



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

EPA - 490
RFW - 00 - 0158

SDMS: 242242 - 241849

Enforcement-Sensitive Information Attached

Memorandum

Date: May 26, 1998

Subject: Request to Conduct a Removal Action at the GE-Housatonic River Site ("Upper Reach Removal Action"), Pittsfield, Massachusetts—**Combined Action and EE/CA Approval Memorandum**

From: Dean Tagliaferro, On-Scene Coordinator
Site Evaluation and Response Section I, OSRR

Dean Tagliaferro

To: Patricia L. Meaney, Director
Office of Site Remediation and Restoration

I. Purpose

The purpose of this Memorandum is to request and document approval for the proposed removal action described herein and also to authorize EPA to conduct an engineering evaluation/cost analysis (EE/CA) to evaluate additional removal action activities for the GE-Housatonic River Site (the "Site"), Pittsfield, Massachusetts.

The proposed removal action covers only a portion of the overall Site proposed for the National Priorities List (NPL). Specifically, the "Upper Reach Removal Site" is defined as the section of the East Branch of Housatonic River from Newell Street, Pittsfield, to the confluence of the East and West Branches of the Housatonic River (the "Upper Reach"), the associated riverbanks and floodplains, all potential sources of contamination to the Upper Reach, and other areas necessary to conduct the removal action including, without limitation, General Electric's (GE) manufacturing facility (required for source control, soil and sediment staging, and dewatering and/or treatment). The distance from Newell Street to the confluence of the East and West Branches of the Housatonic is approximately two miles.

EPA will seek to have GE, the responsible party at the Site, perform the following phase of the proposed removal action:

1. Implement temporary measures to limit access and exposure to contaminated sediments, bank and floodplain soils located between Newell Street and the confluence with the West Branch of the Housatonic River;
2. Eliminate or mitigate all current and potential sources of polychlorinated biphenyls (PCBs) and other hazardous substances from entering into the East Branch of the Housatonic River and/or Housatonic River sediments;



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3. Develop and implement a monitoring plan(s) to assess compliance with the performance standards for source control measures specified in item two above; and,
4. Remove contaminated sediments and bank soils from the Newell Street bridge to the Lyman Street bridge (a distance of approximately 0.5 mile).

Approval of this Memorandum will also authorize EPA to concurrently conduct an EE/CA to evaluate alternatives to mitigate the human health and environmental threat posed by the existing high levels of PCBs and other hazardous substances in river sediments, banks and floodplain soils for the remaining 1.5 miles of the Upper Reach Removal Site (i.e., from Lyman Street to the confluence). EPA will make a final decision for this phase of the removal action following the completion of the EE/CA and a public comment period. EPA will document this decision in a subsequent Action Memorandum.

This proposed removal action will eliminate or mitigate existing potential sources of contamination to the Housatonic River; prevent the recontamination of previously remediated floodplain properties and the further contamination of other floodplains; prevent the downstream migration of contaminated sediments and riverbank soils; and mitigate the human health and environmental threat posed by the existing high levels of polychlorinated biphenyls (PCBs) and other hazardous substances in river sediments, banks and floodplain soils.

II. Site Conditions and Background

CERCLIS ID #: MAD002084093
Site ID #: 0167

A. Site Description

1. Physical Location and Site Characteristics

GE has operated a large-scale industrial facility in Pittsfield, Massachusetts since the early 1900's. The primary industrial activities at the Pittsfield facility included manufacturing and servicing of power transformers, defense and aerospace (ordnance), and plastics. Currently, GE's World Headquarters for Plastics is located at this facility, the defense and aerospace division was sold (General Dynamics is currently operating in the defense and aerospace portion of the former GE complex), and the transformer division is closed.

The overall NPL Site, as proposed for the listing, consists of the 254-acre GE manufacturing facility; the Housatonic River, riverbanks, and associated floodplains from Pittsfield, Massachusetts to Rising Pond Dam (approximately 30 miles); former river oxbows that have been filled; neighboring commercial properties; Allendale School; Silver Lake (a 26-acre Commonwealth of Massachusetts designated Great Pond); and other properties or areas that have become contaminated as a result of GE's facility operations. (See Figures 1 and 2).

As mentioned above, the Upper Reach Removal Site includes the section of the East Branch of Housatonic River, riverbanks, and associated floodplains, from Newell Street to the confluence with the West Branch of the Housatonic River (approximately 2 miles); and all potential sources of PCB contamination to the Upper Reach. In this area, the channel width of the Housatonic River is 40 to 60 feet. The average daily flow is 120 cubic feet per second (cfs), ranging from a low monthly flow of 46 cfs to a 10-year high flow of 4,200 cfs. The water depth in the River during average flows ranges from one to four feet, however, exposed sediments and sand bars are present in low flow conditions.

The Upper Reach Removal Site can be divided into four sections: Newell Street to Lyman Street (approximately 0.5 mile); Lyman Street to Elm Street (approximately 0.5 mile); Elm Street to Dawes Avenue (approximately 0.4 mile); and Dawes Avenue to the confluence (approximately 0.6 mile). See Figure 2.

The area from Newell Street to Lyman Street is primarily commercial, although there is one recreational property. GE's property abuts the River to the north. Several commercial properties, Hibbard playground, and additional GE property abut the river to the south. There are relatively steep banks and minimal floodplains in this area. There is chain-link fencing on both sides of the River.

From Lyman Street to Elm Street, the land use is residential, commercial, industrial or undeveloped, and the land adjacent to the floodplains includes residential properties. While there is some fencing on a portion of the northern riverbank behind commercial properties, the river/riverbank is easily accessible. There is unrestricted access to the southern riverbank.

From Elm Street to Dawes Avenue, the floodplain properties are primarily residential, although there are commercial properties present. The riverbanks in this area are generally steep and the floodplain is relatively narrow. Access to the river/riverbank is unrestricted.

From Dawes Avenue to the confluence, the floodplain properties are residential or recreational. The riverbanks in this area are relatively low, resulting in a broad floodplain. Access is unrestricted.

In all, there are approximately 40 residential properties located within or adjacent to the floodplain in the Upper Reach. For additional information on the characteristics of this stretch of the River, see the memo from Mary Ballew, EPA, and Margaret Harvey, Massachusetts Department Environmental Protection (DEP), titled *Evaluation of Human Health Risks from Exposure to Elevated Levels of PCBs in Housatonic River Sediment, Bank Soils and Floodplain Soils in Reaches 3-1 to 4-6 (Newell Street to the confluence of the East and West Branches)*, May 14, 1998 ("Evaluation of Human Health Risks Memo"), and the *Upper Reach - Housatonic River Ecological Risk Assessment*, by Roy F. Weston, Inc., May 1998, both of which are included in the Administrative Record.

2. Site History

The Site has been subject to numerous investigations dating back to the early 1980s. The investigations were consolidated under two regulatory mechanisms: An Administrative Consent Order (the "ACO") with the Massachusetts DEP and a Corrective Action Permit with EPA pursuant to the Resource Conservation and Recovery Act (RCRA).

On February 8, 1991, EPA issued a RCRA Corrective Action Permit (the "Permit") to the GE-Pittsfield facility. The Permit established a process and a schedule for the assessment and remediation of releases of hazardous wastes at, and from, the GE facility. GE appealed the Permit and it was subsequently modified and reissued effective January 3, 1994. The areas incorporated into the Permit include the 254-acre facility, Silver Lake, the Housatonic River and its floodplain, adjacent wetlands and all sediments contaminated by PCBs migrating from the GE Facility. The Permit specifically addresses seven study areas: Unkamet Brook (US EPA Area 1), The Hill 78 Landfill (US EPA Area 2), East Street Area I (US EPA Area 3), East Street Area II (US EPA Area 4), GE Lyman Street Parking Lot (US EPA Area 5A), Newell Street Parking Lot (Newell Street II) (US EPA Area 5B), and the Housatonic River and Silver Lake (US EPA Area 6). (See Figure 1)

The ACO between GE and the Massachusetts DEP became effective in May 1990. The ACO covers all the study areas in the EPA Corrective Action Permit and three additional study areas: Newell Street Area I; the Former Housatonic River Oxbows; and Allendale School Property. In 1997, "off-site" properties that received contaminated fill from GE were also subject to investigations and cleanup under the ACO.

GE has performed numerous investigations and short term cleanups (see Section II.B.) under the EPA Corrective Action Permit and/or the ACO with the Massachusetts DEP. The results of these actions and investigations are available in numerous documents, reports, letters, data packages, and other submittals to EPA and the Massachusetts DEP.

On September 25, 1997, EPA proposed the GE-Housatonic River Site for inclusion onto the NPL. The Site received a Hazard Ranking System score of 70.71. The proposed NPL Site covers all of the study areas listed in the EPA Corrective Action Permit and the ACO. In October 1997, EPA, in combination with the Department of Justice, the Commonwealth of Massachusetts, the State of Connecticut, the City of Pittsfield and the State and Federal Trustees formed an intergovernmental team and, with the assistance of a mediator, initiated negotiations with GE. The objective of the negotiations was to achieve a comprehensive agreement for cleanup of the entire Site. In the interim, the public comment period on the proposed NPL listing was extended until May 1, 1998. On April 2, 1998, the negotiations were terminated without an agreement between the parties.

The public comment period ended May 1, 1998. EPA is currently evaluating the public comments and a decision on whether or not to list the Site as final on the NPL is expected in six to twelve months.

3. Removal Site Evaluation

As mentioned above, GE has submitted numerous documents, reports, and data packages to EPA and the Massachusetts DEP over the past 17 years. In addition, EPA has performed additional assessment activities at the Upper Reach Removal Site. The Removal Site Evaluation described below is limited to the Upper Reach Removal Site. The primary contaminants of concern identified to date are PCBs.

Although GE performed many functions at the Pittsfield facility throughout the years, the activities of the Transformer Division were the likely primary source of PCB contamination. Briefly, GE's Transformer Division's activities included the construction and repair of electrical transformers utilizing 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.

According to GE's reports, from 1932 through 1977 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 (*Supplemental Phase II/RCRA Facility Investigation Report for Housatonic River and Silver Lake, Volume I*, by BBL, January 1996). Also, as documented by GE, in the late 1960's, a 1000 gallon storage tank of PCBs ruptured or imploded resulting in a release of PCBs in or around Building 68 and into the Housatonic River and its riverbank. GE responded to the spill at the time of release by excavating some of the impacted surface trap rock and river sediments, then transporting this material to a secure landfill. In 1996, however, additional contamination near Building 68 was discovered. (See Section II.B. for details on the Building 68 Removal Action performed in 1997/1998). Based on the light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) plumes described below, it appears that there were additional releases of PCBs into the environment as well.

During the 1930's, approximately one mile of the Housatonic River from Newell Street to Elm Street was straightened and channelized to reduce flooding. This action resulted in eleven oxbows being isolated from the River channel. Some of these former oxbows were filled with material from GE (see November 27, 1996 letter from GE to the Massachusetts DEP *RE: Request for Information regarding Properties That May Have Received Fill from the General Electric Facility in Pittsfield*) later found to contain PCBs.

Potential Sources of PCBs to the Housatonic River. A review of the existing submittals provided by GE indicate that there are several known potential sources of PCBs to Housatonic River. These sources are:

1. The LNAPL and DNAPL plumes at the East Street Area 2/USEPA Area 4 portion of the Site. The LNAPL in this area originates from GE's manufacturing facility, flows toward the Housatonic River and extends into the banks of the River. GE has performed several activities in an attempt to limit the migration of the PCB-contaminated oil in this plume from entering into the Housatonic River. These include the installation of several recovery wells, a slurry wall, and construction of a groundwater treatment plant. To date, GE has collected more than 750,000 gallons of oil from this LNAPL plume. For the period July 1997 through December 1997, 15,000 gallons of oil were collected and 22,000,000 gallons of groundwater were treated. Despite these activities, the LNAPL plume currently presents a potential threat of release of PCBs to the River. GE has reported that "apparent bank seeps" were observed on July 3, 1997 and November 21, 1997 (*Occurrence of Oil at East Street Area 2/US EPA Area 4 - Fall, 1997*, by BBL, February 1998). In addition, Appendix A of this report states that in December 1997, small amounts of oil were observed in piezometers located in or adjacent to the riverbank and in one instance, a small amount of oil was detected in a piezometer located within the Housatonic River.

There is also a DNAPL plume in this area. The Housatonic River may be serving as a preferential ground water discharge pathway, and at least seasonally, hydraulic conditions and preferential pathways may be such that the DNAPL could migrate to the Housatonic River.

2. The DNAPL plume west of Building 68 (East Street Area 2/USEPA Area 4 portion of the Site). DNAPL containing concentrations of PCBs as high as 623,700 ppm PCBs were discovered in late 1997 and early 1998 in two monitoring wells installed as part of the Building 68 Removal Action (*Report on Supplemental Characterization Activities - Building 68 Area*, by BBL, Draft-February 1998 and a letter dated March 25, 1998 from A. Silfer to D. Tagliaferro *RE: Building 68 Area Supplemental Characterization Activities - Status Report and Proposal*). These wells are located within 15 lateral feet of the River. The DNAPL is located at an elevation slightly below that of the Housatonic River sediment surface. Although GE is still investigating the DNAPL under the UAO for the Building 68 Removal Action, this DNAPL presents a current threat of release of PCBs to the Housatonic River.
3. The LNAPL and DNAPL plumes at the Lyman Street Parking lot. GE has documented the presence of LNAPL and DNAPL plumes at the Lyman Street/USEPA Area 5A portion of the Site (*Effectiveness Evaluation of Short Term Measures Lyman Street (Oxbow Area D), Pittsfield, Massachusetts* by Golder Associates, October 1997, MCP

Supplemental Phase II Report for Lyman Street/USEPA Area 5A Site by BBL, June 1996, and *Addendum to MCP Supplemental Phase II/RCRA Facility Investigation for Lyman Street/USEPA Area 5A Site, Volume I*, by BBL, October 1997). The DNAPL contains concentrations of PCBs as high as 66% (BBL, June 1996). The LNAPL contains concentrations of PCBs as high as 27,000 ppm (BBL, October 1997) and flows toward the Housatonic River. GE has installed three recovery wells in this area, and in the last reporting period (August 1996 through July 1997), GE collected 1,022 gallons of LNAPL and 40 gallons of DNAPL (Golder, October 1997). Although GE has installed recovery wells, the plumes still pose a threat of release of PCBs to the Housatonic River. Figure 10 of the October 1997 BBL Report indicates the LNAPL plume extends to the edge of the Housatonic River and that the DNAPL plume extends to within 40 feet of the River. The *April 1998 Monthly Status Report* submitted by GE on May 14, 1998 states that "Apparent bank seepage was observed during one weekly inspection. Sheens were contained within the boomed area." This report also states that LNAPL was measured in piezometers P-1, P-3 and P-4, which are located outside of the recovery wells and approximately ten feet from the Housatonic River.

4. The Silver Lake outfall. The sediments in Silver Lake are contaminated with PCBs as high as 20,689 ppm and numerous other contaminants of concern (*Supplemental Phase II/RCRA facility Investigation Report for the Housatonic River and Silver Lake, Volume I* by BBL, January 1996). Although GE sampled the water flowing through the outfall from Silver Lake to the Housatonic River and did not detect significant concentrations of PCBs, this may not represent the worst-case situation (such as lake turnover). PCBs may migrate via sediment or suspended solid transport through the outfall in addition to the dissolved phase present in surface water.
5. The DNAPL plume at the Newell Street Area II/USEPA Area 5b portion of the Site. GE has documented the presence of a DNAPL plume in this area that contains concentrations of PCBs as high as 388,500 ppm (*Report on Supplemental Characterization Activities - Building 68 Area, by BBL, Draft-February 1998*). GE currently measures the thickness of the DNAPL in four monitoring wells weekly. If the DNAPL is greater than one foot, GE removes DNAPL from the wells. In April 1998, GE removed 36.1 gallons of DNAPL from these wells (*April 1998 Monthly Status Report*, submitted by GE, May 14, 1998). The elevation of the DNAPL is at 950 feet above mean sea level (MSL), which is lower than the sediment surface in the Housatonic River (approximately 969 feet above MSL). As stated above, the Housatonic River may be serving as a preferential ground water discharge pathway, and at least seasonally, hydraulic conditions and preferential pathways may be such that the DNAPL could migrate to the Housatonic River.
6. Heavily contaminated soils in the banks of the Housatonic River including the filled in portions of oxbows A through I. GE has documented high levels of PCBs in contaminated soils in the riverbanks in the subject area, especially in the former oxbows.

The maximum concentrations reported in riverbank samples from potential source areas are summarized in the table below.

Study Area	Surficial Sample (Sampling Location)	Subsurface Sample (Sampling Location)	Report Reference
Lyman Street	3,400 ppm (LS-41)	1,000 ppm (LS-35)	Addendum to the Phase II/RFI, 10/97 (by BBL)
Newell Street II	7,760 ppm (RB-10)	1,400 ppm (RB-7)	3/12/97 PCB Data Submittal, from R. Gates, GE
Newell Street I	76 ppm (RB-4)	350 ppm (SZ-3)	MCP Supplemental Phase II Report, 9/97 (by BBL)
Building 68 Area (East)	146 ppm (3-6C-EB-10)	287 ppm (3-6C-EB-12)	Building 68 Removal Action Work Plan, 5/97 (by BBL)
Building 68 Area (West)	464 ppm (3-6C-EB-22)	622 ppm (3-6C-EB-22)	Building 68 - Supplemental Char. 2/98 (by BBL)
Oxbows A, B, C	47 ppm (I9-4-14A)	N/A	MCP Interim Phase II Oxbow Report, 2/96 (by BBL)

(NOTE: These surficial bank samples were not used in the summary table for bank/floodplain soils listed below and were not used in the *Evaluation of Human Health Risks Memo* data set. If the data were included, it would increase the average concentration of PCBs in bank soils, and possibly increase the risk as calculated for the bank/floodplain soils for the Newell Street to Elm Street sub-reach.)

In addition, PCBs have been detected in former oxbow soils in concentrations as high as 290,000 ppm (both at Lyman Street, sampling location LS-11 and Newell Street I, sampling location QP-9).

The contaminated bank soils pose a threat of release of PCBs into the Housatonic River via erosion and storm water runoff.

7. Dissolved contamination in groundwater migrating into the Housatonic River. Due to the presence of several DNAPL plumes, LNAPL plumes, and heavily contaminated soils, PCBs are present in low levels in the groundwater (Figure 7 of the *Addendum to MCP Supplemental Phase II/RCRA Facility Investigation Proposal for Lyman Street/USEPA Area 5A Site*, Volume I of V, by BBL, October 1997). Although the concentration of PCBs are low, the volume of groundwater discharging to the Housatonic River may be large, and the total loading of PCBs may be significant. Therefore, this represents a potential source of PCBs to the Housatonic River.

There is a possibility that other sources exist that may require mitigation to enable the sediment removal to proceed without future recontamination.

Sediment Sampling Data. The sediment data for the Housatonic River in the Upper Reach is summarized in the table below. This data **excludes** the highly contaminated sediments removed as part of the Building 68 Removal Action. The data set for “surficial sediments” consists of 110 sample locations and includes samples collected by both GE and EPA contractors. Of these, PCBs were detected in all but three samples.

	Average PCB Concentration (ppm)	Maximum PCB Concentration (ppm)
Surficial Sediments (Newell to Lyman Street)(1)	15	100
Surficial Sediments (Lyman to Elm Street)(1)	20	140
Surficial Sediments (Elm Street to Dawes Avenue)(1)	89	905
Surficial Sediments (Dawes to the confluence)(1)	16	132
Surficial Sediments (Newell to the confluence)(1)	26	905
Surface & Subsurface Sediments (Newell to Holmes Road)	70 (2)	7,720 (3)

(1) The data source is the *Evaluation of Human Health Risks Memo*.

(2) The data source is Table 2-1, *Work Plan for the Ecological Risk Assessment of the Housatonic River Site*, Volume I, by ChemRisk, May 1997. NOTE: This 70 ppm average PCB

concentration is for the stretch of the river from Newell Street to Holmes Road, which is beyond the confluence. However, a review of the data indicates that the 70 ppm is representative of the surface and subsurface contamination from Newell Street to the confluence.

(3) The data source is Figure 4-1 Building 68 Removal Action Work Plan, by BBL, May 1997

Although the surficial contamination in the area from Newell Street to Lyman Street is consistent with surficial contamination in the next 1.5 miles, the subsurface contamination is greater between Newell and Lyman Street. This is likely due to this section of the River abutting all the historical and potentially continuing sources of PCBs to the Housatonic River identified above except the Silver Lake outfall and Oxbows A, B, and C. For example, in the two samples adjacent to the Lyman Street LNAPL plume (which is also the location of former oxbow D), PCBs at depth were in the 100 to 300 ppm range. Also, PCBs are currently present at depth in sediments close to the Building 68 excavation at extremely high concentrations (e.g., 7,720 ppm, 1,290 ppm).

Bank/Floodplain Soils. The surficial riverbank and floodplain data for the subject area is summarized in the table below. This data **excludes** bank soils removed as part of the Building 68 Removal Action, floodplain soils excavated by GE under previous short-term measures/immediate response actions (see Section II.B), and also the bank sampling data included in GE reports for study areas other than the Housatonic River (e.g., Lyman Street, Oxbows A, B, & C, Newell Street I and II, etc.). The data set includes samples collected by both EPA and GE contractors at 148 locations.

Location of Bank/Floodplain Soil Samples	Average PCB Concentration (ppm)	Maximum PCB Concentration (ppm)
Newell Street to Lyman Street	410	5,800
Lyman Street to Elm Street	18	43
Elm Street to Dawes Avenue	36	377
Dawes Avenue to the confluence	23	160
Newell Street to confluence	75	5,800

The data source is the *Evaluation of Human Health Risks Memo*.

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

The primary contaminants of concern are PCBs. PCBs are hazardous substances as defined by §101(14) of CERCLA. PCBs are present in the Housatonic River sediments, banks and

floodplain soils. Therefore, a release into the environment of hazardous substances has already occurred.

As discussed above, the source areas represent a continuing threat of release of PCBs into the Housatonic River (i.e., a “threat of release into the environment”). The PCBs that have already been released into the Housatonic River continue to be transported downstream and onto the riverbanks and floodplains by mechanisms including erosion of the sediments and periodic flooding (see the bullet item “Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released” in Section III of this Memorandum).

B. Other Actions to Date

GE has performed numerous activities in an attempt to reduce the migration of the LNAPL and DNAPL plumes from entering into the Housatonic River. These include the installation of recovery wells, the construction of a groundwater treatment plant and the installation of a small section of a slurry wall. To date, GE has collected more than 750,000 gallons of PCB-contaminated oil from the recovery wells. GE has installed chain-link fencing along the top of the riverbank on both sides of the River from Newell Street to Lyman Street in an attempt to limit access to this area.

GE has performed short-term measures (also referred to as immediate response actions) at approximately fourteen residential properties located within the subject floodplain. Twelve of these short-term measures consisted of the excavation of contaminated floodplain soil. At approximately seven of these properties, the excavation was limited to the portion of the residential property judged by GE to be accessible to residents (e.g., the “lawn area”), and contaminated soil remains on these properties between the “lawn area” and the River. At the other two properties, GE planted a new hedge row in an attempt to reduce access from the “lawn area” to the contaminated riverbank/floodplain area.

From June 1997 through the present, GE has been performing a removal action under a Unilateral Administrative Order from EPA at the Building 68 Site. The Building 68 Site is a 550-foot section of the River between Newell Street and Lyman Street (and is therefore within the subject area). At the building 68 Site, GE excavated and properly disposed of 10,796 tons of PCB-contaminated soils and sediments. Restoration activities and investigations of the DNAPL are currently underway.

C. State and Local Authorities’ Roles

As mentioned above, the Massachusetts DEP, the Connecticut DEP and other State Agencies have been extensively involved with investigations and activities at the Site for many years. The Massachusetts DEP has been consulted on this proposed removal action and concurs and supports EPA’s proposed actions.

The City of Pittsfield was a party to the negotiations with GE, and has been extensively involved in the ongoing investigations and cleanups at the Site. The proposed removal action will be coordinated with City officials.

Federal, state and local officials have taken numerous actions to keep the public informed of the status, investigations, and short-term cleanups being performed at the overall Site. These actions include public meetings, newsletters, and the availability of records in local repositories. In addition, there has been substantial coverage in both the local and national press.

III. Threats to Public Health or Welfare or the Environment

Conditions present at the Upper Reach Removal Site meet the criteria for a removal action set forth in 40 CFR §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)].

Exposure to nearby human populations. As stated above, high levels of PCBs were detected in surficial sediments, bank soils, and floodplain samples throughout the subject area. Much of the contaminated riverbank and floodplain are part of, or abut, residential properties, and in a majority of the area, access is unrestricted. Therefore, residents, recreational users, and trespassers are exposed to the high levels of PCBs. The potential for these exposures are documented in a May 20, 1998 memorandum to the file form Margaret Harvey, Massachusetts DEP titled *Report of Site Visit to Housatonic River, Pittsfield, MA on April 28, 1998 (DEP Site Number 1-0147)*. The concentrations of PCBs greatly exceed standards and cleanup levels considered protective of public health including: the Massachusetts Contingency Plan default (Method 1) cleanup standard of two ppm for both residential and industrial soils, EPA’s PCB Spill Cleanup Policy, 40 CFR Part 761, (10 ppm in residential areas— if capped, 25 ppm in industrial areas), and the one ppm preliminary remediation goal 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. 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 human health effects that have been reported include general weakness, respiratory symptoms, altered immune response, and damage to the liver (*Toxicological Profile for Polychlorinated Biphenyls (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 (*Evaluation of Human Health Risks Memo* and the *ATSDR Toxicological Profile*).

PCBs 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 (*Evaluation of Human Health Risks Memo* and the *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 these high levels of PCBs increases both the cancer risks and non-cancer risks to area residents, recreational users and trespassers.

To further evaluate health threats, EPA, in conjunction with the Massachusetts DEP, performed a site-specific human health evaluation (see *Evaluation of Human Health Risks Memo*). This evaluation divided the Upper Reach Removal Site into three sub-reaches based on potential exposure scenarios, and assessed the risks to human health in each sub-reach. A summary of the results are presented in the table below.

Sub-reach A (Newell Street to Elm Street)

	Soil	Sediment
Hazard Index (subchronic non-cancer risk)	200	3
Hazard Index (chronic non-cancer risk)	200	4
Excess Lifetime Cancer Risk	1×10^{-3}	2×10^{-5}

Sub-reach B (Elm Street to Dawes Avenue)

	Soil	Sediment
Hazard Index (subchronic non-cancer risk)	70	200
Hazard Index (chronic non-cancer risk)	90	100
Excess Lifetime Cancer Risk	4×10^{-4}	5×10^{-4}

Sub-reach C (Dawes Avenue to the confluence)

	Soil	Sediment
Hazard Index (subchronic non-cancer risk)	20	9
Hazard Index (chronic non-cancer risk)	30	6
Excess Lifetime Cancer Risk	7×10^{-5}	2×10^{-5}

Risk results rounded to one significant figure.

Chronic is defined as a 5-, 7- or 9-year exposure (see *Evaluation of Human Health Risks Memo*).
 Subchronic is defined as a 3-month exposure.

A hazard index of one is the threshold above which EPA is justified in taking an action based on non-cancer health risks. As is presented above, hazard indices for both chronic and subchronic scenarios exceed this level in all three sub-reaches, for both soil and sediment. In four of the exposure scenarios, the hazard index is at least 100 times or greater than the threshold value. In addition, excess lifelike cancer risks exceed EPA's range of acceptable risk (1×10^{-4} to 1×10^{-6}) in three of six exposure scenarios. The *Evaluation of Human Health Risks Memo* 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 [which is the same as the Upper Reach Removal Site] in Pittsfield, Massachusetts, present significant risks to human health".

Exposure to . . . animals or the food chain. Fish sampling in the Housatonic River has confirmed that there is an actual exposure of PCBs to "animals and the food chain". Sampling has indicated that the average concentration of PCBs in adult largemouth bass in Woods Pond (which is approximately 12 miles downstream of the GE facility) is 87 ppm, while the range of PCB concentrations is from 13.2 to 206 ppm. Even the young-of-the-year fish that were collected by GE in 1994 and 1996 in the vicinity of New Lenox Road (approximately 5 miles downstream of the Upper Reach) have concentrations of PCBs ranging from 21 to 36 ppm. As a point of reference, the FDA action level for fish tissue for human market consumption (not risk based) is two ppm. There is also a fish consumption advisory for PCBs in effect for approximately 80 miles of the Housatonic River beginning at the GE facility. (See *Upper Reach - Housatonic River Ecological Risk Assessment*, by Roy F. Weston, Inc., May 1998.)

EPA also assessed potential health risks for people consuming fish from the Housatonic River as described in Appendix A of the *Evaluation of Human Health Risks Memo*. This memo states that, "In sum, doses estimated for children and adults who ingest contaminated fish from the Housatonic River are higher than those received by the monkeys in the PCB noncancer toxicity study that demonstrated adverse health effects. This is true even in the case of children who ingest contaminated fish over the course of one summer. These exposure estimates raise significant concerns regarding potential health effects in children and adults who ingest contaminated fish from the Housatonic River."

- “Actual or potential contamination of drinking water supplies or sensitive ecosystems” [300.415(b)(2)(ii)].

The *Upper Reach - Housatonic River Ecological Risk Assessment* identifies numerous exceedences of ambient water quality criteria (AWQC) and various sediment benchmarks and guidelines as identified below.

- During the twelve-month period from June 1996 through May 1997, (during which GE conducted the standard surface water monitoring for 10 of the 12 months), surface water samples collected from the Elm Street Bridge had nine exceedences of the AWQC as compared to five exceedences at the upstream control location. (Note: samples collected after May 1997 were not evaluated because work in the river associated with the Building 68 Removal Action began in June 1997.)
- As stated above, 110 surficial sediment samples were collected in the Upper Reach. At all 110 locations, (including half the sample quantitation limit for the three non-detect samples), PCB concentrations exceeded the National Oceanographic and Atmospheric Administration (NOAA) Effect Range-Low guideline and 106 of 110 samples exceeded NOAA’s Effect Range-Medium guideline.
- The Ontario Ministry of the Environment and Energy (OMEE) sediment guideline for 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 severe effect level is that at which pronounced disturbance of the sediment-dwelling community can be expected, affecting the majority of benthic species. Sediments with these concentrations are considered “heavily contaminated”.
- EPA’s draft sediment quality criteria value calculated for PCBs using the equilibrium partitioning methodology was exceeded in 108 of 110 sample locations.

It has been extensively documented in the peer reviewed literature that PCBs in the ecosystem 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 (*Upper Reach - Housatonic River Ecological Risk Assessment*). Furthermore, The *Upper Reach - Housatonic River 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 semi-aquatic mammals (e.g., the river otter) in the Upper Reach of the Housatonic River is likely.

- “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)].

As stated above, there are levels of PCBs as high as 5,800 ppm in surficial riverbank soils in the upstream part of the Upper Reach (between Newell and Lyman Street) and surficial riverbank soils as high as 377 ppm have been detected at downstream locations. Areas of this highly

contaminated bank soil already have been observed to erode and discharge into the Housatonic River and are likely to continue to do so. After entering into Housatonic River, the contamination will either be deposited on already contaminated river sediments, or onto other downstream riverbanks or floodplains.

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

PCB contaminated soils and sediments continue to migrate and redeposit at downstream sediment, riverbank and floodplain locations as a result of natural erosion. This situation is exacerbated by periodic flooding of the Housatonic River, which deposits contaminated sediments on floodplain properties. The River is projected to overtop its banks every two to ten years, depending on stream morphology (e.g., high banks vs. low banks), for most of the two-mile stretch (see Attachment 4 of the document titled *Memorandum for the Record, Subject: The Remediation and Restoration of the Housatonic River (Newell Street to the confluence with the West Branch), Pittsfield, MA*, by Mark J. Otis, May 6, 1998). The residential properties include the riverbanks themselves and therefore even flooding that does not “overtop” the banks will deposit contaminated sediments on a portion of the residential properties.

There is both historical and current sampling data that indicates that migration of contaminated material has and is occurring. First, sampling data clearly indicates that the floodplain properties are contaminated. This is acknowledged in a report by GE’s consultant which states “sampling and hydraulic modeling of the River between the GE facility and Woods Pond Dam has shown PCBs to exist primarily in the 10-year floodplain.” (*Supplemental Phase II/RCRA facility Investigation Report for the Housatonic River and Silver Lake, Volume I* by BBL, January 1996). Secondly, EPA recently re-sampled riverbank areas previously remediated by GE as a short-term measure. The area sampled is along Deming Street. As part of GE’s action, gabion baskets were constructed in two tiers along the riverbank. In February 1998, after a high water event, EPA personnel collected six samples from sediment deposits on the lower gabions. PCB concentration in these six samples ranged from two to 45 ppm (Memo from J. Pimpare, EPA to B. Olson, EPA dated April 7, 1998).

IV. Endangerment Determination

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

V. Proposed Actions and Estimated Costs

A. Proposed Actions

1. Proposed Action Description

Objectives

There are four objectives to the proposed removal action: to mitigate the human health and environmental threat posed by the existing high levels of PCBs in river sediments, and bank and floodplain soils; to eliminate or mitigate existing sources of contamination to the Upper Reach of the Housatonic River; to prevent the recontamination of previously remediated floodplain properties and further contamination of other floodplains; and, to prevent the downstream migration of contaminated sediments and bank soils.

Evaluation of Alternatives

EPA requested assistance from the United States Army Corps of Engineers (US ACE) in the evaluation of options for the remediation of the Housatonic River and associated floodplains. The US ACE documented their evaluation in a report titled *Memorandum for the Record, Subject: The Remediation and Restoration of the Housatonic River (Newell Street to the confluence with the West Branch), Pittsfield, MA*, by Mark J. Otis, May 6, 1998. This memo describes the US ACE's evaluation of the following six alternatives:

- No action
- Monitored natural attenuation
- Capping
- Removal of all contaminated sediments and soils
- Removal of two feet of contaminated sediments and bank soils
- Removal of two feet of contaminated soils, capping the residual contamination and backfilling to grade.

EPA evaluated these options and determined that no action and monitored natural attenuation are not viable options because the human health and environmental threats currently posed by the PCB-contaminated soils and sediments warrant immediate action. Additionally, the US ACE estimated that monitored natural attenuation would not result in acceptable levels in the sediments for approximately 500 years. While the US ACE recommended the removal of two feet of contaminated soils, capping the residual contamination and backfilling to grade throughout the entire two-mile stretch, EPA determined that a phased removal action is appropriate.

Due to the continuing threat posed by the existing sources of contamination to the River (e.g., the LNAPL plumes, contaminated bank soils, etc.), and the likelihood of continued downstream migration of PCBs due to mechanisms such as erosion and flooding, it is necessary to initiate source control and additional upstream response actions in the first ½ mile immediately. The source control, riverbank, and river sediment activities in the area between Newell Street and Lyman Street (Phase I) need to be addressed immediately and in a coordinated manner for the following reasons:

- This area is upstream of the remaining 1.5 miles also subject to the proposed removal action and, to prevent recontamination, work in downstream areas cannot be initiated until work in this section is completed. A coordinated response will result in completing the 0.5 mile area in the shortest amount of time.
- This area contains a majority of the potential sources and the most heavily contaminated bank soils and sediments at depth.
- The potential sources of contamination, the riverbanks and sediments in this 0.5 mile section are geologically and hydrologically interrelated, and therefore, response actions need to be integrated. For example, removing heavily contaminated bank soils at Lyman Street without evaluating the potential impacts to the existing NAPL and groundwater pumping systems, may maintain or increase releases of NAPL into the River. Furthermore, engineering controls, construction equipment, and logistical problems are expected to be similar for both riverbank and sediment mitigation activities.
- Performing the response actions in a coordinated manner would result in the least amount of disruption to the neighborhood; and may result in obtaining access to non GE-owned property, if required, once instead of twice.
- Tree clearing and restoration activities can be performed once instead of several times.

EPA estimates Phase I actions will require greater than six months to complete. Thus, a planning period of more than six months exists before comprehensive removal activities can be initiated for the 1.5 miles of the Site located between Lyman Street and the confluence with the West Branch of the Housatonic River (Phase II of the removal action). Therefore, in accordance with §300.415(b)(4) of the NCP, an EE/CA will be conducted to further evaluate alternatives for this 1.5 mile stretch.

EPA considered relying solely on temporary measures, such as fencing, warning signs, public education, etc. to limit the exposure of PCBs to residents and recreational and other users of the river and floodplain until final remedial actions are taken. While these temporary measures are necessary and appropriate to minimize exposure to PCBs while the EE/CA is performed, they do not eliminate the need to take more comprehensive removal activities because: their effectiveness decreases with time; residents may not be willing to leave fences in place in their backyards for long periods of time, if at all; monitoring and enforcement of warning signs and access restrictions in this area is impractical; these actions will not prevent previously remediated portions of properties from becoming recontaminated during a flood event; and these actions do

not eliminate the potential exposure pathways. Also, performing large scale floodplain and bank soil removal to limit exposure prior to implementing upstream actions will not be effective because of recontamination and logistical concerns.

Proposed Actions

Phase I

1. Perform actions to temporarily limit access and exposure to contaminated areas including the installation of fencing, repairs to existing fencing, installation of warning signs, inspection and maintenance of fences and warning signs, public education, covering of contaminated soils or soil removal. These actions shall be performed along both sides of the riverbanks/floodplains from Newell Street to approximately the confluence with the West Branch of the Housatonic River.
2. Eliminate or mitigate all current and potential sources of PCBs and other hazardous substances from entering into the Upper Reach of the Housatonic River and/or Housatonic River sediments.
3. Develop and implement a monitoring plan(s) to assess compliance with the performance standards for source control measures mentioned in item two above.
4. Remove contaminated sediments and bank soils from the Newell Street bridge to the Lyman Street bridge. The excavation and subsequent cap/cover will meet the following criteria:
 - ▶ Includes the installation of a continuous cap that effectively isolates the residual contamination from any ecological or human receptors. This includes preventing or minimizing the recontamination of sediments and bank soils by erosion, diffusion, advection, desorption of PCBs into the dissolved phase and re-entering the River system, or any other mechanism;
 - ▶ Includes the installation of a minimum one foot of backfill required for proper wetland restoration;
 - ▶ Does not result in the reduction of the River's cross section or flood storage capacity;
 - ▶ Allows for a margin of safety for the inaccuracies associated with the excavation and placing of the materials in these conditions.
 - ▶ Is consistent and is designed to be compatible with all source control measures.
 - ▶ Contributes to the efficient performance of any anticipated long term remedial actions.
5. Backfill and perform restoration of the river sediments and banks.
6. Treat/dispose of the contaminated sediments and soils. Any off-site disposal facilities used will be in compliance with EPA's Off-site Rule (40 CFR 300.440—Procedures for Planning and Implementing Off-Site Response Actions).

Phase II

EPA will conduct an EE/CA to further evaluate alternatives to mitigate the human health and environmental threat posed by the existing high levels of PCBs and other hazardous substances

in river sediments, banks and floodplain soils for the remaining 1.5 miles from Lyman Street to the confluence. These alternatives will include capping; excavation of all contaminated sediments and soils; and a combination of excavation, capping, and leaving some sediments, bank and floodplain soils in place. When the EE/CA is finalized, EPA will select a proposed action and conduct a 30 day public comment period. EPA will then respond to comments and document the selected Phase II removal action activities in a subsequent Action Memorandum.

Post-Removal Site Control

EPA expects that GE will be primarily responsible for post-removal site control (PRSC) as defined in Section 300.415(k) of the National Contingency Plan (NCP). Upon approval of this Action Memorandum, EPA's Remedial Program agrees to assume oversight responsibilities of PRSC activities. If the overall GE-Housatonic River Site does not get finalized on the NPL, then EPA, under other mechanisms, and/or the Massachusetts DEP will be requested to assume oversight responsibilities for PRSC. PRSC activities may include monitoring GE's compliance with the performance standards and maintenance plans.

2. Contribution to Remedial Performance

The mitigation or elimination of potential sources of PCB contamination to the Housatonic River is consistent with any conceivable long-term remedial action. The removal of sediments and bank soils between Newell Street and Lyman Street is necessary to ensure that this 0.5 mile stretch of the River is not a source of contamination to the downstream sediments, riverbanks and floodplain soils and to allow removal activities to proceed. The OSC will work closely with the RPM(s) and state personnel to ensure that removal activities will not impede future responses.

The immediacy of the human health and environmental threats dictate that a response action be initiated within six months. As stated above, the *Evaluation of Human Health Risks Memo* concluded that "short-term exposure to elevated levels of PCBs in Housatonic River floodplain soils, riverbank soils and river sediments . . . present significant risks to human health." Therefore, it is appropriate to perform this response action as a removal action rather than a remedial action.

This two-mile stretch of the River was segregated from the remaining 28 miles of the River for a removal action for the following reasons:

- Thorough human health and environmental risk evaluations/assessments have been completed and indicate that immediate action is required;
- There are continuing sources of PCB contamination in this stretch of the River;
- There is a high density of residential properties abutting this stretch of the River;
- Recent sampling has indicated that portions of some residential properties already remediated by GE have become recontaminated, and additional flooding may cause additional properties

already remediated or partially remediated by GE to become recontaminated (Note: all floodplain properties remediated or partially remediated by GE to date are within this two-mile stretch); and,

- The characteristics of the River (e.g., lower flows, minimal adjacent wetlands, steeper banks) change significantly after the confluence with the West Branch.

3. Description of Alternative Technologies

Alternative technologies may be feasible for the treatment of contaminated soils and sediments. The OSC will evaluate alternative technologies to determine if they are appropriate at this Site.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

During the process of the removal action, State and federal ARARs will be identified. It is likely that the ARARs will be similar to those identified in Table 2-1 of the Building 68 Area Removal Action Work Plan, by BBL, May 1997. Upon identification of the ARARs, the OSC will determine the applicability and practicability of complying with each identified ARAR. The OSC will base his final decisions upon the criteria set forth in 40 CFR §300.415(j). The EE/CA will also identify and evaluate ARARs and again the OSC will determine the applicability and practicability of complying with each identified ARAR in accordance with 40 CFR §300.415(j).

5. Project Schedule

Removal action activities will be initiated as soon as practical. Implementation of source control measures and/or soil and sediment removal are expected to be initiated by November 1, 1998. EPA will initiate the EE/CA process within 14 days of approval of this Memorandum.

B. Estimated Costs

Since EPA will seek to have GE perform Phase I of the removal action, no funds are being requested to perform this Phase of the proposed removal action. Funding to monitor GE's performance will be required. In accordance with §300.415(k) of the NCP, the 12-month and \$2,000,000 statutory limits to removal actions do not apply to PRP-lead removal actions. However, approximately \$250,000 in funding will be required to perform the EE/CA described above. Funds expended to conduct an EE/CA are CERCLA §104(b)(1) monies and are not counted toward the \$2 million statutory limit for removal actions.

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

Delayed action will increase the health risks by allowing for the continuation of direct contact and ingestion of PCBs by residents and other people accessing the River, riverbanks and

floodplains in the Upper Reach. Furthermore, additional PCBs may enter the Housatonic River from the previously identified source areas and the contaminated sediments will continue to migrate downstream and continue to be deposited onto riverbanks and floodplains during storm events. In addition, significant exposure will continue to occur to ecological receptors within the Upper Reach, and downstream transport will add to the exposure of the ecosystem located downstream of the area subject to the proposed removal action.

VII. Enforcement — Intended for Internal Distribution Only

See attached.

VIII. Recommendation

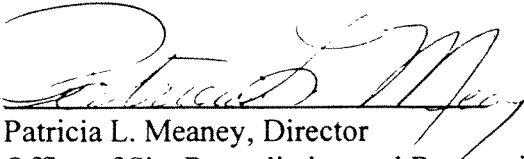
This decision document represents the selection of certain removal action activities and authorizes EPA to conduct an EE/CA to evaluate additional removal activities for the Upper Reach portion of the overall GE-Housatonic River Site, in Pittsfield, Massachusetts. The proposed removal action was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision document is based on the administrative record for the Site. (See Appendix A for the Administrative Record File Index and the List of Selected Key Guidance Documents)

As stated in Section III, conditions at the Site meet the NCP §300.415(b)(2) criteria for a removal action 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)].

Combined Action-EE/CA Approval Memorandum
GE-Housatonic River Site (Upper Reach Removal Action)
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Therefore, I recommend approval of this removal action.

Approval:  Date: 5/26/98
Patricia L. Meaney, Director
Office of Site Remediation and Restoration

Disapproval: _____ Date: _____
Patricia L. Meaney, Director
Office of Site Remediation and Restoration