in the country or look up the massive dollars funneled to political campaigns and you will see General Electric's dollars at work to stymie a credible solution to their polluting legacy. If only those dollars would be spent on our river.

We have been reading, listening, analyzing, and watching the efforts by the

U.S. Environmental Protection Agency and the engineers and scientists who have been attempting the hard work of ending the talk and physically digging into contaminated sediment.

We commend Chet Janowski and the laudable work his team has been engaged in, but in viewing a recent video of the laying of a thin black garbage bag style sheet of plastic on the bed of our beloved river, tears come to our eyes. It is clearly evident what is taking place cannot be termed a cleanup but a containment. And we say this is wrong.

Since January we have been trying to obtain information as to how our government has failed us. We already know General Electric has. We have been unable to obtain important documents that we believe will assist us in our conviction that a more credible and permanent solution to the containment, removal, and disposal of General Electric PCBs in our environment can be found, as well as the attendant compensation that must, and I repeat, must be renegotiated.

These documents have been intentionally withheld from us, we were told, until after the filing of the Consent Decree in Federal Court by government representatives last month. And we can only conclude that the motives for such withholding are not honorable.

It is evident that economic cost is the overriding factor in the containment of Housatonic PCBs, but not cost to the uses of the river or the health cost to the mothers and children who daily recreate in the river, oblivious to the toxic hazard exposures or to the cost of future generations or to the eventual economic cost to taxpayers. No, the overriding cost interest is always, ultimately, unfortunately, in favor of General Electric.

We continue to plea for independent deep core studies to be performed in the Connecticut and lower Massachusetts region of the Housatonic River.

Absent from the EE/CA July 2000 report is an analysis of the October 7th, 1998, Greenpeace study entitled "Technical Criteria for the Destruction of Stockpiled Persistent Organic Pollutants," or POPs. These alternatives as proposed by Greenpeace have received promising or approving recommendations from the governments of Australia and Canada, the United Nations, and the U.S. Departments of Defense and Energy. Why were none of these alternatives reasonably analyzed in EE/CA? Is the cost again just too great for General Electric?

Finally, we are outraged at the untimely switching of the public meeting in Kent, Connecticut, on August 8th to August 9th on this very EE/CA report. We have been unable to determine who is being accommodated, but it is clear it was not the parties who are specifically concerned about the General Electric PCB toxins in Housatonic. We ask that this not happen again.

We are told as stakeholders in the rest of the river that we are not time critical. If that is indeed true, we continue to protest that there is no credible reason for us to be included in this most recent Consent Decree submitted in Federal Court which primarily impacts the Pittsfield, Massachusetts, portion of the proposed PCB containment.

We submit that that is a small solution to a big problem. We know it, General Electric knows it, and our political establishment knows it. Thank you.

THE COURT: Tim Gray.

MR. GRAY: My name is Tim Gray. I'm the director of the Housatonic River Initiative. We have about six pages of comments that I will submit to EPA, and I will read them tonight.

On April 14th, 2000, Housatonic River Initiative submitted preliminary comments regarding the EE/CA. These comments supplement those concerns and are a response to EPA's revisions.

HRI is a broad-based nonprofit community organization concerned with the cleanup of PCBs and other toxic substances in the Housatonic River in the Pittsfield and greater Berkshire County community. Our members are sportsmen, women, environmental, town and county political leaders and concerned residents throughout the county. Based on our decade-long advocacy and our ability to represent a wide variety of stakeholders, the Massachusetts Department of Environmental Protection has recognized HRI, quote, as a primary citizens advisory group for these sites, and suggested that interested citizens and other parties are encouraged to join forces under the HRI umbrella.

HRI proposed several specific suggestions to improve the EE/CA process and any subsequent decision making process for the rest of the river. We wrote section 2.3.3, river sediment. The river sediment delineates the sampling process employed by GE in the early years, and GE and the U.S.

EPA in more recent years.

Samples were collected at .5 foot intervals to a depth of 2 feet. Additional samples were collected at selected locations to maximum depth obtainable with manual equipment.

Throughout the last 20 years the issue of the extent of the contamination has been a contentious one, and HRI believes that the clearest lesson to be learned is that there are often uncharted or unexpected and/or previously unacknowledged sources of contamination at this site.

From its inception HRI has contested GE's estimation of PCB contamination and other contaminants in the Housatonic River system. We strenuously argue that the 1982 Stewart Laboratories report and BBL's 1991 data that GE relied upon for its 1994 PICM, Preliminary Investigation of Corrective Measures, seriously underestimated the contamination.

EPA's recent experience with the Building 68 removal action and current problems in the cell C of the half mile strengthens our belief that a thorough and precise sampling regime is critical to containment of subsequent engineering and removal challenges.

While HRI recognizes that the contamination and source control problems within the Mile and Half-Mile Reach may not be as intense as EPA faces in the more industrial One-half Mile Reach, nevertheless, we renew our request that, whenever possible, samples be taken to determine nondetect levels.

HRI recognizes that the physical conditions of some of the subreaches in the Mile-and-a-half pose different challenges and the rocky nature of the river bed makes sampling difficult. That said, HRI believes that imprecise sampling coupled with an engineering plan based on insufficient data is a recipe for failure.

As HRI stated in its comments to the Consent Decree, the engineering limitations of the Building 68 removal and discovery of an unexpected source led to the decision to leave contaminated bank soils with PCB levels as high 102,000 parts per million at a depth of 6 to 8 feet deep and river sediments with PCB levels of 2,240 parts per million at a depth of 8 feet.

HRI has similar concerns about the riverbank soils. The same section, 2.3.4, Riverbank Soils, states, Bank samples were collected along the same 100-foot transects used for sediment sampling. Sampling locations on the transect included bottom of the bank, water's edge, mid bank, and the top of the bank. Samples were selected perpendicular to the slope of the riverbank; samples were collected at depths of half a foot, 1 to 1-1/2 feet, 2 to 2-1/2 feet, and analyzed for PCBs.

While the EPA has conducted supplemental sampling of riverbank soils in residential properties abutting the EE/CA Reach of the Housatonic River, we are disappointed that supplemental sampling of river sediment was not conducted at greater depths for this section of the river.

We appreciate the Agency's decision to recognize the intentional need for response actions as the remediation takes place.

6.3.2, removal recommendation transect 64 to 96. However, if the additional sampling does not indicate a possible presence of NAPL, then additional response actions -- excuse me. However, if an additional sampling does indicate the possible presence of NAPL, then additional response actions may be necessary. Response actions to address NAPL from the oxbows or other NAPL encountered in the EE/CA Reach may include soil and sediment excavation, NAPL removal, and/or capping.

The need for additional response action and associated costs for known NAPL areas will be addressed in the final action memorandum.

We reiterate our suggestion for supplemental sediment sampling in the EE/CA Reach at greater depths to provide the most accurate portrait of contamination levels and to best prepare the contractors for any additional discoveries of NAPL.

Again, the 25-year history of assessment and of corrective measures of this site has revealed a continuing pattern of previously undocumented or undiscovered sources of contamination.

HRI wrote in April, summary of PCB distribution states -- this is also from the document cited, 2.3.5 -- the average PCB concentration data and UCLs for the sediment suggests the majority of the PCBs are contained within the upper 3 feet of sediment. Both the average PCB concentration and the UCL drop off significantly below the 3-foot depth, although isolated areas of high concentrations are found at depths greater than 3 feet. It should be noted, however, that this number of samples below the 3-foot depth within any given subreach is very limited.

Our concerns about the relation between insignificant sampling and remediation engineering decisions is heightened by the reality of EPA's decision to engage in a cost sharing arrangement with GE and possible consequences for the taxpayer. While some additional sampling might add to EPA's early expenses, it might ensure later savings.

At this time HRI would like to reiterate it is very supportive of the cleanup criterion for river sediment of 1 part per million. Bioaccumulation and biomagnification support the need for the most stringent standards. Recent data regarding PCB uptake in ducks in the Housatonic River is only the most recent indicator pointing to the need to remove as much contamination as possible. We urge the EPA to stand firmly behind this cleanup criteria.

As for the bank soils, HRI supports EPA's cleanup criterion for the riverbanks on the residential properties of 2 PPM to at least a depth of 3 feet. EPA's cleanup criterion for riverbank soils adjacent to recreational or commercial properties is 10 parts per million in the top 12 inches and 10 parts per million in the next 2 feet.

Even if one accepts the analysis that residential exposure for humans does not represent an unaccepted threat to human health, HRI believes that leaving up to 10 parts per million in the top foot of riverbank soils poses a potential threat to the river in the event of flooding.

Storm events have the potential for removing large portions of the riverbank, and soils at 10 PPM and below in large enough quantities may once again endanger fish, ducks, and other animal populations.

We have already experienced the reality of recontamination of already remediated riverfront properties. HRI believes that more removal rather than less is the safest course.

Based on a recommendation of the National Remedy Review Board during their review of this project, the agencies have made the following revisions:

USACE and the EPA in consultation with the Mass. DEP have rereviewed the cleanup criteria presented in subsection 3.4 of this report for residential riverbank soils. Because existing laws and regulations restrict excavation of riverbanks, EPA and the Mass. DEP agree that applying the residential cleanup of 2 PPM below 3 feet in the riverbanks is overly conservative due to the reduced potential for human exposure. Rather, applying a recreational type exposure scenario to the residential bank soils below 3 feet is more indicative of the exposures that could be expected. Therefore, residential bank soils below 3 feet will be cleaned up to meet an average PCB concentration of 10 parts per million.

Specifically, the cleanup criteria for riverbank soil and residential properties are as follows:

Maximum 2 parts per million based on a 95 percent UCL in the zero to 3-foot depth interval, average PCB concentration within the 3- to 6-feet depth interval is not to exceed 10 parts per million, and the maximum PCB concentration in any sample location below 3 feet cannot exceed 50 parts per million.

If the average PCB concentration below 3 feet exceeds 10 parts per million, remove bank soils at 1-foot intervals and replace with soils with nondetect PCB -- with nondetect PCBs and recalculate the average PCB concentration from the 3-foot depth down to the groundwater table.

HRI does not believe these revisions, specifically the decision to allow PCB concentrations to approach the 10 parts per million below the 3-foot depth interval, will adequately protect human health in the environment for at least two reasons.

The first consideration involves the ever changing nature of human activity, whether it is the act of adults mowing their lawns, engaging in recreational activities, gardening, or the always unpredictable actions of children and young adults. There are many scenarios, predictable and unpredictable, where bank soils previously found at levels below 3 feet could be moved upward to more likely come in contact with humans, birds, and animals.

The second consideration involves the ever changing nature of the riverbank and its banks. Heavy rains, erosion, flooding could easily move bank soils previously found at below the 3-foot depth interval back into the river system, recontaminating the river and once more becoming available to the river ecosystem.

While the recommendation of the National Remedy Review Board seems reasonable, if all other factors remain constant and there is never any future exposure to either humans or the environment, it fails to imagine many quite possible future scenarios.

Recent experience with the Building 68 removal action and the ongoing remediation of the Half Mile Reach have revealed time and again that we must confront the unexpected. While the National Remedy

Review Board's recommendation may save some time and money in the short line, it may very well prove to cost taxpayers much more in the future. The wiser and more conservative approach is to return to EPA's original recommendation.

Finally, HRI renews its concern regarding the landfill of contaminated sediments and bank soils in landfills on the GE property. As previously stated, HRI renews its long-standing objection to any decision to offer containment at these landfills over the treatment option.

Landfills at Building 78 and Building 71 are across the street from the Allendale School and a residential neighborhood. The Hill 78 landfill already contains highly toxic materials.

As the 1998 EPA site assessment states, Building 78 landfill unit was formerly intervened which has been filled in with waste material. Former employees stated in an interview that drums of liquid Pyrenol were disposed in the landfill in the 1950s and 1960s. Pyrenol is composed of 60 percent PCB.

Sampling of the fill has revealed some areas with PCB concentrations at several hundred PPMs. The DEQE, the Massachusetts Department of Environmental Quality and Engineering, which preceded the DEP, suspected an oil layer exists in the landfill. More, former employees stated PCB-containing liquids were poured on the ground.

An April 1994 public involvement plan documented -- excuse me, document by the Massachusetts DEP states, The hill 78 landfill is approximately 2 acres in size with a maximum depth of approximately 40 feet. The school property is within 50 feet of the Hill 78 site fence line.

From approximately 1940 to 1980, GE used the Hill 78 area as a landfill for demolition or construction debris, excess fill, and solid reportedly nonhazardous wastes. GE also allegedly used the landfill to dispose of drums containing PCBs and fuller dirt saturated with PCBs in the 1950s and '60s.

The EPA record facility assessment stated that former GE employees disposed of PCB oil in the landfill. From 1980 to the early 1990s, GE used this area to store soils containing less than 50 parts per million PCBs from routine facility-wide excavations. Sampling of the fill revealed areas with PCB concentrations up to 120,000 parts per million in subsurface soil.

Investigations in this area conducted prior to 1989 were completed on behalf of GE. Most of the soil sampling was completed to determine the extent of contamination in the proposed Altresco plant construction area. The location selected for the Altresco plant generally contains less than 1 parts per million PCB, except for the northern portion of this area where the concentrations as high as 16,000 parts per million were detected at a depth of 6 feet.

Oily sheens were present on two of the soil samples from the fill. The fill extends at least 25 feet below the ground surface. Subsurface soil at the site is contaminated with PCBs with concentrations up to 120,000 parts per million, and volative (phonetic) organic carbons were present in the soil and at concentrations of less than one part per million.

Groundwater samples were collected from the four wells and analyzed for VOCs, SCOCs, PCBs, and inorganics. Results indicated the presence of phenyls at 75 parts per billion.

In 1991, DEQE consultants completed a phase 1 investigation on the site. Results confirmed that the landfill area is the most contaminated portion of the site. Groundwater in the vicinity of the landfill area is contaminated with PCBs at concentrations up to 9 parts per billion. In addition, VOCs were detected in the groundwater samples collected from wells located downgradient of the landfill area and south of the Altresco power plant at concentrations of less than 1,000 parts per billion.

Groundwater samples collected from a well in the southwestern corner of the site contained concentrations of less than 30 parts per billion of dioxins and furans. The Department classified the site as a priority, and GE submitted phase 2 scope of work opposing further definition of groundwater contamination at the site and assessment of contamination, potentially attributable to abandoned transformer oil lines extending from the East Street Area 2 site across the site and to Building 51, part of the Unkamet Brook site.

HRI urges a consistent policy to permanently reduce the volume and toxicity of the contaminants that have plagued this site since the mid '30s when GE first introduced PCBs to this area.

I'll skip this next section as it just cites the regulations from CERCLA about landfill, but I will say that basically the CERCLA section encourages the reduction of toxic waste, the volume toxicity and mobility of the hazardous substances.

As Section 4.7.3, treatment of consolidation disposal technology, notes, the total volume of material excavated from the EE/CA Reach will likely exceed the maximum amount that can be placed in the consolidation areas at GE, currently 50,000 cubic yards. Both TSCA and non-TSCA regulated PCB remediation wastes are likely to be present.

The possible presence of RCRA hazardous remediation wastes, section 52191, option A, consolidation at GE with the disposal of excess off-site facilities provides further detail. The total volume of excavated contaminated waste is approximately 89,700 cubic yards. Of this total, approximately 12,100 cubic yards may be TSCA waste, 2,800 cubic yards may be RCRA waste, and 74,800 cubic yards, including oversized materials, may be nonhazardous, non-TSCA remediated waste.

For option A, this EE/CA assumes that up to 25,000 cubic yards of TSCA and RCRA wastes and up to 25,000 cubic yards of the remediation will be consolidated at the GE consolidation areas. The remainder of the remediation waste, 39,700 cubic yards, not consolidated at GE, will be transported to appropriate off-site facilities for treatment disposal.

Because of all these factors, HRI urges the EPA to take this opportunity to introduce a thermal desorption treatment solution to this site. HRI endorses thermal desorption treatment with off-site disposal. The GE plant is large enough to efficiently host a thermal desorption system.

As the EE/CA states, thermal desorption has been used extensively on a full scale level to treat PCBs and other organic contaminants and sediment. Treated PCB levels of less than 2 parts per million are routinely achievable for sediment with initial concentrations of several thousand parts per million.

The EE/CA notes that at an assumed thermal desorption processing rate of 10 tons per hour, the contaminated material could be treated in approximately 21 months, assuming a 24-hour-per-day seven-day work week, 30 percent down time, and a bulk density of 1.5 tons per yard.

While 21 months might seem like a long time to some, HRI believes that 21 months is a relatively short time considering that the Berkshire community has waited 20 years for the river to be remediated since the first consent agreement was signed by GE and the Massachusetts DEQE. And 21 months is a small price to pay for finally achieving a permanent solution.

HRI believes that while short-term costs for treatment clearly exceed landfilling costs, there are many long-term benefits to treatment, not only in terms of future risks to human health but to the environment.

Further, HRI believes that by adding economies of scale into the equation and promoting the treatment option on a riverwide basis, the current gap between treatment and landfilling could be significantly closed. Not only would this bring us closer to some of the current aims of CERCLA to investigate permanent and alternative treatment remedies for this site, but would make the treatment option more feasible for CERCLA and RCRA sites throughout the nation.

And because EPA has agreed to a cost sharing agreement with GE for this Mile-and-a-half, we believe it is appropriate that the government consider the possible positive long-term implications of encouraging permanent remedies.

Respectfully submitted on behalf of the Housatonic River Initiative.

THE COURT: Benno Friedman?

Is there anybody else who would wish to submit a public comment?

MR. FRIEDMAN: I'm not sure whether I should go all the way up here because my comments are not nearly as precise, eloquent, or even in written form at this point.

What I am commenting on is actually quite a narrow, almost single sentence in the recommended alternative worksheet that was sent to many of us by the EPA.

There is a line on page -- let's see, well, it's Section 6412, COLA (phonetic) region investigation. Two test plots are planned just upstream of the Elm Street bridge and will be located approximately 50 feet apart.

I focused on the number 50 feet apart because it was interesting that in the Berkshire Eagle some weeks ago Dean -- I believe it was Dean Taliaferro was quoted as having said that you could put test wells, test borings, test -- take test samples 50 feet apart all up and down the river, and you will still not have the ability to fully delineate all the potential sources of PCBs, of pools of fluids, of potential sources of contamination of the river, at least insofar as I would imagine the first half mile specifically is about, because that's essentially where most of the source of PCBs comes from to the river.

And so even though this comment period -- this evening of comments really is specific to the Mile-and-a-half Reach, what underlies the attempt to cleanse the river in this Mile-and-a-half Reach is that the first half mile has been successfully negotiated and will not produce recontamination for that additional mile-and-a-half nor for the rest of the river.

And based on Dean's own comments, I wish to reiterate a position that the Housatonic River Initiative and many individuals have taken and spoken and supported for years at these various meetings, which is that the EPA's approach -- or at least we find that the EPA's approach in response to the newly discovered sources of contamination that are being currently discovered in the first half mile is a response after the fact rather than what would be probably better suited to this whole situation, which is working out and implementing a plan that anticipates these various undiscovered sources of contamination and actually makes sure that the contamination, even if it's not discovered on the first or second or third go round, doesn't ever reach the river, whether it's six months, six years, or 60 years from the present.

And so I strongly support and hope -- support the idea and hope that the EPA is willing to once again reconsider the approach that they've taken, namely, the sheetpiling, the attempted draining through recovery wells, of these additional sources of contamination, and once again consider a larger, more comprehensive approach such as a drainage or slurry ditch that would go along both sides of the river for the first half mile so that all of these pools of yet undiscovered materials, whether they be PCBs or coal tar, whatever substances they are, that are presently being discovered on a piecemeal basis be addressed in a much more comprehensive fashion. And, that all of the work that's being done and all of the money that's being spent be assured of having a more lasting effect upon the long-term regaining of health of the river.

Thank you very much.

MR. KILBORN: Is there anybody else that would like to submit public comment?

Judy, did you want to -- are you all set?

UNIDENTIFIED SPEAKER: I gave my time to Tim Gray.

MR. KILBORN: With that, I'd like to thank everybody for participating. Remember that the public comment period closes on September 1st. Information again is in the fact sheet. And I thank everybody for coming again.

And this hearing is closed.

(7:46 p.m., hearing adjourned.)

CERTIFICATE

I, LANCE A. BOARDMAN, Shorthand Reporter, do hereby certify that the foregoing is a true and accurate transcription of my stenographic notes taken in the above-mentioned action, to the best of my knowledge and ability.

IN WITNESS THEREOF, I hereby set my hand this 5th day of September, 2000.

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Lance A. Boardman