DRAFT FINAL

SOURCE AREA CHARACTERIZATION REPORT
TECHNICAL SUPPORT SERVICES
GENERAL ELECTRIC (GE) HOUSATONIC RIVER PROJECT
PITTSFIELD, MASSACHUSETTS

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LIST OF ACRONYMS

ACO	Administrative Consent Order
ACOE	U.S. Army Corps of Engineers
ASTs	aboveground storage tanks
BB&L	Blasland, Bouck & Lee
cfs	cubic feet per second
DNAPL	dense nonaqueous phase liquid
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
GE	General Electric
IRA	Immediate Response Action
LNAPL	light nonaqueous phase liquid
mg/kg	dry unit weight of solid
MWRC	Massachusetts Water Resources Commission
NFPA	National Fire Protection Agency
NPL	National Priorities List
OU	operable unit
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCDDs/PCDFs	pesticides/herbicides, polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
PCE	tetrachloroethene
ppm	parts per million
RCP	reinforced concrete pipe
SPT	standard penetration test
STM	Short-Term Measure
SVOCs	semivolatile organic compounds
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TSD	treatment, storage, or disposal
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
USTs	underground storage tanks
VOCs	volatile organic compounds
WESTON	Roy F. Weston, Inc.
WMEC	Western Massachusetts Electric Company

SECTION 1

INTRODUCTION

1. INTRODUCTION

The purpose of this document is to consolidate and summarize existing information related to potential sources of contamination from the General Electric (GE) Facility to the Housatonic River over the Upper Reach of the river (defined as Newell Street Bridge to the confluence of the east and west branches of the Housatonic River, a distance of approximately 2 miles). Additionally, this report assesses available source information to identify potential sources not previously identified, evaluate the effectiveness of any control measures and determine any data gaps for characterizing sources. This document is intended to serve as a basis for comment and discussion on potential sources leading to a conceptual Removal Action Work Plan that presents source control alternatives. The objective of source control is to prevent recontamination of clean sediment following excavation of contaminated sediment in the Housatonic River.

In preparing this document, no new data have been collected, and an assessment of the accuracy and validity of existing data was not performed. Summary tables and posting maps from existing reports prepared for GE by a variety of consultants were used to produce a conceptual model of sources to the river. Summarized data provided electronically by the U.S. Environmental Protection Agency (EPA) were also used and are presented in figures in this report. No independent assessment of the quality and usability of this data was performed.

1.1 SITE DESCRIPTION

The proposed GE Housatonic River National Priorities List (NPL) site (the site) 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; and other properties or areas that have become contaminated as a result of GE’s facility operations. Figure 1-1 depicts the general NPL site area in Pittsfield. All figures are presented in a separate section following the text. Figure 1-1 does not show the full 30 miles of river downstream from the GE facility. The hazardous substances associated with the site include polychlorinated biphenyls (PCBs), dioxins, furans, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganic constituents.

Potential sources of contamination to the Housatonic River are located on or near property currently or formerly operated by GE, including some of the former oxbows of the Housatonic River that have been landfilled with hazardous materials; soil contaminated with hazardous substances, including PCBs, VOCs, and SVOCs due to spills from a number of aboveground storage tanks (ASTs), underground storage tanks (USTs), and process 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; PCB-contaminated soils used as fill material on the Allendale School playground; the former waste stabilization basin located adjacent to Unkamet Brook; stormwater discharges; Silver Lake, which has received contaminated stormwater runoff from the GE facility since the 1940s; sediments of the Housatonic River itself; and likely other spills and/or burial locations as yet unidentified in files reviewed by Roy F. Weston, Inc. (WESTON®) as of this date.

The Housatonic River flows through the center of the site, and its tributary, Unkamet Brook, flows directly adjacent to a number of source areas. The site generally slopes toward the Housatonic River, and includes portions of the Housatonic River and Unkamet Brook 100-year floodplains (01-0168). In this document, reference citations represent WESTON Reference Numbers as shown in Section 6. Surface water runoff from the site enters the Housatonic River and Unkamet Brook at numerous points in Pittsfield, Massachusetts. Unkamet Brook has an estimated mean annual flow rate of 4 cubic feet per second (cfs), based on its upstream drainage basin area (01-0169). The average daily flow rate of the Housatonic River is 120 cubic feet per second (cfs), ranging from a low monthly flow of 46 cfs to a 10-year high flow of 4200 cfs (USACE, 1998 personal communication). Groundwater in the vicinity of the site flows predominantly toward the Housatonic River (01-0168).

Contamination, particularly PCBs, which are very persistent in the environment, has also been detected in the sediments and soils within the approximate extent of the 10-year floodplain associated with the Housatonic River downstream from the site to Woods Pond in Lenox, Massachusetts, and in Housatonic River sediments as far as and downstream of the Connecticut state line (04-0007). Analyses of samples collected upstream of the site revealed trace or non-detectable concentrations of Aroclor-1254 or -1260 present in the sediment (04-0007). 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 (06-0001, 05-0005, 05-0003, 01-0024, 01-0027). The highest concentrations of Aroclor-1254 and -1260 have been detected near the GE facility in the vicinity of the site, downstream of the former Building 68 PCB spill (01-0020, 01-0022, 01-0024).

Surface water runoff from sources, flooding of sources by the Housatonic River, migration of nonaqueous phase liquids, direct discharge of PCB fluids from the Building 68 tank implosion, and groundwater discharge from the sources to the Housatonic River have been interpreted as the cause of the sediment contamination in the Housatonic River. Migration and redistribution of sediments contaminated with Aroclor-1254 and -1260 and other hazardous materials within the Housatonic River has further resulted in contamination detected in the floodplain downstream from the site (04-0007 06-0001, 01-0147).

The majority of Pittsfield's 47,000 residents reside within one-radial mile of the Housatonic River and Unkamet Brook (00-0154). The Housatonic River is used for recreation, including fishing, boating and swimming (02-0085). The Housatonic River has been closed to fishing for human consumption since 1982 due to PCB contamination (02-0085).

1.1.1 Site Regulatory Background

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 (ACO) with the MADEP and a Corrective Action Permit with EPA pursuant to 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 (EPA Area 1), The Hill 78 Landfill (EPA Area 2), East Street Area I (EPA Area 3), East Street Area II (EPA Area 4), GE Lyman Street Parking Lot (EPA Area 5A), Newell Street Parking Lot (Newell Street II) (EPA Area 5B), and the Housatonic River and Silver Lake (EPA Area 6). Table 1-1 summaries the study areas and the locations are shown on Figure 1-1.

The ACO between GE and MADEP became effective in May 1990. The ACO covers all the study areas in the 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 under the permit and/or the ACO with the MADEP. The results of these actions and investigations are available in numerous documents, reports, letters, data packages, and other submittals to EPA and MADEP.

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 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.

Table 1-1

Site Study Area Summary

Operable Unit Designation	MA DEP Designation	EPA Region I RCRA Designation
OU 1	Unkamet Brook Area	EPA Area 1
	Hill 78 Area	EPA Area 2
	East Street Area 1	EPA Area 3
	East Street Area 2 (Building 68 and Former Oxbow H)	EPA Area 4
	Lyman Street Parking Lot (Former Oxbows D and E)	EPA Area 5A
OU 2	Housatonic River	EPA Area 6
OU 3	Allendale School	*
OU 4	Silver Lake	EPA Area 6
OU 5	Newell Street Parking Lot (Former Oxbows F and G)	EPA Area 5B
	Newell Street Area I (Former Oxbow I)	*
OU 6	Former Oxbows A, B, C, J, K	*

- = out of EPA Region I RCRA jurisdiction.

1.2 SITE HISTORY

The site has been used for industrial purposes since the turn of the century, when industries such as the Stanley Electric Company and the Berkshire Gas Company and its predecessors occupied portions of the property near the intersection of East Street and Merrill Road (01-0024). GE initiated operations on the property in 1903. The area has been utilized by three manufacturing divisions at the GE facility (Transformer, Ordnance, and Plastics) (01-0024).

Additional site history information is provided in Section 3 and below by operable unit (OU).

1.2.1 OU 1—GE Facility

OU 1 (see Figure 1-1) includes mostly GE property located between Tyler Street/Dalton Avenue on the north, Unkamet Brook on the east, Merrill Road and the Housatonic River on the south, and Lyman Street and Silver Lake on the west. The site is traversed by Merrill Road, East Street, and several sets of railroad tracks (01-0025). The majority of OU 1 is located on GE-owned property (01-0025). A very small portion of OU 1, located in the southeast corner of the intersection of Newell Street and East Streets, is privately owned (01-0025). Many areas of past waste disposal or PCB contaminated fill disposal have been identified in OU 1, including the Interior Landfill, the Former Waste Stabilization Basin, the Hill 78 Landfill, and Former Oxbows D, E, and H. The history of these five locations is briefly described below.

1.2.1.1 Interior Landfill

The Interior Landfill, covering approximately 14 acres, was operated by GE until the late 1970s (01-0020). The landfill is bordered by Dalton Avenue to the north, Merrill Road to the south, wetlands on the eastern edge of the landfill, and regularly maintained lawn with some small trees on the west edge of the landfill (02-0085). An asphalt-paved parking lot covers the western portion of the landfill, which is separated from Unkamet Brook by a maintained lawn and ornamental trees (01-0020, 02-0085). Unkamet Brook bisects the landfill and flows directly to the Housatonic River. The Interior Landfill lies within the Unkamet Brook 10-year floodplain (01-0020). A magnetic survey of the landfill delineated two discrete zones within the landfill, one zone containing a magnetic anomaly suggesting the presence of buried metal in the western portion of the landfill and the other eastern zone where no anomalies were detected.

Available information documents that soil, excavated as part of the construction of GE Buildings OP-1 and OP-2 in 1940 and 1941, was disposed of in the landfill along with wastes related to bushing operations conducted in GE Buildings 51 and 59 (01-0020). Additionally, excavations performed during the re-routing of Unkamet Brook in the late 1970s indicated the presence of capacitors that had evidently been disposed of in the Interior Landfill (01-0020). An Immediate Response Action is currently being conducted (June 1998) within the Interior Landfill due to the presence of drums, capacitors, bushings, and insulators at the landfill surface along Unkamet Brook.

1.2.1.2 Former Waste Stabilization Basin

A Former Waste Stabilization Basin is located west of Unkamet Brook, south of the western portion of the Interior Landfill, and north of Merrill Road on the GE facility (01-0021). Sometime in the 1940's, the Former Waste Stabilization Basin was formed by the construction of earthen embankments in an existing bog area adjacent to Merrill Road and Unkamet Brook (01-0021). For more than 40 years, process wastewater effluent, non-contact cooling water, and stormwater were discharged into the basin and then into the Unkamet Brook. In December 1979, in accordance with an agreement between GE and MA DEP, the discharge of process wastewater to the waste stabilization basin was discontinued (01-0021).

In 1979 - 1980, GE conducted an investigation to characterize the sediments within the former waste stabilization basin (01-0020). Source sample analytical results indicated the presence of VOCs, SVOCs, PCBs, and inorganic constituents.

In 1981, standing liquids and the sludge within the basin were removed and reportedly disposed of in a secure, permitted landfill. Following the removal of these materials, the basin was backfilled with gravel, capped with soil, and seeded (01-0021).

1.2.1.3 Hill 78 Landfill

The Hill 78 Landfill is located in the central portion of GE's Pittsfield facility, north of Merrill Road, south of Allendale School and Tyler Street Extension, east of GE Building 78, and west of the GE O.P. parking lot (01-0017). The Pittsfield Generating Company Facility (former Altresco Cogeneration Facility) is located within the Hill 78 site (adjacent to the landfill) and has been in operation since it was built in 1989. A surface water drainage swale originates approximately 220 feet south of the landfill, where a 42-inch reinforced concrete pipe emerges from the ground (01-0017, 03-0007). The pipe carries stormwater runoff from properties north of the Hill 78 site, including the Allendale School property. Discharge from the pipe and drainage swale ultimately flows into the Housatonic River (01-0017).

The 3.5-acre landfill has been used by GE since the early 1940s for the disposal of excavated soils, plant demolition and construction debris, and other solid wastes (01-0017). Interviews with former employees revealed that drums, containing PCB-contaminated soil, were disposed of in the landfill during the 1950s and 1960s (01-0017). The most common disposal method was dumping of debris from trucks onto the ground surface (01-0017). From approximately the mid- to late-1970s to 1990, materials placed in the landfill included soils and construction debris containing PCBs at concentrations less than 50 parts per million (ppm) (01-0017). This practice was discontinued in 1990 at the MA DEP's request, and a MA DEP-approved cover was placed over the landfill as a Short-Term Measure (STM) (01-0017). The landfill cover consists of a geotextile layer, a 1-foot layer of crushed stone, and a 1-foot layer of “clean” fill and topsoil.

1.2.1.4 Former Oxbows D, E, and H

In the 1940s, oxbows along the Housatonic River in Pittsfield, Massachusetts, were isolated during the rechannelization of the river by the U.S. Army Corps of Engineers (ACOE) (06-0001). Over a period of approximately 40 years following the rechannelization of the river, the majority of the oxbows were backfilled with various materials (06-0001, 05-0005, 01-0027). Former Oxbow H was backfilled with material from GE, the Berkshire Gas Company, and possibly others (01-0024, 02-0085).

Soil samples collected from each of the Former Oxbows indicate the presence of VOCs, SVOCs, pesticides, PCBs, and metals above reference criteria (06-0001, 01-0027). Although part of the fill is non-hazardous construction debris, the Former Oxbows have been documented to contain PCBs in soil samples collected less than 2 feet below the land surface (05-0005, 02-0085, 01-0024).

1.2.1.5 Underground Storage Tanks

Information provided by GE documents the presence of several USTs on and near the western portion of OU 1 (01-0024). Materials documented to have been stored within these USTs include (but are not limited to) 10C mineral oil dielectric fluid, coal tar liquors, PCB-containing waste water, corrosives, insulating fluids, solvents, pyranol, kerosene, varnish, and fuel oil (01-0024). In addition to buildings and storage tanks, a network of pipes and tunnels underlies the western portion of OU 1 (01-0024).

GE has owned and operated several buildings on and near the eastern portion of OU 1. In addition to buildings, 18 USTs (including a tank farm area with 14 USTs between 20,000- and 25,000-gallons and one 100,000-gallon AST) have been documented within this area (01-0025). Materials documented to have been stored within these USTs include (but are not limited to) 10C mineral oil dielectric fluid, and waste aqueous phosphate (phosphoric acid) (01-0025). A network of subsurface pipes and tunnels has also been identified within this area that conveyed the contents of the tank farm to their use areas in surrounding buildings (01-0025). GE indicated that PCBs detected in soils in this part of the site resulted from limited interconnections between PCB and mineral oil distribution systems (01-0025).

UST related releases or contaminated fill are potentially related to areas of light nonaqueous phase liquid (LNAPL) and dense nonaqueous phase liquid (DNAPL), which are present in the East Street Area 2, Lyman Street Parking Lot, Unkamet Brook, and East Street Area 1 areas of OU 1. Another major potential source of LNAPL/DNAPL within OU 1 and OU 2 is the PCB spill at Building 68 that resulted from an aboveground tank rupture immediately adjacent to the river in or around 1968. Additional information and history on these LNAPL and DNAPL areas are provided in Section 3.

1.2.2 OU 2—Housatonic River

OU 2 includes sediments and stream bank materials of the Housatonic River that are contaminated with hazardous substances, especially PCBs. Numerous studies conducted since 1982 have included sediment, fish tissue, and benthic organism samples collected from the

Housatonic River. The samples, analyzed for PCBs, indicate that PCB contamination exists in the Housatonic River from approximately the outfall of Unkamet Brook to the Massachusetts state line (approximately 30 miles downstream of the site) and beyond (04-0007). The reach of the Housatonic River with the most significant PCB contamination is a 12-mile reach beginning at its confluence with Unkamet Brook in Pittsfield and ending at Woods Pond in Housatonic, Massachusetts (00-0155).

The release of PCBs and other hazardous substances to the Housatonic River is mostly attributable to releases from the sources located within OUs 1, 3, 4, 5, and 6. These releases have occurred due to surficial runoff, as well as discharge of contaminated groundwater and free product (primary source) to the Housatonic River, best documented within OU 1.

1.2.3 OU 3—Allendale School Soils

OU 3 is located to the north of the Hill 78 Landfill, across the Tyler Street Extension (03-0004). The Allendale School was constructed in 1950 on a 12-acre parcel (03-0007). At the time of its construction, GE and the City of Pittsfield entered into an agreement under which GE permitted the City of Pittsfield to remove approximately 40,000 cubic yards of soil material from the GE property for use as fill material in the school yard (03-0007). The area from which the soil was removed is now known as the Hill 78 Landfill (part of OU 1) (03-0007).

Concerns associated with the Allendale School property were initially identified by MA DEP when PCBs were detected during construction of the Altresco Corporation Cogeneration Facility, located on GE property southeast of the school property (03-0007). The detection of PCBs by MA DEP at the school property above MCP Cleanup Standards led to several subsequent sampling events between 1990 and 1996 to characterize the extent of PCBs present, as well as to assess the potential presence of other hazardous constituents (03-0007, 02-0085). Analytical results from these sampling events document the presence of various hazardous substances, including VOCs, SVOCs, herbicides, PCBs, furans, and inorganic constituents (03-0007).

PCBs have been consistently detected in samples collected from many locations on OU 3 (03-0007, 03-0004). However, a geotextile and “clean” soil cap was constructed on the property in

1991 to isolate the contamination (03-0007). The cap is approximately 5 acres, and was applied to the areas where the concentration of PCBs found in soil samples exceeded 2 ppm (03-0007, 03-0006). Two grab soil samples were collected on 3 July 1991 from the soil pile that was to be used to construct the cap (03-0007). The soil came from an off-site source and no PCBs were detected in the samples collected from the capping material (03-0007).

At the request of MADEP, GE initiated field activities to delineate areas outside of the existing cap which had PCB soil concentration greater than 2 ppm. As a result of these investigations, GE performed a limited removal of 1,600 cubic yards of impacted soil from the Allendale School property during April 1998.

1.2.4 OU 4—Silver Lake

Silver Lake has been the subject of numerous investigations performed by GE since the mid-1970s (04-0007). Recent studies have been performed under a Consent Order issued to GE by MA DEP in May 1990.

Silver Lake was used by GE in the 1940s for testing torpedo launch mechanisms, and the iron testing rails are still visible on the northeastern side of the lake. Silver Lake is hydraulically connected to the Housatonic River by an overflow weir and a 48-inch diameter concrete conduit (04-0003).

1.2.5 OU 5—Newell Street

OU 5 comprises three Former Oxbows, F, G, and I, between the north side of Newell Street and the Housatonic (02-0071). These areas were isolated from the Housatonic River during the 1940s as part of rechannelization efforts performed by the City of Pittsfield, in conjunction with ACOE, to straighten the Pittsfield stretch of the river for flood control purposes (02-0071). Former Oxbow I was backfilled with material from GE, the Berkshire Gas Company, and possibly others (01-0024, 02-0085). The former oxbows are located on private property and GE property (some of which GE purchased following the discovery of contamination) which is used for recreational and commercial purposes.

1.2.6 OU 6—Former Oxbows

Five of the Former Oxbows, designated A, B, C, J, and K, comprise OU 6. In the 1940s, oxbows along the Housatonic River in Pittsfield, Massachusetts, were isolated during the rechannelization of the river by ACOE (06-0001). Over a period of approximately 40 years following the rechannelization of the river, the majority of the oxbows were backfilled with material (06-0001, 05-0005, 01-0027). Former Oxbow A was backfilled with material from GE and possibly others due to its use as a landfill (01-0024, 02-0085).

The OU 6 Former Oxbows are all located on property that is not currently owned by GE. Former Oxbows A and C are located along the south bank of the Housatonic River, west of the Lyman Street Bridge and east of the Elm Street Bridge. Former Oxbow B is located along the northern bank of the Housatonic River, west of the Lyman Street Bridge and east of the Elm Street Bridge (05-0005). Former Oxbows J and K are located east of the Newell Street Bridge, on the northern and southern banks of the Housatonic River, respectively (05-0005). Much of the area covered by the five oxbows is undeveloped, however, portions of Oxbows A, B, and J have been developed. The southwestern portion of the Oxbow A fill area is paved and contains a car wash and a Laundromat. A portion of a strip mall and two auto dealerships are present atop Oxbow B. Several parking lots, a gas station, a restaurant, an automotive electrical repair shop, and a portion of an apartment building are present atop Oxbow J.

1.3 EXISTING SOURCE CONTROL MEASURES

A summary of existing source control measures implemented by GE based on review of available information is provided in this section. The focus is on documented source control measures implemented to mitigate known sources of PCBs and other contaminants that would likely pose a direct threat to the Housatonic River.

Active and on-going source control measures have been implemented by GE within Operable Units 1 and 5. These primarily have been focused on containment and removal of LNAPL and DNAPL and excavation and removal of riverbank/floodplain soils and river sediments. These source control measures are described in further detail in the subsections below.

1.3.1 OU 1—East Street Area 1

As early as 1955, LNAPL containment/collection was initiated by GE in the form of a collection trench to capture oil and groundwater. In 1979, use of this trench system was discontinued. It was replaced with an upgraded oil recovery system consisting of a french drain and caisson with a groundwater depression pump and oil skimming device. This system, referred to as East Street Area 1 - Northside Oil Recovery System, is located north of East Street, just east of the Newell Street and East Street intersection. The Northside Recovery System consists of a 6.75-foot diameter perforated steel caisson with 22 6-inch diameter, approximately 80-foot long, perforated collection laterals (11 on each of the east and west sides). The collection laterals were designed to collect and remove floating oil from the groundwater surface. The laterals start at a depth of approximately 7.5 feet below land surface and extend to a maximum depth of 18.5 feet.

A groundwater drawdown pump installed within the caisson induces a cone of depression in the localized water table, producing a hydraulic gradient to enable effective oil recovery. Oil is skimmed from the groundwater by a hydrophobic/oleophilic membrane connected to a separate oil pump. Currently, the collected oil is stored in a 55-gallon drum located within the caisson and transported off-site for disposal. From 1972 to 1996 the oil was periodically removed and transported to GE's former Thermal Oxidizer for treatment. The Northside Recovery System discharges the pumped groundwater to the 64G Groundwater Treatment Facility located in East Street Area 2, where it is treated prior to being discharged under a NPDES permit to the river.

Operations of the Northside Oil Recovery System between 1979 and 1986 resulted in oil recovery from the plume. As a result, the main plume decreased in size and the remaining oil occurred in several "pockets". GE decided to supplement the existing recovery system with construction of another groundwater recovery system in 1986 to address the scattered nature of remaining oil "pockets" more effectively. This new system is referred to as the "Southside Oil Recovery System" (see Figure 3.3.1-2).

In August 1990, GE supplemented the "active" oil recovery program at the Northside caisson with a "passive" oil recovery program. This involved removal by manual bailing on a weekly basis where oil accumulations were detected during periodic monitoring of wells where oil accumulations had been observed in the past. If oil thickness of 0.1 foot or greater was detected, manual bailing was initiated.

The Southside Oil Recovery System is located on the south side of East Street, approximately 500 feet east of the intersection of Newell and East Streets. This system consists of a perforated pre-cast concrete caisson, oil skimming device, and a groundwater depression pump. Oil is skimmed from the groundwater within the caisson and pumped into a 55-gallon drum located within the caisson. Oil is periodically removed and transported off-site for proper disposal.

Operation of the “Southside” recovery caisson was essentially discontinued in 1990 due to several mechanical difficulties with the system and concern by the City of Pittsfield regarding the discharge of recovered groundwater to the City's sewer system. "Passive" oil recovery (manual bailing) was initiated in 1990 on a weekly basis if oil thickness of 0.1 foot or greater was detected.

"Active" recovery was re-initiated in July 1992 after evaluation of possible discharge options. It was concluded that groundwater could be pumped from the Southside caisson to a manhole in the Northside caisson system. From there it would go to the 64-G groundwater treatment facility in East Street Area 2.

Operation of the Northside and Southside recovery systems is on-going. Details on the recent performance of these systems are included in Section 3.3.1.

1.3.2 OU 1—East Street Area 2

To address stormwater/wastewater discharges to the Housatonic River and both LNAPL and DNAPL contamination observed in monitoring wells and at riverbank seeps within East Street Area 2, the following wastewater and contaminant source control measures have been implemented (01-0024):

1.3.2.1 Wastewater and Stormwater System

Process wastewater and stormwater runoff are combined in East Street Area 2 and piped to several oil/water separators (64-X, 64-W, 64-Z and 31-W) and the Building 64-T Wastewater

Treatment Facility. The oil/water separators serve as both a trap for LNAPL and a settling tank for part of the sediment load carried with the water flow. Figure 3.6-1 shows the locations of the system components and outfall locations into the Housatonic River and Silver Lake. The outfalls are permitted NPDES discharges. No violations of the NPDES permit discharge requirements have been noted in the available information.

1.3.2.2 Contaminant Source Control Measures

In the early 1960s, GE initiated various programs and investigations to address leaking tanks and to collect oil that had been detected underground at East Street Area 2. These efforts have continued to date with the installation of various contaminant source control measures over the years. Figure 3.3.2-1 shows the locations of the major components of the existing and former source control measures. The systems are described below:

- Groundwater Treatment Facility, Building 64-G—This facility is designed to remove polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), and metals from groundwater pumped from the active pumping wells in East Street Area 1, East Street Area 2, and Lyman Street. Part of the treated water is discharged to the Recharge Pond to maintain a hydraulic barrier while the remainder is discharged to the Housatonic River via NPDES permitted outfall 005.

- Former Thermal Oxidizer Facility, next to Building 60-A—This facility was used to destroy recovered PCB oils piped or transported to the unit from to 1972 to 1996. The unit was regulated as a treatment, storage, or disposal (TSD) facility under the provisions of RCRA.

- LNAPL/Groundwater Recovery Systems, active pumping caissons and wells—Table 3.3.1-1 summarizes the amounts of LNAPL and groundwater extracted from the active and intermittent pumping caissons and wells. The active pumping wells and caissons in East Street Area 2 as of Spring 1998 are as follows:

  - 64S—5-ft diameter caisson with 8-in lateral collector pipes, oil skimmer and groundwater pumps.

  - 64V—2-ft diameter caisson with well screen, oil skimmer and groundwater pumps.

  - RW-1(X)—well with oil skimmer and groundwater pumps.

  - RW-2(X)—well with oil skimmer and groundwater pumps.

   - RW-1(S)—new recovery well installed in 1998 with oil skimmer and groundwater pumps.

- LNAPL/Groundwater Recovery Systems, Intermittent pumping.
   - Well 40R & 64R caisson with 8-in lateral pipes and oil skimmer and groundwater pumps.
   - 64X recovery system, consisting of the following:
      - 64X(N) caisson with oil skimmer and groundwater pumps.
      - 6X(W) caisson with oil skimmer and groundwater pumps.
      - 64X(S) caisson with oil skimmer and groundwater pumps.
      - 10-foot deep/3-foot wide collector trench with 8-in diameter lateral collector pipe between 64X(W) and 64X(S).
      - South (riverside) collector trench wall barrier — 1-ft thick clay and 60-millimeter thick HDPE liner.
- LNAPL Recovery Wells—Passive oil recovery from wells and piezometers with more than 0.25 feet of product, checked weekly. The following wells and piezometers were checked and bailed during late 1997: 13, 14, 15R, 50, 66, PZ-1 and PZ-5.
- DNAPL Recovery Wells—Passive DNAPL recovery from wells with more than 1-foot of oil, checked weekly. The following wells and piezometers were checked and bailed during late 1997 and early 1998: 5, 28, 64V, EB-25, EB-28 and ES2-6.
- Recharge Pond—100-ft by 70-ft pond used as a hydraulic barrier to LNAPL flow through groundwater mounding. Water is pumped into the pond to maintain a constant water elevation of 984 feet above mean sea level (01-0053).
- Hanging "V—Shaped" Slurry Wall—LNAPL barrier associated with recovery caisson 64V. The "V-shaped" design was intended to contain and channel LNAPL to recovery caisson 64V. The slurry wall is a 2-ft thick soil-bentonite slurry mix with a design permeability of $1x10^{-7}$ cm/sec (01-0053). It is approximately 380 feet in length and extends 22 to 24 feet below ground surface. The slurry wall does not extend down to the top of the till/silt confining layer described at the site.
- Oil-absorbent boom system (approx. 250 feet long) along north riverbank of the Housatonic with intermittent oil removal using absorbent materials. Two seep observation zones have been established within the boom area. These two zones are inspected at least 3 times per week. Seep observation Zone 1 is near well RW-1(X) and Zone 2 is near well RW-2(X).

1.3.3 OU 1—Lyman Street Parking Lot

LNAPL was observed entering the Housatonic River via seeps in the vicinity of the Lyman Street parking lot in August 1990. GE installed an oil-absorbent boom along the riverbank in this area as a short-term corrective measure. On-going weekly inspections of the riverbank, weekly inspections of the booms, and boom maintenance/replacement have been conducted since that time.

In December 1990 (four months after the seeps were noticed), LNAPL was first measured in monitoring wells. It has been detected in a total of fifteen wells and well points at the site since that time. DNAPL was first measured in monitoring wells during late 1990 or early 1991. It has since been detected in a total of seven wells at the site. A 1992 LNAPL sample analysis indicated that it contained 27,000 ppm of PCB Aroclor 1254. A 1991 DNAPL sample analysis indicates that it is composed of 9.8% to 66% PCBs, 0% to 13% polynuclear aromatic hydrocarbons (PAHs), 0.23% to 1.1% polychlorinated benzenes, 0.01% to 0.04% volatile aromatics, 0% to 0.06% volatile hydrocarbons, and 0 to 0.03% volatile solvents. The delineated LNAPL plume extent roughly corresponds to the former Oxbow Area D in the southwestern portion of the site. The DNAPL plume is also present in the southwestern portion of the site. The delineated DNAPL plume extends from the central area of the former Oxbow Area D to the western boundary of the site.

Weekly water level measurements and product thickness measurements have been taken since December 1990 through the present (March 1998). Passive removal of product with a bailer or skimmer has also occurred weekly in wells where the LNAPL thickness exceeds 0.25 ft and in wells where the DNAPL thickness exceeds one foot. In April 1992, GE secured the site by closing the parking lot and locking gates to restrict site access.

A three well recovery system is currently in operation to recover groundwater and product and to create cones of depression in order to prevent the flow of contamination to the river. The system began operation in August 1992 as a Stage A Short Term Measure (STM). Under Stage A STM the system included two recovery wells (RW-1 and RW-2) and a mobile on-site treatment system. Due to the continued presence of oil seeps, the recovery system was expanded. In November

1994, construction activities were begun for a Stage B STM, which included a below-grade water pipe to convey pumped groundwater to the 64G Groundwater Treatment Facility. Installation of this pipe was completed in early 1995. A third recovery well (RW-3) was installed and active recovery from this well began in August 1997.

Monthly inspection logs indicate that the down time for the recovery system is typically less than 0.3% per month. LNAPL and DNAPL are recovered from RW-1 and LNAPL is recovered from RW-3. No product is present in RW-2. During the twelve month period from August 1996 to July 1997, a total volume of 3,921,084 gallons of water were pumped from these three recovery wells. A total of 24 gallons of LNAPL and 40 gallons of DNAPL were pumped from well RW-1 and a total of 998 gallons of DNAPL was pumped from well RW-3 during this period. It appears that the LNAPL and DNAPL thicknesses are decreasing in the wells. The most recent data and reports reviewed (April 1998) did indicate, however, that a NAPL seep was observed on the river bank at Lyman Street during April 1998.

1.3.4 OU 5—Newell Street Area 2

In 1995, DNAPL was discovered in three deeper (35 feet total depth) monitoring wells installed less than 100 feet from the river in this area (wells NS-15, NS-30, and NS-32). Figure 3.7-1 depicts the locations of these wells. Since that time, DNAPL has been present in thicknesses up to approximately four feet in these wells. Currently, weekly monitoring and bailing of DNAPL is conducted at these wells. In addition, initiation of monitoring for DNAPL in wells NS-34, NS-35, and NS-36 was scheduled to begin in March 1998. No data was available on monitoring results from these wells.

LNAPL is observed periodically in monitoring well NS-10. GE conducts bailing of LNAPL from this well when product is observed at a thickness greater than 0.25 feet.

According to the available information, no other quarterly monitoring is conducted at Newell Street other than product removal/product measuring in the above mentioned wells. No other measures are being taken to address LNAPL, DNAPL, or related dissolved contaminants in groundwater at Newell Street.

SECTION 2

GENERAL SITE CHARACTERISTICS

2. GENERAL SITE CHARACTERISTICS

A summary of general physical site characteristics, as well as potential pathways for contamination migration that have been identified at the delineated Operable Units, are provided in the following subsections.

2.1 SITE TOPOGRAPHY

The topography of the Housatonic River Basin in western Massachusetts is characterized by rough glaciated terrain. The river and its tributaries lie in an alluvial plain with the Berkshire Hills to the east and the Taconic Range to the west. Elevations of the basin range from sea level at the river mouth in Connecticut to 2,600 feet above sea level at Brodie Mountain, Massachusetts. The elevation of the river at the Massachusetts-Connecticut border is approximately 650 feet above sea level (02-0071).

The topography near the Pittsfield GE facility is generally flat with little or no relief. Bordering areas slope mildly toward the Taconic Range to the north and west. The facility is adjacent to an area of flat and swampy land to the south and east that borders highlands rising sharply to the Tully and Day Mountains. The elevation of the river at the GE facility is approximately 972 feet above sea level and the riverbanks are at approximately 984 feet above sea level (02-0071).

Land use in the area around the GE Facility is mainly commercial and residential. The GE facility is mainly surrounded by residential areas; Brattle Brook Park, residential neighborhoods, and several schools are located inside a 1-mile radius of the facility.

2.2 SURFACE HYDROLOGY AND DRAINAGE CONDITIONS

Rainfall and melting snow are the main water sources that feed the Housatonic River system. The average annual precipitation in this river basin is approximately 46 inches per year. Approximately 24 inches per year leave the basin as runoff through the Housatonic River, another 10 inches per year escape to the atmosphere by evaporation and transpiration, while the remaining 2 inches per year infiltrate into the ground (02-0071).

The watershed of the Housatonic River and its tributaries covers 1,950 square miles. The portion of this watershed found in Massachusetts is 500 square miles. The three tributaries feeding the Housatonic River in the area of the GE Facility are Barton Brook, Brattle Brook, and Unkamet Brook. The watershed of these tributaries and the East Branch of the Housatonic River is considered a well drained area with 0.13 to 0.17 million gallons per day per square mile flowing as runoff (02-0086). Groundwater also discharges into the river in the area of the GE facility contributing to the river flow.

The flood potential of the Housatonic River Basin has been documented in various studies by the United States Department of Agriculture (USDA) Soil Conservation Service, the USGS, and the U.S. Army Corps of Engineers (USACE) (02-0071). A mapping study was performed by Blasland, Bouck & Lee (04-0004, 02-0041) between the USGS gaging station in Coltsville and the Connecticut state line. This study shows the extent of 10-year flood plains found by interpolating data from a FEMA report and using data from HEC 2 modeling. The 10-year floodplain is outlined in red on Figures 2.1-1 and 2.1-2 (02-0041) (sediment sampling results are also shown on the figure) and is quite narrow adjacent to the GE facility. Downstream of the facility within the Pittsfield City limits, the floodplain widens and includes numerous residential and commercial areas.

2.2.1 Preferential Pathways

Discharge outfalls from the different areas of the GE facility into the Housatonic River are briefly summarized here and discussed further in Section 3. The outfalls considered as potential preferential pathways are piping or drainage systems associated with stormwater sewer systems, sanitary sewer systems, utilities (potable water mains, fire protection mains, natural gas lines, and electric conduits), underground tunnels, process and product lines, and other underground piping networks. The pathways discussed here are potential pathways for migration of contaminants into the Housatonic River; further study of these outfalls is required. Although outfalls into Silver Lake are not of major importance for the purpose of this report, the outflow from Silver Lake into the Housatonic River is considered a potential source of contamination.

2.2.1.1 OU 1—Main Facility

East Street Area 1

East Street Area 1 has one stormwater drainage line that flows directly into the Housatonic River. There are also two underground sanitary sewer lines that run beneath the Newell Street Bridge (01-0155).

East Street Area 2/Oxbow H

East Street Area 2 has eleven storm sewer outfalls that flow directly into the Housatonic River and two sanitary sewer lines that run under the river. There are also three storm sewer outfalls into Silver Lake and one other underground piping network that could potentially direct contamination into Silver Lake. (01-0002).

Hill 78 Area

This area has two stormwater outfalls that drain into the city stormwater outfall. One of these outfalls flows down a swale toward the river in the vicinity of Commercial Street. (01-0051).

Unkamet Brook Area

There are three stormwater outfalls (outfalls 009, 011, and 012) that flow into small brooks that flow directly into the Housatonic River. There is one yard drain that flows into a small wetland/brook and one road drain that feeds the Unkamet Brook. One sanitary sewer line runs along the parking area and could potentially direct water into the Housatonic River along its trench. (01-0020).

Lyman Street/Oxbows D & E Area

There is one stormwater sewer outfall west of Lyman Street that could be a potential pathway for contamination into the Housatonic River. (01-0019).

2.2.1.2 OU 3—Allendale School

Surface water runoff from the Allendale School and the cap drainage system is collected in storm water catchbasins at the southwest corner of the property, which convey the water southeasterly via a 42-inch diameter reinforced concrete pipe. The 42-inch pipe conducts the water beneath the western edge of the Hill 78 Landfill to a discharge point south of Merrill Road (01-0017). The drainage continues overland, passing under the railroad grade via a 36-inch diameter culvert, and enters another 36-inch diameter culvert north of the intersection of East and Commercial Streets (03-0007). The culvert follows Commercial Street southeasterly to where it discharges to the Housatonic River (01-0017).

2.2.1.3 OU 4—Silver Lake

Silver Lake has an outfall that flows directly into the Housatonic River through a 48-inch diameter concrete conduit. This outfall could potentially contribute contamination into the river by transport of contaminants adsorbed on sediment or dissolved in water.

2.2.1.4 OU 5—Newell Street Area

Oxbow I

This area has two drainage swales adjacent to the Housatonic River on the north and east sides that feed stormwater runoff directly into the river. These sources could potentially contribute contamination into the river by erosion and transport of contaminated surface soils.

Parking Lot/Oxbow F

The GE parking lot in the west section of the Newell Street area drains to the west into a swale that empties into the Housatonic River after passing Oxbow F. This swale also carries stormwater drainage from Newell Street.

Oxbow G/Parking Lot

Oxbow G is covered by the GE parking lot. Sheet drainage flows north off the parking lot directly into the Housatonic River.

2.2.1.5 OU 6—Oxbow Areas

The preferential pathways for this area had not been fully characterized as of the February 1996 MCP Phase I and Interim Phase II report (04-0005). The MADEP comments on this report state the need for additional information depicted on plans in the Preferential Pathways Analysis section (01-0024). In general, the main pathway of concern for these filled oxbows is surface drainage/erosion to the river from unpaved soils. The following is a summary of drainage pathways briefly discussed in the February 1996 report (04-0005).

Oxbow A

There is a man-made ditch located along the south and southeast border of this area. Because the area is heavily vegetated and is sloped toward the Housatonic River, this ditch is not expected to convey a significant amount of water. The area is sloped toward the river and could contribute contamination through stormwater runoff. Heavy vegetation in this area will likely decrease overland flow.

Oxbow B

This area has extensively paved areas that will direct stormwater to the Housatonic River. The entire area is sloped, but an area of heavy vegetation slows stormwater flow. The underground outfall from Silver Lake crosses this area and could preferentially convey contamination to the river.

Oxbows C

This area has a man-made ditch in the center of the site that directs surface drainage to the Housatonic River. There are also underground sewer lines in the south and southeast portion of the site that could also act as migration pathways.

Oxbow J

This area has an open drainage channel that is well vegetated. This channel also accepts stormwater from East Street and Merrill Road. There is a parking area in this oxbow that conveys stormwater runoff directly to the river. There are also underground lines for storm sewer, sanitary sewer, and water mains.

Oxbow K

This area was not considered for preferential pathways in historic studies because no significant contamination was found in this area. This conclusion was based on limited sample data and may require further evaluation.

2.3 GEOLOGY

A discussion of the geologic conditions at the site and the surrounding area was derived from a review of regional geologic reports produced by the United States Geologic Survey (USGS), as well as from numerous engineering reports prepared by consulting firms for various portions of the GE facility.

2.3.1 Regional Geology

The GE Facility is located within the Taconic region of the New England Physiographic Province of the Eastern United States. This region is characterized by rough glaciated terrain with hilltops rising to elevations on the order of 2,000 feet and relatively narrow stream valleys. The site is located within the Housatonic River valley, one of the larger stream valleys in the region. The

Housatonic River divides the region into the Berkshire Highlands to the east and the Taconic Hills to the west.

2.3.1.1 Bedrock

The bedrock geology of the region is characterized by moderately-folded autochthonous carbonate rocks of Cambrian-Ordovician age overlain by highly-folded parautochthonous and allochthonous amphibolites, gneisses, and schists of Proterozoic (late-Precambrian) to Cambrian age. In general, the more erosion-resistant gneisses and schists form the higher elevation hills, while the valleys are underlain by the softer carbonate rocks. The Housatonic River valley is predominately underlain by various members of the Stockbridge Formation which include a variety of calcitic and dolomitic marbles with minor quartzite stringers. The upland areas to the east are composed predominantly of the basement gneisses and schists of the Berkshire massif including the Washington and Tyringham gneisses and their cover rocks including the Dalton and Cheshire metaquartzites, to name a few. The upland areas to the west of the Housatonic River valley are composed predominately of the phyllites and schists of the Nassau and Everett Formations and the Greylock Schist.

The tectonic history of this region is complex, dominated by the mountain-building episode of the Taconic Orogeny. During the late-Ordovician period, as the carbonate rocks of the Stockbridge Formation and the clastic rocks of the Dalton and Cheshire Formations were being deposited, the Proto-Atlantic Ocean (located east of the site at the time) began to close. Offshore, deep-marine rocks of the Everett and Woolumsac Formations were pushed upward and westward to form the Taconic Hills to the west of the Site. As the continental plates continued to close in the late Ordovician, older rocks (Proterozoic-Y) of the Washington and Tyringham Gneisses along with more-recently deposited Cambrian-Ordovician age rocks overlying them (cover rocks of the Cheshire and Dalton Formations) were also pushed upward and westward, forming the Berkshire massif. Subsequent uplift, erosion of the overlying cover rocks, and further (although relatively minor) deformation of these rocks during the Acadian Orogeny in the Devonian period, has resulted in the present bedrock geology.

2.3.1.2 Overburden

The overburden geology of the region is typical of continental glaciated terrain and is characterized by till-covered uplands dissected by alluvial-filled stream valleys. The glacial deposits are Pleistocene in age and include till and various alluvial deposits. The till is typically gray to dark brown depending on the locale, and moderately to very dense with varying amounts of sand, gravel and cobbles in a fine-grained (silt and/or clay) matrix. The till is typically found directly overlying bedrock in most areas and is usually exposed in the upland areas. The thickness of the till can vary widely from non-existent to over 50 feet, but is generally found to be on the order of 10 to 20 feet thick. In stream valleys, the till is typically overlain by alluvial (glacio-fluvial) deposits consisting of sand and gravel with lesser amounts of silt and clay. The composition and thickness of the alluvium is highly variable across the region, with maximum thicknesses in the range of several hundred feet in some of the deeper valleys. The glacial alluvium can be locally overlain by Recent age alluvium which represents the reworking of the glacially-deposited material by younger rivers and streams. Artificial fill is also present in widely varying textures and thicknesses in areas where cultural development is present.

The overburden deposits were initially formed approximately 10,000 to 15,000 years ago, as the Wisconsin glacial stage came to a close with the final retreat of the continental glaciers that had covered the landscape with several thousand feet of ice for nearly 100,000 years. The retreating ice sheet left the landscape covered with a relatively thin veneer of poorly-sorted material (till) that had been scoured from the bedrock surface as the glaciers advanced. The tremendous weight of the overlying ice sheet tended to compact the material into the dense till evident today. As the glacier retreated, meltwaters flowing from them eroded and redistributed the material, sorting out the various grain sizes and depositing them as glacial alluvium in different areas depending upon the energy in the system (coarse-grained material in areas of fast-flowing water, and fine-grained materials in slow-moving water or lakes). After the glaciers had retreated, precipitation falling on the landscape maintained the flow in many of the rivers and streams initially formed by glacial meltwaters. The continued flow in these watercourses tended to alternately erode and redeposit the glacial alluvium resulting in the Recent age deposits we find today. Finally, as cultural development overspread the area, man has excavated upland areas and filled lowland areas to facilitate construction of buildings and roads.

2.3.2 Site Geology

The GE Facility is located on the banks of the East Branch of the Housatonic River just north of the confluence with the West Branch in a relatively wide portion of the river valley formed by the merger of the two rivers. The Berkshire Highlands rise approximately 1,000 feet above the river to the east of the site and the Taconic Hills rise to a similar height to the west.

The bedrock in the Housatonic River valley in the vicinity of the site is mapped as predominately white, coarsely crystalline, well-layered calcitic marble of the Stockbridge Formation. Few wells have been drilled into the bedrock in this area to confirm this. However, the boring log from a monitoring well installed near Building 68 and well logs for the production wells at the adjacent Altresco facility indicate the bedrock is a calcitic marble. Bedrock is believed to be at a depth of approximately 50 feet near the southwest border of the facility, dropping to a depth of greater than 250 feet northeast of Unkamet Brook.

Overburden at the site includes till, glacial alluvium, Recent age alluvium, and fill and ranges in thickness from 50 to more than 250 feet. In general, the till overlies bedrock and is believed to range in thickness from 10 to more than 50 feet. Limited data are available with regard to the thickness of the till as very few borings fully penetrate the till. The vast majority of the soil borings and monitoring wells drilled at the site were terminated shortly after encountering the till (2 feet). The till is very dense with standard penetration test (SPT) blow counts averaging 80 blows per foot. Although somewhat heterogeneous, the till is generally described as brown silt with varying amounts of sand, gravel and clay. The gravel typically consists of angular fragments of marble bedrock. Typical grain size distribution of the till, based on sieve and hydrometer analyses, is 40% silt, 30% clay, 20% sand, and 10% gravel.

The glacial and Recent age alluvium at the site are nearly indistinguishable since there is little difference in texture. The alluvium is extremely variable in composition ranging from silty sand to coarse sand and gravel and is typically found overlying the till. The alluvium ranges in thickness from about 20 feet near Silver Lake to more than 200 feet near Unkamet Brook. Peat deposits of Recent age have also been encountered locally, typically at depth in the filled oxbows, likely representing the former bottoms of those water bodies. The alluvium is typically of medium to low density with SPT blow counts on the order of 10 to 60 blows per foot.

The fill is also highly variable in composition although the major component is sand with lesser amounts of gravel, cinders, ash, glass, brick, etc. The fill is encountered in discontinuous lenses overlying the alluvium in most developed areas of the site. The thickness of the fill varies from non-existent to more than 20 feet in some of the deeper oxbows.

2.4 HYDROGEOLOGY

A brief discussion of the hydrogeologic conditions at the site and surrounding area was derived from a review of regional geologic and hydrologic reports produced by the USGS and Massachusetts Water Resources Commission (MWRC) (01-0163), as well as from numerous engineering reports prepared by consulting firms for various portions of the GE facility.

2.4.1 Groundwater

2.4.1.1 Bedrock

Groundwater in the bedrock exists predominately in fractures. Regional tectonic events as described in Section 2.3.1, have left the bedrock in the vicinity of the site somewhat fractured and faulted, providing an extensive network of pathways for groundwater movement and storage (fracture porosity). In addition, groundwater flow though the carbonate rocks of the Stockbridge Formation has enhanced the permeability and porosity of these rocks by dissolving the fracture faces (solution porosity).

Bedrock in the vicinity of the site is used for economic purposes. The Altresco facility, located on the GE site, uses four bedrock wells screened in the Stockbridge Formation to provide cooling water for its manufacturing process. Pumping rates for the four wells range from 150 gpm to 600 gpm, indicating the Stockbridge Formation can provide significant amounts of water. Although the Town of Pittsfield uses surface water reservoirs to supply the city with potable water, residents in outlying rural areas use the bedrock as a water source (01-0163). The residential wells are typically several hundred feet deep and tap the gneisses and schists underlying the upland areas. Yields for the residential wells are typically in the range of 5 to 10 gpm.

Due to the limited number of wells screened in the bedrock, little is known about groundwater flow directions or gradients in that zone. The overlying low-permeability till unit may act as a confining or semi-confining unit for the bedrock. No information is available regarding the transmissivity of the bedrock, although from the well yield information discussed above, it is apparent that the Stockbridge Formation is significantly more transmissive than the surrounding schists and gneisses of the upland areas.

2.4.1.2 Overburden

Based on available information, groundwater in the overburden at the site is typically found in the alluvium within 5 to 10 feet of the ground surface under unconfined conditions. Overburden groundwater is not used for economic purposes in the vicinity of the site.

In general, groundwater flow in the overburden is toward the Housatonic River, which acts as the predominant groundwater discharge point for the region. Horizontal hydraulic gradients vary widely across the site, with a range of two orders of magnitude, from approximately 0.1 to 0.001. Groundwater flow direction and gradient in the overburden are impacted significantly on a local basis by the various groundwater remediation activities currently ongoing.

Numerous slug tests have been performed on monitoring wells and several long-term pumping tests have been conducted at various locations across the site. The results of these tests indicate the hydraulic conductivity of the overburden varies widely, ranging from approximately $1x10^{-6}$ cm/sec (0.03 ft/day) in the till to $2x10^{-2}$ cm/sec (680 ft/day) in the alluvium. In general, the hydraulic conductivity of the alluvium is two to three orders of magnitude greater than that of the till.

Vertical gradients in the overburden are typically upward across the site and increase in magnitude proximate to the Housatonic River. This is consistent with the observation that the Housatonic River is the regional groundwater discharge point. A year-long vertical gradient assessment was conducted in the Unkamet Brook area. It was observed that the vertical gradients remained upward throughout the year, but that small, local downward gradients can occur immediately adjacent to the Housatonic River in the shallow zone during flooding events. This temporary reversal was attributed to bank storage of surface water during floods.

2.4.2 Groundwater-Surface Water Interaction

As indicated above, the Housatonic River is the predominant groundwater discharge point for the region. This means that most groundwater within the Housatonic River basin (which includes the GE Facility) eventually discharges into the Housatonic River, either by direct subsurface flow through the river bottom sediments, or by discharging into smaller tributaries which then flow to the Housatonic River. Only groundwater that is lost to evapotranspiration, is removed by pumping, or leaves the drainage basin via underflow, does not eventually reach the Housatonic River.

Although a gaining stream (one that receives groundwater inflow) over most of it length, the Housatonic River does lose water locally in areas where it is dammed. The Woods Pond area of the river, located approximately 12 miles downstream of the GE facility is such a location. The Woods Pond Dam tends to back up flow in the river, resulting in an artificially high water level which causes a locally downward hydraulic gradient. This condition is enhanced by the pumping of three industrial supply wells near the dam.

Silver Lake, located on the southwestern boundary of the site, is connected to the Housatonic River via a drainage culvert. The water level in the lake is controlled by the elevation of the culvert invert in the lake. The lake receives groundwater inflow along its northern shore, but loses water along its southern shore as a result of ponding caused by the drainage culvert.

SECTION 3

CONTAMINANT SOURCE AREA DESCRIPTION AND ANALYSIS

3. CONTAMINANT SOURCE AREA DESCRIPTION AND ANALYSIS

3.1 GENERAL OVERVIEW

This section provides a description of identified sources of contamination at the GE Pittsfield site that could impact the Housatonic River. As previously stated, the focus is the area of the Upper Reach of the river where the time-critical Removal Action will be conducted (Newell Street to Lyman Street reach). For each OU, sources are described, existing source control measures are outlined and preliminarily evaluated, data gaps are identified, and potential impacts to the river are discussed.

The initial data review has resulted in identification of numerous source areas, the most significant of which appear to be LNAPL and DNAPL plumes adjacent to and potentially under the river, and heavily contaminated riverbank soils in the Removal Action area. Significant data gaps exist with regard to overall characterization of NAPL, contaminated groundwater, and soil/sediment in and adjacent to the river.

The following subsection outlines evaluation requirements for source control measures, arranged by source area descriptions and by OU designation.

3.2 EVALUATION REQUIREMENTS FOR SOURCE CONTROL MEASURES

There are five general categories of contaminant sources that have been identified as potentially impacting the river:

- NAPL discharge.
- Contaminated groundwater discharge.
- Riverbank soil/river sediment transport.
- Desorption/adsorption of residual riverbank and sediment contaminants.
- Direct stormwater discharge and surface runoff to the river.

Existing source control measures at the GE Facility (OU 1) and across the river at the Newell Street parking lot area (OU 5) consist of efforts to contain and/or remove LNAPL and DNAPL and associated contaminated groundwater, as well as a number of soil/sediment removal actions. These measures have included the following specific activities/mechanisms:

- Periodic monitoring of DNAPL and LNAPL levels in wells.
- Periodic manual bailing of DNAPL and LNAPL from wells.
- Containment of LNAPL using a slurry wall.
- Groundwater and LNAPL extraction by pumping.
- Riverbank soil and river sediment excavation and removal with subsequent backfill and erosion control measures.

This section describes data requirements for evaluating the effectiveness of source control measures. Several observable or measurable conditions, which could indicate the relative success of source control measures that have been or would be taken to control these sources, are summarized below.

3.2.1 Control of NAPL/Dissolved Groundwater Contaminants

The following general conditions, when met, would indicate successful control of NAPL:

- No NAPL discharge to river.
- Adequate delineation of a NAPL plume.
- Demonstration of hydraulic control of a NAPL plume or, if no active control, demonstration of areal stability of the plume over time.

Successful control of contaminated groundwater discharge to the river would be indicated by the following conditions:

- Concentrations of contaminants adjacent to and discharging to river below established thresholds for sediment recontamination and river contamination.
- Adequate delineation of plume extent.
- Demonstrated hydraulic containment of plume in vicinity of the river, or if no active controls, demonstration of plume attenuation prior to discharge to river.

To meet these above conditions, the following types of data would be necessary for both NAPL and contaminated groundwater plumes:

- Monthly or quarterly monitoring data covering a minimum of one year that can document the full extent of the NAPL and dissolved contamination. An adequate monitoring network must be in operation to meet this criterion.

- If a containment system consisting of NAPL/groundwater extraction is being operated, there should be, at a minimum, monthly performance monitoring data from the system showing extracted NAPL/groundwater volumes, hydraulic capture zones, monthly to quarterly monitoring of NAPL extent, and extent of dissolved groundwater contaminants. This data should demonstrate full containment of the NAPL such that it is not detected downgradient of the containment structure or extraction well, and capture of groundwater such that further migration of dissolved constituents is not occurring, other than those dissolved constituents located downgradient beyond the designed capture zone.

- If a slurry wall or sheet pile containment system has been implemented, there should be monthly NAPL and groundwater monitoring data from a monitoring system consisting of, at a minimum, up- and down-gradient monitoring wells, and monitoring wells at each end of the slurry wall, to show containment of NAPL and/or dissolved contaminants.

The above data requirements apply in general to both LNAPL and DNAPL. However, it should be noted that DNAPL sources are typically more difficult and costly to characterize and control.

The degree to which discharge of dissolved contaminants in groundwater to the river needs active controls will depend significantly on the potential for the dissolved contaminants to recontaminate clean sediments. This potential depends on contaminant-specific parameters such as partitioning between soil, sediment, and water on each compound of interest; compound concentrations; and the allowable concentration of the compound in the river sediment. This issue of transport of contaminants and potential recontamination of river sediments is discussed below.

3.2.2 Conceptual Soil/Groundwater Partitioning Model

Because of the ability of contaminants to sorb to fine sediment and organic material, there is a possibility that groundwater discharging into the sediments could recontaminate the sediments. Sorption is defined as the interaction of a contaminant with a solid. Adsorption refers to the production of an excess contaminant concentration at the surface of a solid. A number of factors that control sorption follow:

- Water solubility.
- Polar-ionic character.
- Distribution (sorption) coefficient.

The distribution or sorption coefficient is a measure of the hydrophobicity of an organic compound. The more hydrophobic the contaminant is, the more likely it is to partition or adsorb onto sediment.

A linear adsorption isotherm is described by the equation:

$S = K_dC$: where S is the mass of solute sorbed per dry unit weight of solid (mg/kg), C is the concentration of the solute in solution (mg/L), and K_d is the distribution coefficient (L/kg).

This relationship was used to determine the contaminant concentrations in groundwater discharging to sediments that could cause a recontamination of the sediments. The compounds that are most applicable to this approach include those compounds that are strongly sorbed. These compounds include PCBs, pesticides, polyaromatic hydrocarbons (PAHs), and metals. Volatile organic compounds (e.g., TCE and benzene) are not strongly sorbed at low organic carbon concentrations and therefore, are not expected to recontaminate the sediments through sorption. For this reason, VOCs have not been modeled.

For this model, distribution coefficients were determined based on organic carbon content. Karickhoff et al. (1979) found a strong correlation between K_d and the organic content of the sediment and defined a term K_{oc} (soil/sediment partition or sorption coefficient) where K_d is equal to K_{oc} times the organic carbon content (f_{oc}). This relationship is valid for organic carbon content down to 0.1 percent, below which the mineralogy has a greater control of sorption.

The determination of the contaminant levels in groundwater that could recontaminate sediment were based on published K_{oc} values, an organic carbon fraction of 0.1%, and sediment contaminant action levels. For PCBs, the action level used is the 1 mg/kg cleanup level discussed in the USACE workplan and EPA's preliminary remediation goal for residential areas specified in EPA OSWER Directive 9355.4-091. Table 3.2-1 presents the results of these calculations.

Table 3.2-1

Calculated Maximum Groundwater Contaminant Levels

Contaminant	Sediment Concentration (ppm)	Log K_{oc} [1]	f_{oc}	Groundwater Concentration (µg/L)	Water Solubility @ 25°C (µg/L)
PCB 1260	1	6.42	0.001	0.38	2.7
PCB 1254	1	Max 5.61	0.001	2.45	12
		Min 4.4	0.001	39.8	
PCB 1242	1	3.71	0.001	195	240

[1] Montgomery, 1991

As shown, the more highly halogenated PCBs (e.g., Aroclor 1260) are more strongly adsorbed, resulting in much lower groundwater concentrations causing sediment recontamination. For instance, groundwater that discharges to the river with PCB (Aroclor 1260) concentrations above 0.38 ppb could potentially recontaminate sediments above 1 ppm. A single model evaluation may not provide an adequate characterization of potential PCB transport. Further analysis, data gathering, and modeling will be required to better determine potential recontamination. The pending Removal Action Work Plan will present details concerning the additional data gathering, analysis, and modeling required.

3.2.3 Control of Soil/Sediment Transport

Significant PCB concentrations (well above 1 ppm) are present in soil at several locations along the two-mile stretch of riverbank and floodplain starting at Newell Street. Limited measures have been taken to mitigate the potential for direct human exposure to these soils and for their transport by erosion into the river. To evaluate whether these upstream sediment or riverbank soils could recontaminate the remediated river area, the following factors must be considered:

- Available evidence of downriver sediment transport.
- Sediment transport or erosion control measures taken to date.
- The current potential for transport of PCBs in riverbank/floodplain soils.
- PCB concentrations in riverbank soil and upstream river sediments.

Relevant data for this preliminary evaluation were taken from previous investigations by GE and are presented in the OU source area descriptions. The primary direct evidence available to evaluate sediment soil transport is actual soil/sediment sampling and analysis, observations of erosion patterns, and surface water suspended sediment measurements.

Conceptual evaluations relative to potential contaminated sediment and soil transport are provided for the various OUs as appropriate. These evaluations also consider the potential for sediment and soil transport via numerous outfalls within the OUs that discharge to the river.

3.2.4 Control of Recontamination by Desorption/Adsorption of Residual Contaminants

Residual PCBs or other contaminants in the deeper river sediment or bank soils could potentially be transported into the clean backfill sediment by adsorption onto the backfilled sediment as groundwater discharges to the river. To evaluate the potential for this to occur and result in recontamination above 1 ppm in backfilled sediment, analysis of the potential for desorption of contaminants from residual soil and into groundwater will be necessary. Evaluation of this issue will require development of a model of conditions in the subsurface below and adjacent to the river. This model will allow assessment of groundwater discharge amounts and contaminant concentrations in soil/sediment and groundwater in the vicinity of the river, quantification of soil organic carbon levels, and further evaluation of the kinetics of the desorption/adsorption reactions for PCBs and other contaminants.

3.3 OU 1—SOURCE AREAS

The GE facility contaminant source areas in OU 1 are discussed by site in the following subsections.

3.3.1 East Street Area 1

The following subsections describe source areas which have been identified within the East Street Area 1 of OU 1. Also included are available data that demonstrate the relative effectiveness of source control measures taken by GE in this area.

3.3.1.1 Identified Source Areas

Figure 3.3.1-1 shows the locations of the identified source areas at the East Street Area 1 Site. Based on previous reports, many are identified by a Solid Waste Management Unit (SWMU) number.

SWMU T-9 - Building 10 Sump Tank

Building 10 Sump Tank (UST 10-01) was a 2,600-gallon, 7-foot diameter steel UST located east of Building 10. It was installed in 1967 and served as an overflow collection tank for residual liquids from electrical apparatus testing activities performed in Building 10. There was one 6-inch opening and a single vent on top of the tank, covered by soil.

The Building 10 sump tank was leak-tested on October 23, 1986 by ConTest of East Longmeadow, Massachusetts. The test was performed at two liquid elevation levels; the results of both tests indicated that the tank was leaking. GE immediately initiated system checks and a vent pipe to the floor drain pipe system was found to be loose and was repaired. The tank was retested on November 12, 1986 by ConTest and the results were within compliance limits of National Fire Protection Agency (NFPA) 329 standards for a tight tank. The tank was retested in 1987, 1988, 1989, and 1990 and found to be in compliance each time. The tank was removed in June 1994.

Prior to removal in June 1992, five discrete water grab samples were collected from UST 10-01. Two samples were analyzed for PCBs and three samples were analyzed for oil and grease. PCB concentrations ranged from 1.7 to 2.1 ppm, while oil and grease concentrations ranged from 2.8 to 2,240 ppm.

One soil composite sample and 15 discrete soil grab samples were collected as part of the removal of UST 10-01. The composite sample was collected at a depth of 0 to 3 feet and was analyzed for TCLP metals. No metals were present at levels above detection in the composite sample. The grab samples were collected at various depths from 0 to 3 feet and were analyzed for PCBs and TPHs (see location E on Figure 3.3.1-2). Measurable levels of PCBs and TPHs were detected in all 15 samples. PCB concentrations ranged from 250 to 1,050 ppm and TPH concentrations ranged from 61 to 360 ppm. The contents of UST 10-01 (oil and water) were also sampled for PCBs. The oil fraction contained 2 to 5.1 ppm PCBs and the water samples contained 0.005 to 0.301 ppm.

Surface soils were sampled at locations ES1-5 and ES1-6 in 1996 for the Phase II/RFI investigation (see Figure 3.3.1-3). At ES1-6, concentrations of PCBs at 120 and 970 ppm were detected in the depth intervals of 0 to 0.5 feet and 0.5 to 2 feet, respectively. At ES1-5, the concentration of PCBs was 100 ppm in the 0- to 2-feet depth interval. Surface soil samples were not analyzed for any other analytes.

The Building 10 Sump Tank appears to have been the source of the surface soil "hot spot" for PCBs in the vicinity of Building 10. Contaminated surface soil from this area could potentially reach the Housatonic River via the stormwater system

SWMU T-61 - Building 12F Tank Farm

The building 12-F tank farm was used for underground storage of mineral oil dielectric fluid as part of the facility's overall oil storage and distribution system. A total of 14 underground tanks were located in this area, ranging in size from 20,000 gallons to 25,000 gallons. One 100,000-gallon-capacity AST was also located in this area. It is believed that these tanks were installed in 1918, 1925, and 1947. While these tanks reportedly were not used for the storage of PCB-containing fluids, some residual PCBs had been detected during previous sampling and analysis efforts. The presence of PCBs in this area has apparently resulted from limited interconnections between PCB and mineral oil distribution systems. Each of the USTs were removed in 1964. Releases from these tanks are reportedly the sources of floating product at the site, and the potential for the observed floating product to reach the river via preferential pathways needs to be assessed further.

Surface soils were sampled at locations ES1-7, ES1-8, and ES1-9 in 1996 for the Phase II/RFI investigation (see Figure 3.3.1-3). Surface soil concentrations of PCBs ranged from 0.34 to 2.2 ppm. Surface soil samples were not analyzed for any other analytes. During previous MCP investigations, ES1-2 and ES1-3 were sampled to characterize surface soil conditions in this area. PCB concentrations ranged from 0.41 to 2.9 ppm.

SWMU T-W - Building 9G (UST 9G-01)

This SWMU consists of a 5,000-gallon steel UST (UST 9G-01) located in the area west of Building 9G and south of Building 9. The tank was installed in 1948 and contained 10C mineral oil. Site inspection notes indicate that in 1985 the tank was pumped of its contents. A small amount of residual product was found inside the tank and subsequently sampled by Blasland, Bouck & Lee (BB&L) and submitted for PCB analysis. PCBs were detected in the sample at a concentration of 100 ppm. In February 1990, the tank was cleaned and subsequently closed in May 1990 by filling it in place with a concrete slurry.

Soil was sampled for PCBs at location ES1-10 (see Figure 3.3.1-3) and the highest concentration detected was 0.52 ppm at 0 to 2 feet in depth. Surface soil samples (0 to 2 feet depth) were not analyzed for any other analytes.

It appears that this tank has not adversely impacted soils in the vicinity, based on the limited data available.

SWMU T-NN - Building 14 UST (UST 14-03)

Building 14 UST 14-03 is a 6,000-gallon UST located south of Building 14E. The tank was installed in 1963 and was used to store Solvesso-100 (a solvent blend of alkylated benzene (greater than 96%) and saturated hydrocarbons [less than 4%]) until 1976, when the tank was taken out of service. The UST was found to be sand-filled during a pre-excavation inspection for the Altresco Steam Line strain-pole braces by BB&L in August 1989.

The following two samples were obtained for PCB analysis in August 1989: an aqueous sample from the water which had collected in the manway to the tank, and a soil sample from the fill material excavated from the manway. PCBs were detected in the aqueous sample at a concentration of 0.22 ppm and in the soil sample at a PCB concentration of 29 ppm.

Surface soils were sampled at location ES1-11 in 1996 for the Phase II/RFI investigation (see Figure 3.3.1-3). Two other samples were analyzed for PCBs at locations E1 and F1. PCBs ranged from 1.2 to 1.6 ppm at those locations. PCBs were detected in surface soil samples collected for the Altresco Steamline soil assessment. PCB, TCE, and PCE have also been detected in the deeper soils along the Altresco streamline and the nature and extent of the deeper soil contamination have not been characterized. PCB concentrations in the Altresco surface soil samples ranged from 4.5 to 1,500 ppm, but it is likely that this surface soil "hot spot" for PCBs is due to contaminated fill since the area was extensively filled between 1941 and 1952.

SWMU T-26 - Extension Drain Tank (UST 14-04)

This SWMU consists of a former 5,000-gallon fiberglass UST, referred to as the Building 14 Extension Drain Tank (UST 14-04), which was located south of Building 14E and east of Building 14H. It was installed in 1973 and was used to store waste aqueous phosphate (phosphoric acid) and other residuals used for cleaning transformer radiators in Building 24H. This tank was taken out of service in 1984 and was removed in late 1989.

Removal activities were initiated for the UST 14-04 in August 1989 and an aqueous sample was collected from inside the tank and analyzed for PCBs. This sample, described as wash water, contained PCBs at a concentration of 0.042 ppm. Tank removal activities involved the excavation of the concrete slab and subsurface soils, followed by the removal of the UST. Excavated material was sampled and contained less than 5 ppm PCBs (see location G on Figure 3.3.1-2).

Underground Pipes, Outfalls, and Tunnels

The underground pipes, outfalls, and tunnels were addressed as potential sources/pathways of migration in the "Assessment of Potential Preferential Pathways in East Street Area 1/USEPA Area 3" (BB&L, November 1996). The assessment involved two phases as follows: (1) identification and location of underground pipes/tunnels, which could serve as preferential migrations pathways, and (2) evaluation of potential for off-site migration of hazardous constituents via these pathways. Pipelines/conduits/tunnels that were identified in the first two phases as requiring further evaluation were retained for Phase III evaluation. This involves further investigation of the migration of hazardous materials due to the identified preferential pathways. Pipelines retained for Phase III evaluation are discussed below and are shown on Figure 3.3.1-4. Results of the Phase III evaluation have yet to be reported.

Sanitary Sewer and Stormwater Drainage Pipelines

Three sanitary sewer pipelines and six stormwater drainage lines were retained for Phase III evaluation (see Figure 3.3.1-4). These were identified as having pipeline inverts below the water table and thus could potentially be subject to infiltration and could convey stormwater off-site or lead to downgradient stormwater pipelines which convey stormwater off-site. The six stormwater drainage pipelines at the site ultimately lead to the Housatonic River Outfalls 005, 05A, 006, 06A, and SR-5 west of the site and Outfall 007 east of the Site. Additionally, a small diameter city stormwater pipeline near Milan Street discharges to a non-permitted outfall south of Lombard Street. The three sanitary sewer pipelines lead to a siphon system located at the Newell Street Bridge, which conveys sanitary flow under the Housatonic River to a 42-inch pipeline on the south side of the river.

Process/Product Lines

Six process/product lines (see Figure 3.3.1-4) were retained for Phase III analysis because they conveyed or could convey hazardous materials (mostly fuel oil and 10-C oil). GE Facility records relating to UST/pipeline closure activities were reviewed as part of the Phase III evaluation to determine the closure status of these pipeline systems and the potential to release hazardous materials to subgrade.

Other Piping Networks

Additionally, a 6-inch french drain line (see Figure 3.3.1-4) was identified for Phase III evaluation. The drain line could provide a preferential flow path for free product detected in the past in the vicinity of monitoring well 60.

NAPL/Groundwater Plumes

DNAPL has not been detected at the site and LNAPL exists in isolated pockets in the vicinity of the Northside and Southside Recovery Systems. Due to detections of TCE, PCB, and PCE along the Altresco pipeline and near well RF-13, additional DNAPL investigation may be necessary to characterize the site. LNAPL extent is discussed in Subsection 3.3.1.4.

3.3.1.2 Groundwater Contamination Plumes

Groundwater concentrations of VOCs, SVOCs, and metals are relatively low throughout most of the site and there are reportedly no reliable PCB data available for groundwater. Groundwater data are shown on Figure 3.3.1-5. Monitor wells E1 and F1 were sampled in 1990; wells ES1-1, ES1-2, ES1-3, ES1-4, RF-13, and the Northside and Southside caissons were sampled under MCP Phase II in 1991; and wells ES1-18, ES1-19, and ES1-20 were sampled to supplement Phase II data in 1996. Wells ES1-18, ES1-19, and ES1-20 were sampled to provide background water quality data.

A limited number of monitoring wells were sampled prior to the MCP investigation. On various dates in 1979 and 1980, 75 groundwater samples were analyzed for PCBs. PCBs were detected in 14 of the 75 samples, ranging in concentration from 0.00003 to 0.743 ppm. It is suspected, however, that these results reflect traces of PCB-bearing oil in the samples analyzed rather than actual concentrations of PCBs dissolved in groundwater and that these results are of limited use (01-0056).

Chlorinated VOCs were detected in well RF-13 (1,2-DCE and TCE at 0.13 and 0.14 ppm, respectively) at appreciable concentrations. Chlorinated benzenes were detected in well ES1-4 and the Southside caisson. DNAPL has not been detected in any of the wells monitored.

Despite the fact that groundwater has been in long-term contact with floating oil in this area, the associated groundwater quality in the sampled wells does not show appreciable concentrations of constituents associated with the floating oils. This could be due to the fact that wells closer to the remaining floating oil have not been sampled. A sample of LNAPL from the Northside caisson was analyzed and found to contain PCBs at 91 ppm, chromium at 2 ppm, and zinc at 120 ppm.

3.3.1.3 Data Gaps

Data Gaps Identified by GE Consultants

BB&L has proposed the following additional investigations that could help determine if East Street Area 1 contaminant sources pose a threat to Housatonic River sediments.

- The extent of PCB concentrations within 0 to 2 feet depth interval around former UST 10-01 has not been defined; however, three surface soil samples have already been proposed by BB&L. Additional surficial soil samples do not appear to be warranted and have not been proposed for the Buildings 9 and 14 USTs or the Building 12F Tank Farm.

- Several stormwater and sanitary sewer pipelines warrant more investigation as potential pathways. BB&L proposed to evaluate potential off-site migration via stormwater or sanitary sewer pipelines and/or bedding material by conducting outfall, soil/groundwater, and free product investigations.

- Outfall investigations have been proposed by BB&L to include monthly visual inspections noting any presence of free product and a review of the 1995-1996 NPDES Discharge Monitoring Reports, and stormwater discharge data contained in GE's NPDES permit applications for the outfalls. These data will be reviewed with respect to presence or potential infiltration of hazardous materials into the pipelines.

- Soil/groundwater investigations have been proposed by BB&L to assess potential of soils and groundwater to contribute to off-site migration of hazardous constituents. To support this end, existing soil and groundwater data (both analytical and hydrogeologic) will be reviewed. Rising head slug tests are also proposed for 25 wells and hydraulic conductivities derived from these tests will be compared to estimated hydraulic conductivities of pipeline backfill to assist in identifying preferential flow pathways.

- Free product investigations have been proposed by BB&L to consist of inspection of select accessible stormwater and sanitary manholes for the presence of free product in those areas where groundwater was above or within 0.5 feet of pipeline inverts.

Groundwater and LNAPL

The groundwater cone of depression and oil extent and thickness directly south of the Southside caisson is not defined due to lack of monitoring wells; the closest well downgradient of the Southside Recovery System is well ES1-23 which is located approximately 300 feet south east of the Southside caisson. Groundwater elevation and oil thickness data from a new monitoring well approximately 100 feet due south of the Southside caisson is needed to help define the cone of depression and the extent of oil. Additional groundwater sampling between East Street and the Housatonic River and in the northeast section of the site near well RF-13 is also recommended.

Lakewood Residential Area

There is evidence of filling in the Lakewood residential section of the site and recent sampling of surficial soils on some properties indicates that some of these residential properties are contaminated. Additional soil sampling should be conducted in this area, according to MADEP, particularly since it is located close to the Housatonic River.

3.3.1.4 Effectiveness of Existing Source Control Measures

Operations of the Northside Oil Recovery System (see Figure 3.3.1-5 for location) between 1979 and 1986 resulted in oil recovery from the plume. As a result, the main plume decreased in size and the remaining oil occurred in several "pockets". GE decided to supplement the existing recovery system with construction of another groundwater recovery system in 1986 to address the scattered nature of the remaining oil "pockets" more effectively.

The supplemental recovery system initiated in 1986 (referred to as the East Street Area 1 - Southside Oil Recovery System) is located on the south side of East Street, approximately 500 feet east of the intersection of Newell and East Streets (see Figure 3.3.1-5). Similar to the Northside Recovery System, this system consists of a perforated precast concrete caisson, an oil skimming device, and a groundwater depression pump.

In August 1990, GE supplemented the "active" oil recovery program at the Northside and Southside caissons with a "passive" oil recovery program involving removal by manual bailing on a weekly basis where oil accumulations were detected during periodic monitoring of wells in the past. If oil thickness of 0.1 foot or greater was detected, manual bailing was initiated.

Overall Effectiveness of the Oil Recovery Systems

Table 3.3.1-1 shows the amounts of oil and water removed from the Northside Oil Recovery System, the Southside Oil Recovery System, and from passive recovery between March 1997 and March 1998 (most recent data available). A total of 15 gallons of oil were removed at the Northside system, 63 gallons were removed at the Southside system, and 1.575 gallons were removed by passive recovery from wells 34, 72, 105, and 106. Since 1994, yearly totals of oil recovered from oil recovery systems at East Street Area 1 have remained essentially the same, ranging from 60 to 80 gallons of oil recovered per year. Pumping downtime at both recovery systems has been generally less than 2%. Although in December 1994, downtime was 10.8 % at the Southside Recovery System due to pump failure.

The overall area and thickness of oil appears to have decreased since implementation of the source control measure. Oil thickness is generally less than 0.8-foot thick (after bailing stagnant oil). Figure 3.3.1-6 shows the extent of the oil plume in October 1983. Figure 3.3.1.7 shows the extent of the oil plume in October 1997. Comparison of the two maps shows that the oil recovery systems have been effective in reducing the extent and thickness of the oil plume. Oil appears to currently exist in several isolated pockets at least 400 feet from the Housatonic River. Based on the available data, it is unlikely that the isolated oil plumes will migrate to the Housatonic River, however, additional review of the monitoring system and hydraulic control are warranted.

3.3.1.5 Potential Impact on River Sediments

Surface soil (0-2 feet depth) could provide a source of chemicals to river sediments via surface runoff. Although metals, VOCs, and PAHs were not detected at levels of concern in the surface soil, two "hot spots" of PCBs exist in the surface soil (see Figure 3.3.1-3). These "hot spots" are located near manholes and catch basins and could be transported to the river via stormwater drains.

Constituents present in the remaining oil pockets floating on the groundwater at the site may act as sources of constituents to groundwater due to oil being in direct contact with groundwater. The transfer of constituents from oil to groundwater would be expected to be less than that observed for the more water-soluble compounds such as VOCs and low-molecular-weight PAHs.

Table 3.3.1-1

Active Recovery System Summary March 1997 to March 1998

Month	Northside Caisson		Southside Caisson		Passive Recovery Wells
	Volume Oil Collected (gal)	**Volume Water Recovered (gal)**	**Volume Oil Collected (gal)**	**Volume Water Recovered (gal)**	**Volume Oil Collected (gal)**
March 1997	10	25,100	10	70,550	0
April 1997	1	42,500	0	97,570	0.088
May 1997	0	33,100	0	77,940	0.145
June 1997	0	23,500	0	72,120	0.014
July 1997	0	24,400	13	82,390	0.013
August 1998	0	20,400	12	71,210	0.25
September 1997	2	20,000	3	69,670	0.137
October 1997	0	22,700	0	74,280	0.285
November 1997	2	20,100	0	64,180	0.298
December 1997	0	34,600	25	87,840	0.267
January 1998	0	39,000	0	75,780	0.005
February 1998	0	30,200	0	64,640	Information not available
March 1998	0	37,200	0	78,530	0.073
Total	**15**	**372,800**	**63**	**986,700**	**1.575**

Therefore, the route most likely for subsurface migration of PCBs and other chemicals with low water solubility is via the oil rather than in a dissolved phase in groundwater. Oil is currently present at the site in a few isolated pockets (see Figure 3.3.1-7), which are approximately 400 feet from the Housatonic River, and migration via this route to the river is not likely. Migration of oil directly to the river could be enhanced by transport via sanitary sewers or stormdrain pipelines. Of particular concern are oil detected in vicinity of wells 45/76, which could migrate via sanitary sewer pipelines to outfall 007, and oil detected in wells 54/72 which could migrate via sanitary sewer pipelines to outfall SR5.

Since movement of groundwater beneath this site is primarily in a southerly direction toward the Housatonic River, transport of constituents from groundwater to river sediments is considered a potential migration pathway. The available groundwater concentrations data south of East Street appear to be minimal. Additional groundwater data south of East Street would help characterize potential groundwater impacts to the river.

One remaining potential pathway for constituents to migrate to the river is via the air pathway. Surface soils could provide a source of chemical to the atmosphere via volatilization or dust migration. The presence of buildings, extensive pavement, and vegetation at this site limits the extent to which dusting and volatilization would occur. If soil were disturbed during excavation activities, the potential for transport via volatilization or dusting would be greater. Excavation protocols address releases of dusts from on-site excavations and define appropriate measures to mitigate potential chemical migration associated with on-site excavation.

3.3.2 East Street Area 2

3.3.2.1 Identified Source Areas

East Street Area 2 is the western portion of the main GE facility in Pittsfield. Manufacturing processes involved in transformer, ordnance, and plastics operations were conducted extensively in this area (01-0024). GE has owned the property since 1903. Berkshire Gas Company also operated a coal gasification plant within the East Street 2 Area from 1902 to 1973 (see Figure 3.3.2-1). Over the years, GE has installed and operated significant numbers of ASTs, USTs, and piping that handled the chemicals and fuels needed in the various manufacturing processes (see

Figure 3.3.2-1). Through leaks and spills from these operations, various chemicals and oils have been released to the soil and groundwater at the site. The identified contaminant source areas at East Street Area 2 include the original tanks, pipelines, and operations areas, plus delineated areas of LNAPL, DNAPL, and soil contamination. Table 3.3.2-1 and Figure 3.3.2-1 summarize the potential contaminant source areas previously identified at East Street Area 2 (01-0024).

Based on potential impact on Housatonic River sediment, the primary contaminant sources of concern at East Street Area 2 are the following:

- Contaminated soils along the Housatonic riverbank.
- Oxbow H contaminated fill materials.
- Primary LNAPL plume and riverbank oil seeps.
- Building 68 riverbank DNAPL plume.
- DNAPL areas identified under/near the primary LNAPL plume.
- Contaminated surface/subsurface soils.

Riverbank Soils

The erosion of contaminated riverbank and floodplain soils into the Housatonic River is a potential concern. The riverbank surface soils (0 to 2 feet bgs) from Newell Street Bridge down to the foot bridge near the western end of East Street Area 2 are contaminated with PCBs at concentrations exceeding 1 ppm. Surface soil samples collected along the East Street Area 2 riverbank exceeded 1 ppm. The highest concentrations (up to 622 ppm) were detected near Building 68, starting from the end of the railroad tracks and extending downstream to the foot bridge. Generally the PCB concentrations decrease with depth and in most locations decrease to near or below 1 ppm at between 6 and 10 feet bgs. Figure 3.3.2-2 identifies the riverbank areas with PCB concentrations exceeding 20 ppm. Removal of PCB-contaminated riverbank soils in the vicinity of Building 68 was conducted by GE in 1997/1998, but significant amounts of contaminated soils remain.

Oxbow H Fill Material

Oxbow H (see Figure 3.3.2-1) was filled in using soil and solid wastes from the GE Facility, Berkshire Gas, and potentially other sources beginning in the late 1930s and continuing through 1973. The area of the former oxbow is approximately 1.5 acres and the fill materials range from

Table 3.3.2-1
East Street Area 2
Contaminant Source Area / SWMU Summary

Operable Unit	Area / Site ID	EPA ID	Source or SWMU ID	Source Description
OU 1	East Street Area 2	4	G-1	Building 60 Drum Storage Area
			G-2	Scrap Yard
			G-7	Old Coal Gasification Plant Storage Tank Area
			G-8	Oxbow H Fill Area
			G-10	Bldg. 60 Tank Truck Area
			G-13	Bldg. 64-W Oil/Water Separator
			G-14	Bldg. 64-X Oil/Water Separator
			G-15	Bldg. 64-Z Oil/Water Separator
			G-16	Bldg. 31-W Oil/Water Separator
			T-2	Bldg. 11 Interceptor Tank
			T-5	Bldg. 3C Yard Former Oil/Water Separator
			T-6	Bldg. 3C Vault
			T-23	Bldg. 12X Emergency Overflow Tanks
			T-50	Bldg. 12G Pyranol Unloading Station & Storage Area
			T-42	Bldg. 68 Drainage Pits
			T-63	Bldg. 61 Phenolic Dust Baghouse
			T-65	12Y Rainwater Sump
			T-D	Bldg. 29 Transformer Oil Transfer Area
			T-O to T-T	Bldg. 3C, 6 USTs, 3C-01 to 3C-06
			T-U, T-V, T-A1	Bldg. 7, 3 USTs, 7-01, 7-02, 7-04
			T-19	Bldg. 12T, UST 12T-01
			T-LL, T-MM	Bldg. 14, 2 USTs, 14-01 and 14-02
			T-OO to T-UU	Bldg. 11, 7 USTs, 18-01 to 18-07
			T-VV	Former Bldg. 24/GE Parking Lot, UST 24A-02
			T-WW to T-YY	Former Bldg. 26, 3 USTs, 26-01, 26-02, 26F-01
			T-ZZ, T-AAA	Former Building 26, 2 USTs, 29-02, 29-03
			T-BBB to T-DDD	Bldg. 33, 3 USTs, 33-01, 33A-01, 33A-02
			T-GGG to T-KKK	Bldg. 61, 5 USTs, 61-01 to 61-05
			T-LLL to T-OOO	Bldg. 61, 4 USTs, 62-01 to 62-04
			T-PPP , T-QQQ	Bldg. 64Y, 2 USTs, 64Y-01, 64Y-02
			-	Building 68 Spill Area
			-	LNAPL Mobile and Residual
			-	DNAPL Mobile and Residual
			-	Groundwater Contaminant Plumes
			-	Underground Pipes, Outfalls & Tunnels

SWMU - Solid Waste Management Unit

7 to 18 feet in thickness. The fill material contains assorted debris, including bricks, wood, glass, and coal slag. A black oil staining with a hydrocarbon odor was noted throughout the fill materials. Within the oxbow fill area between the recharge pond and the Housatonic River, DNAPL was detected in well ES2-6. It appears from the composition of the oil (high PAH concentrations and no PCBs detected) that the DNAPL is probably related to the coal gasification wastes within the oxbow fill (see Table 3.3.2-2).

In general, PAHs have been detected throughout the oxbow but PCBs appear to be primarily concentrated on the western arm of the oxbow. The northern section of the oxbow, nearest the former coal gasification plant, has the highest PAH concentrations (797 ppm total SVOCs, mostly PAHs). PCB concentrations in the oxbow fill range from non-detected to over 4,500 ppm. In general, the PCB concentrations decrease with depth, except where LNAPL plumes have been delineated.

Primary LNAPL Plume and Riverbank Oil Seeps

A large LNAPL plume containing PCBs (Aroclors 1254 and 1260), PAHs, dioxins, and dibenzofurans has been delineated at East Street Area 2 (see Table 3.3.2-2 for composition). The plume dimensions measured during October 1997 were approximately 1,200 feet long and up to 900 feet wide with LNAPL thickness (as measured in wells) ranging up to 4.3 feet (see Figure 3.3.2-3, 01-0031). Prior to GE's implementation of interim remedial measures, LNAPL seeps discharged oil into the Housatonic River south of the V-shaped slurry wall and the recharge pond (see Figure 3.3.2-1). Figure 3.3.2-4 shows the extent of the measured LNAPL plume in 1989 (01-0167). A comparison of this figure with the 1997 oil map (Figure 3.3.2-3) shows the decreasing size of the mobile LNAPL and gives an indication of the minimum area of residual LNAPL in soil. With the implementation of interim measures by GE, the LNAPL seeps are reported to have decreased in number and to have become intermittent. The size of the measured LNAPL plume has also been reduced over the years due to the interim remedial measures (see Subsection 1.3).

Table 3.3.2-2
East Street Area 2
Summary of LNAPL & DNAPL Sample Results

Analytical Parameter	Caisson 64V LNAPL	Caisson 64V DNAPL	Monitoring Well ES2-6 DNAPL	Caisson 64S LNAPL	Monitoring Well 5 DNAPL	Monitoring Well EB-25 DNAPL
VOLATILE ORGANICS (ppm)						
Benzene	190	---	---	---	---	---
Chlorobenzene	250	---	---	540	---	ND(50)
Ethylbenzene	800	700	3,700	64	---	---
Toluene	---	ND	250	---	---	---
1,2,4-Trimethylbenzene	---	ND	1,700	---	---	---
Xylenes (Total)	830	2,900	2,900	71	---	---
2-Butanone	170	---	---	100	---	---
SEMIVOLATILE ORGANICS (ppm)						
Acenaphthene	10,300	15,000	18,000	546	---	ND(12,000)
1,3-Dichlorobenzene	---	---	---	477	8,600	ND(12,000)
1,4-Dichlorobenzene	1,325	---	---	---	37,000	ND(12,000)
1,2,4-Trichlorobenzene					370,000	190,000
2.6-Dinitrotoluene	2,480	---	---	---	---	---
Fluoranthene	6,238	9,900	13,000	305	---	ND(12,000)
Naphthalene	49,270	34,000	75,000	7,700	---	---
Benzo(a)anthracene	3,410	4,900	6,800	---	---	ND(12,000)
Benzo(a)pyrene	1,623	4,200	4,900	---	---	---
Benzo(b/k)fluoranthene	1,954	4,300	8,100	---	---	---
Chrysene	2,405	3,700	5,400	---	---	ND(12,000)
Acenaphthylene	987	2900	5,500	270	---	---
Anthracene	4,173	6,500	9,200	---	---	---
Fluorene	6,405	---	---	---	---	---
Phenanthrene	22,090	26,000	39,000	1,592	---	---
Pyrene	8,666	15,000	29,000	516	---	ND(12,000)
1-Methylnaphthalene	11,970	---	---	1,539	---	---
2-Methylnaphthalene	8,555	11,000	28,000	951	---	---
Hexachlorodibenzodioxin	---	---	---	0.0027	---	---
Heptachlorodibenzodioxin	M	---	---	0.0031	---	---
Octachlorodibenzodioxin	0.00086	---	---	0.006	---	---
Hexachlorodibenzofuran	M	---	---	0.005	---	---
Octachlorodibenzofuran	0.0024	---	---	0.0207	---	---
Heptachlorodibenzofuran	M	---	---	0.0065	---	---
Pentachlorodibenzofuran	M	---	---	---	---	---
PESTICIDES/PCBs (ppm)						
PCBs (Total)	---	---	---	---	570,000	---
Aroclor 1260	14,000	---	---	53,000	---	613,000
Aroclor 1254	---	---	---	500	---	---
Aroclor 1242	---	---	---	500	---	10,700
METALS (ppm)						
Arsenic	1.8	---	---	0.39	---	---
Chromium	---	---	---	0.97	---	---
Copper	---	---	---	1.9	---	---
Nickel	3	---	---	---	---	---
Zinc	3	---	---	---	---	---
SPECIFIC GRAVITY	---	1.03	1.03	---	1.3	---

M - Compound detected but lab could not quantify
--- Results not reported or no analysis
ND (5) - Not detected (detection limit)

Building 68 Riverbank DNAPL Plume

During sediment excavation activities conducted in the Housatonic River adjacent to and downriver from Building 68, DNAPL was detected seeping into excavation cells 5 and 6 (01-164). Subsequent investigations identified the DNAPL as containing Aroclor 1260 and located the DNAPL plume at wells 3-6C-EB-25 and -28 along the riverbank (see Figure 3.3.2-5). Table 3.3.2-2 summarizes the DNAPL composition at monitoring well EB-25. The DNAPL thickness measured in well EB-25 has ranged up to 1.08 feet and the specific gravity of the oil was measured at 1.55 g/ml. The elevation of the DNAPL is approximately 963 feet msl, which corresponds to the top of the site till unit, approximately 5 feet below the bottom of the Housatonic River at that location (see Figure 3.3.2-6).

The till unit slopes toward the river near Building 68 (see Figure 3.3.2-6), so any DNAPL flow along the top of the till unit would move southward under the river toward the Newell Street OU. Site investigation and remediation activities by GE are ongoing in this area. Additional DNAPL investigations and remedial actions have been proposed for the Building 68 DNAPL area.

DNAPL Areas Identified Under/Near the Primary LNAPL Plume

DNAPL has been identified at several well locations along the eastern edge and within the large LNAPL plume identified at East Street Area 2. Measurable DNAPL thicknesses have been reported in wells 5, 28, ES2-6, ES2-17, and recovery caisson 64V at the top of the till layer beneath the site (GE monthly reports). The composition of the DNAPL in several of these wells is presented in Table 3.3.2-2. According to MADEP records, however, analyses of samples from all DNAPL areas have been conducted by GE, and the results are available in MADEP files. These 4 wells are isolated, and subsequent investigations have not identified DNAPL in surrounding deep well locations. Figure 3.3.2-5 shows the identified DNAPL locations in East Street Area 2. The general trend of the top of till surface is southward toward the Housatonic River so the DNAPL could potentially move down toward the river along the till surface.

Contaminated Surface Soils

PCB surface soil contamination delineated across East Street Area 2 is concentrated above the area of the identified LNAPL plume and the scrap yard area near Building 68 and the western arm of Oxbow H (where strong magnetic anomalies have been detected) as shown on Figure 3.3.2-2. There are several areas with surface soil PCB concentrations exceeding 4,000 ppm. With the exception of the soils along the riverbank, the surface soils should not pose a threat to the Housatonic River sediment unless stormwater runoff carries sediment into the facility storm sewer system that discharges into the Housatonic River at multiple locations. Figure 3.3.2-7 identifies the storm sewer and wastewater outfalls along the river in East Street Area 2 (01-0024). PCB-contaminated sediment has been routinely removed from the oil/water separators that handle the combined stormwater and process water flow that is discharged to the Housatonic River so the transport of contaminated surface soils by stormwater needs to be characterized.

3.3.2.2 Groundwater Contamination Plumes

The groundwater contamination data for East Street Area 2 appear to be limited based on the information presented in the available site reports. No groundwater contaminant plume maps were presented in the East Street Area 2 reports reviewed for this document. With the large areal extent of mobile and residual NAPL at the site, the collection of groundwater samples without product is difficult and it appears that only limited groundwater sampling has been conducted.

Some groundwater samples were collected along the Housatonic riverbank in 1994 (01-0024) at the following nine wells in key locations covering the East Street Area 2 riverbank: ES2-1 through ES2-4, ES2-7, 43, 54, 63, and 64. Figure 3.3.2-8 shows the locations of the nine wells along the riverbank. All nine wells are shallow with screens set above the till layer. Well ES2-4 is critical because it monitors the Building 68 area and wells 63 and 54 monitor the zone where LNAPL seeps have been observed south of the slurry wall. Well 43 is located in the Oxbow H fill downgradient of the Recharge Pond. Groundwater concentrations in these wells are important due to their proximity to the Housatonic River and the upward vertical groundwater flow gradients measured along the river. Groundwater flow in East Street Area 2 is predominantly southward (01-0002) toward the Housatonic River (see Figure 3.3.2-9) potentially carrying dissolved and LNAPL contamination directly into the Housatonic River. Groundwater flows up into the river water through the existing riverbed, where groundwater contaminants could partition onto the fine grained river sediments.

The groundwater samples collected at the nine wells were analyzed for MCP Appendix IX+3 VOCs, SVOCs, and metals analytes (01-0024). No PCB or pesticide groundwater analytical data were presented for these nine locations. Chlorobenzene and benzene were the two most common VOCs detected in the wells. Chlorobenzene and benzene were detected at five of the nine wells with maximum concentrations of 0.870 ppm and 0.140 ppm, respectively, detected at well 64. Chlorinated solvent compounds were also detected in several of the wells with the highest concentrations detected in well 64 (1,1,1-trichloroethane at 11.0 ppm; 1,2-dichloroethene (total) at 5.4 ppm and trichloroethene at 1.2 ppm).

Most of the SVOC compounds detected in the nine wells were PAHs with the highest concentrations detected in well ES2-2 (0.758 ppm total SVOCs). Sixteen PAH target compounds were detected in well ES2-2 with acenaphthene and phenanthrene detected at the highest concentrations (0.100 and 0.098 ppm, respectively).

Several metals were detected at groundwater concentrations exceeding MCP GW-3 standards in the nine wells. Lead (0.31 ppm), nickel (0.26 ppm), and zinc (3.2 ppm) exceeded MCP criteria and mercury was detected at 0.00027 ppm in well 43. Potential sources of the metals detected at well 43 are the Oxbow H fill and the Recharge Pond.

3.3.2.3 Data Gaps

The East Street Area 2 environmental investigations have produced a significant amount of data and information on the conditions at the site; however, there are various data gaps that need to be addressed to ensure that contaminant sources do not continue to affect the Housatonic River. The following list of data needs focuses only on sources that may recontaminate the river sediments:

- Systematically investigate the potential occurrence of as yet undetected DNAPL areas below the Housatonic River and along the riverbank.
- Locate PCB groundwater data for East Street Area 2 or collect additional samples for analysis.

- Better define the vertical and horizontal extent of the detected DNAPL areas, especially under the river and along the riverbank at Building 68. Also define residual DNAPL extent and impact at Building 68 Area.
- Conduct comprehensive groundwater sampling and water/product level rounds on a periodic basis. Focus on compounds that are likely to partition onto the river sediments such as PCBs, PAHs, pesticides, and metals. Aroclor- and congener-specific PCB groundwater data are required.
- Sample the sediment load discharging from the East Street Area 2 outfalls.
- Define the nature and extent of residual LNAPL along the riverbank in the oil seep area.
- Better define the site stratigraphy to access potential confining layers (peat, silt) above the till unit.
- Determine bedrock groundwater quality.
- Determine potential impact of oil/water separator bypass and subsequent untreated river discharge during high flow events.
- Determine potential risk areas for riverbank erosion.
- Thoroughly assess the effectiveness of the existing LNAPL recovery systems in keeping LNAPL and groundwater contamination from reaching the river. Focus on the effectiveness of the hanging slurry wall and the Recharge Pond in controlling the movement of groundwater contamination toward the river. A comprehensive review of the well screen intervals, water elevations, and site geology is needed. Additional monitoring well locations are anticipated to be needed south of the slurry wall to complete the assessment.

3.3.2.4 Effectiveness of Existing Source Control Measures

The LNAPL recovery system at East Street Area 2 has been in operation since the early 1980s when oil recovery operations began at caissons 64R, 64S, and 64X (01-0053). Initially the separated groundwater was discharged directly to the Recharge Pond. The “V-shaped” slurry wall and caisson 64V system became operational in 1988. Until 1991 when the groundwater treatment plant at Building 64-G became operational, the active oil recovery systems were operated only intermittently because the Recharge Pond could not handle the volume of pumped groundwater. The riverbank recovery wells RW-1(X) and RW-2(X) were installed along the riverbank in 1992 and 1993 to control the extent and movement of LNAPL that was not captured by the existing 64V system. Since 1991, the recovery system has been operating continuously with only limited downtime.

Over 51,000 gallons of LNAPL and 53,000,000 gallons of groundwater were recovered and treated during 1997 from the East Street Area 2 oil recovery system. Over half of the oil (29,297 gallons) was recovered from caisson 64R. Table 3.3.2-3 summarizes the volumes of LNAPL and groundwater pumped from the active recovery caissons and wells at East Street Area 2 during 1997. A review of the extent of mobile LNAPL measured at the site during 1989 and 1997 (shown on Figures 3.3.2-3 and 3.3.2-4) shows that the areal extent of the mobile LNAPL has decreased significantly (01-0031). The incidence of oil seeps along the riverbank has decreased. Only the occasional observation of oil seeps has been attributed to residual LNAPL mobilized by fluctuating water levels along the river (01-0034). The existing boom system is reported to be containing any oil seepage that occurs. However, the boom system only contains the oil from spreading downstream and will not protect the river sediments from contamination.

The existing recovery system appears to be controlling the movement of LNAPL north of the slurry wall as shown by the groundwater flow model particle capture traces presented on Figure 3.3.2-10 (01-0065). Also, based on the groundwater elevation contours presented in Figure 3.3.2-11, it appears that the mobile LNAPL along the riverbank is contained. Unfortunately, the riverbank LNAPL area (see Figure 3.3.2-3) is so close to the river that it will continue to be an immediate threat to the river due to the local water level fluctuations and potential recovery well downtime. The existing recovery system also does not address the residual LNAPL along the zone of water table fluctuation, which will act as a continuing source of oil seeps. To adequately assess the effectiveness of the LNAPL/groundwater recovery system in controlling or eliminating the movement of contaminated groundwater and LNAPL toward the river, additional review of the existing groundwater data is required. The reports reviewed for this document do not adequately present groundwater contamination and hydraulic data for the site.

As of March 1998, wells 5, ES2-17, 3-6C-EB-25, and 3-6C-EB-28 through 30 are monitored for DNAPL. The locations of wells and caissons where DNAPL has been detected at East Street Area 2 are shown in Figure 3.3.2-5. Weekly monitoring and bailing of DNAPL (greater than 0.25 feet thick) as a “passive recovery” method is currently the only DNAPL source control

Table 3.3.2-3

East Street Area 2
Summary of Oil and Groundwater Recovery Volumes
January Through December 1997

Month	64S		64V		64R		RW-1(X)		RW-2(X)		64X	
	OIL	WATER	OIL	WATER	OIL	WATER	OIL	WATER	OIL	WATER	OIL	WATER
January 1997	1,282	1,479,900	2,073	1,479,900	4,788	421,700	28	1,550,500	0	272,231	28	706,800
February 1997	414	754,200	854	1,152,700	3,132	169,200	13	1,307,400	0	262,500	13	806,400
March 1997	500	938,600	1,405	1,180,300	2,756	335,400	40	1,410,300	0	330,300	40	432,000
April 1997	468	1,608,400	1,273	1,604,900	5,709	959,000	0	1,893,900	0	352,800	0	656,100
May 1997	922	1,124,100	1,337	1,234,500	3,811	817,900	32	1,474,000	0	306,700	32	403,200
June 1997	445	688,700	1,330	908,300	3,360	439,200	37	1,118,800	0	307,300	37	403,200
July 1997	344	414,100	1,084	1,243,000	1,179	323,200	25	904,100	0	426,100	25	504,000
August 1997	242	269,700	702	951,000	453	363,900	33	1,272,600	0	200,300	33	403,200
September 1997	165	263,100	1,573	930,100	1,458	162,300	37	1,369,200	0	205,300	37	403,200
October 1997	203	276,400	1,495	1,101,500	1,164	39,500	20	1,508,700	0	301,000	20	504,000
November 1997	180	183,200	1,504	965,200	987	101,100	50	1,308,300	0	215,700	50	431,400
December 1997	258	686,400	1,393	1,171,400	500	215,600	15	1,450,900	0	317,500	15	504,000
	5,423	8,686,800	16,023	13,922,800	29,297	4,348,000	330	16,568,700	0	3,497,731	330	6,157,500
Totals for 1997	51,403	Gallons of Oil			53,181,531	Gallons of Water						

measure implemented at the site. Using this method, very little DNAPL has been removed from the subsurface. Only 4.96 liters of DNAPL were removed during 1997 (GE monthly reports). As of March 1998, the maximum DNAPL thickness measured in each well was as follows: Well 5 (0.26 feet), ES2-17 (0.30 feet), 3-6C-EB-25 (0.89 feet) and 3-6C-EB-28 (0.32 feet).

The DNAPL has been detected at the top of the till unit in each of the DNAPL wells. In general, the till surface slopes toward the river at the site (see Figure 3.3.2-12). Two structural troughs in the till near the Recharge Pond and the western arm of Oxbow H (see Figure 3.3.2-12) may serve as channels for DNAPL flow toward the river. Also, the top of till contours shows a structural high area near Building 68 which brings the top of till surface near the elevation of the river bottom. As shown in cross-section on Figure 3.3.2-6 and in plan view on Figure 3.3.2-12, the top of till elevation near Building 68 is just below the river bottom (within 5 feet vertically).

The DNAPL sources that are located away from the riverbank, such as wells 5 and ES2-17, do not appear to pose a direct threat to the river sediments. However, the Building 68 area DNAPL source is a direct threat to the river sediments, as demonstrated during the Building 68 sediment removal operations when DNAPL seeped into the excavation (01-0164). The existing DNAPL source control measures (bailing) are inadequate to control the Building 68 DNAPL source. DNAPL under the river or in the riverbank will need to be addressed before sediment removal.

The storm sewer and process water flow that is discharged to the Housatonic River needs to be addressed. The existing system is not designed to eliminate contaminated sediments from reaching the river. Process wastewater with oil can reach the river during high flow events when the oil/water separators are bypassed. Additional investigation is needed to fully assess the potential impacts of the outfall discharges on the river sediments.

3.3.2.5 Potential Impacts on River Sediments

There are several East Street Area 2 sources that can potentially impact Housatonic River sediments. The primary concerns are the following:

- Direct movement of contaminated soil and sediment into the river through riverbank erosion, run-off, and outfall discharge.

- Mobile DNAPL near Building 68 in the riverbank and riverbed (under the river) sediments flowing directly into sediment excavations.
- Mobile LNAPL south of the slurry wall seeping directly into the river.
- Residual LNAPL south of the slurry wall mobilizing through water level fluctuations and seeping directly into the river.
- Shallow contaminated groundwater containing PCBs, PAHs and metals (compounds with high sorption coefficients) flowing up into the Housatonic River and re-contaminating the riverbed by partitioning onto the fine grained river sediments.

3.3.3 Hill 78

3.3.3.1 Identified Source Areas

Figure 3.3.3-1 shows the locations of the identified source areas at the Hill 78 Area Site.

Hill 78 Landfill

This landfill was utilized in the 1940s for the disposal of excavated soils during construction of Buildings OP-1 and OP-2. It was subsequently used as a disposal area for plant demolition material, construction debris, and other wastes, including drums containing PCBs (likely adsorbed by fuller's earth). Soil sample results have confirmed the presence of PCBs in the landfill. The EPA issued a RCRA corrective-action permit to the GE facility in February 1991 designating the Hill 78 landfill as SWMU G-5.

An estimated volume of PCB-contaminated material within the landfill, based on the geometry of the landfill during the April 1987 soil boring program, is roughly 48,500 cubic yards. This is a rough estimate because the soil borings did not penetrate the total depth of PCB-contaminated material.

In August 1991, GE installed a cover over the landfill area as a Short-Term Measure (STM), pursuant to the MCP. The cover was constructed of a geotextile layer placed over the top of the landfill, followed by a one-foot thick layer of crushed stone (compacted to a density greater than 90% and graded so that the surface of the stone sloped slightly to the west). Side slopes were capped with a minimum of one foot of clean fill (including 6 inches of topsoil), compacted, graded to a 1:3 slope, and hydroseeded (01-0022, 01-0161).

RCRA Part B Permitted Treatment, Storage, and Disposal Facility (Building 78)

Prior to being used for hazardous waste storage, Building 78 was a gas manufacturing plant that produced industrial gas products (oxygen, hydrogen, and nitrogen) used at the GE facility. In 1983, GE received approval for construction of outside ASTs. In early 1984, industrial gases were delivered to the storage tanks, and gas production ceased in Building 78 (01-0022, 01-0161).

TSCA Permitted PCB Drum Storage Facility (Building 71)

Building 71 was constructed in 1953 and used as a storage building until 1979 when it was reconstructed to store drums of PCB-contaminated materials. The reconstruction consisted of replacing the concrete floor, installing berms, and sealing the floor. No floor drains were installed. In 1979, a 26,000-gallon tank was installed in a diked area near Building 71 and was used to collect PCB-contaminated oil pumped from tankers and drums in Building 71. The dike contained a sump used to collect stormwater and a locked manual valve to drain stormwater that collected in the sump. Prior to discharging water from the sump, a sample was collected and analyzed for PCBs. The sump was then drained into a stormwater catch basin. In 1983 or 1984, the tank was removed, and the dike was cleaned. This eliminated any potential stormwater contamination (01-0022, 01-0161).

Altresco (PGC) Cogeneration Facility

The Altresco Cogeneration Facility comprises approximately one-fourth of the Hill 78 area. Preliminary construction of the facility began in 1989, after pre-excavation soil boring programs were completed. This facility consists of four main buildings listed here in decreasing size: the gas turbine generator building, the steam turbine generator building, the cooling tower structure, and the fuel oil tank building. The cogeneration facility produces steam that is piped through above-ground steam lines to provide heat for GE buildings. No. 2 fuel oil is stored in aboveground reserve tanks at the Altresco fuel oil tank building. Six production wells have been installed from 102 to 600 feet below grade at the site to provide cooling water for the cogeneration plant; two of these wells have since been abandoned.

Three on-site releases of oil or hazardous material have been documented for the Altresco Cogeneration Plant and are on file at the DEP. In October 1990, approximately 5 to 10 gallons of non-PCB oil was released into the sump area between the Gas Turbine and Steam Turbine Generator Buildings. The pump to the oil/water separator failed and the sump overflowed, causing oil to run into the ditch alongside the main Altresco entrance. Clean Berkshires Environmental Remediation Service placed booms in the ditch and the spill was contained before reaching the river.

In November 1990, the sump overflowed again, and 3 to 4 gallons of an oil/water mixture entered the storm drain and were lost. Liquids emerge from the storm drain system near the southeastern corner of the Steam Turbine Generator Building and follow a drainage ditch that flows past Well 78-4, then turns and flows west until it reaches the 30-inch RCP that discharges beneath Merrill Road.

Later in November, 1990, an unspecified amount of No. 2 fuel oil was spilled onto gravel in the bay area while filling an above-ground reserve tank. Clean Berkshires excavated approximately 20 tons of gravel and virgin soil from around the tank and installed a concrete pad to avoid future spills (01-0022, 01-0161).

Area	Estimated Volume of PCB-Contaminated Material
Altresco Area	11,000 cubic yards
Altresco Parking Area	270 cubic yards
Altresco Steamline Supports	8,600 cubic yards
Altresco Transmission Line	1,250 cubic yards

Former Bldg. 72 Transformer Test Area

Building 72, built in 1967 and demolished in 1988, was the former transformer test site. Lightning strikes were the primary transformer tests performed in this building. Building 72 was located on the site of the present steam turbine generator building (01-0022, 01-0161).

Underground Pipes, Outfalls, and Tunnels

Underground pipes, outfalls, and tunnels were addressed as potential sources/pathways of migration in the "Assessment of Potential Preferential Pathways in East Street Area 1/USEPA Area 3" (01-0051). The assessment involved two phases as follows: (1) identification and location of underground pipes and tunnels that could serve as preferential migrations pathways, and (2) evaluation of potential for off-site migration of hazardous constituents via these pathways. Pipelines, conduits, and tunnels that were identified in the first two phases as requiring further evaluation were retained for Phase III evaluation, which involves further investigation of the migration of hazardous materials due to the identified preferential pathways. Pipelines retained for Phase III evaluation are discussed below and are shown on Figure 3.3.3-2. The results of the Phase III evaluation were not available in time for this report.

Sanitary Sewer and Stormwater Drainage Pipelines

Two sanitary sewer pipelines and three stormwater drainage lines (see Figure 3.3.3-2) were retained for Phase III evaluation. They were identified as having pipeline inverts below the water table and thus could potentially be subject to infiltration and could convey stormwater off-site or lead to downgradient stormwater pipelines that convey stormwater off-site. The two sanitary sewer pipelines lead to systems which convey sanitary flow under the Housatonic River to a 42-inch sanitary main pipeline on the south side of the river. The three stormwater drainage pipeline systems ultimately lead to the Housatonic River via Outfall 007 or to a non-permitted City of Pittsfield outfall near Commercial Street.

Fire Protection Lines

One fire protection pipeline (see Figure 3.3.3-2) was retained for Phase III evaluation. This 6-inch pipeline runs from a hydrant near the steam turbine generator building, along the eastern side of the main access road at the Site, and connects to water mains along Merrill Road.

Process/Product Lines

One process/product line was retained for Phase III evaluation. This process/product pipeline system runs from East Street Area 1 site, beneath New York Avenue, across the Hill 78 Site and connects to oil storage facilities at the Unkamet Brook Site. It consists of three 1¼-inch industrial gas lines, two 4-inch 10C oil lines, and one 2-inch 10C oil line, all located within the same pipe trench.

As part of the Phase III evaluation, GE Facility records relating to pipeline closure activities were reviewed to determine the status of this pipeline system and potential to release hazardous materials to subgrade. Transfer of 10C oil in the pipelines was discontinued in 1964. In 1989, as part of the installation of the Altresco Steam Line, these former distribution lines were severed at New York Avenue and near Building 51 within the Unkamet Brook Site, drained, and sampled.

These oil pipelines were investigated further from 1996 to 1997. GE excavated soil near the pipeline low point and cut the pipelines to determine whether residual material remained. Approximately 400 gallons of liquid were removed from the three pipelines. The northern 4-inch line was found to contain oil; the southern 4-inch line contained an emulsified liquid; and the 2-inch line appeared to contain water. Samples from the pipelines contained PCBs at 716, 667, and 112 ppm, respectively.

Other Piping Networks

One 3-inch effluent drain line was identified for Phase III evaluation as a potential pathway for hazardous material release to subgrade. This pipeline carried wastewater from equipment testing facilities in Building 73 to an on-site stormwater line. Testing wastewaters were first processed through an oil/water separator before discharge to this gravity fed pipeline that is now inactive.

3.3.3.2 Groundwater Contamination Plumes

Several PCB exceedances of MCP GW-1 criteria (0.5 ppm) were observed in groundwater as shown on Figure 3.3.3-3. Most of the exceedances were surrounding Hill 78 Landfill but three other exceedances were noted (along Merrill Road at locations NY-2 and H78B-16 and west of the gas and steam turbine generator buildings at location H78B-15). Locations H78B-15 and H78B-16 are located near the fire protection line retained for Phase III analysis (see Figure 3.3.3-2). Location NY-2 is next to a sanitary sewer pipeline retained for Phase III analysis. However, location NY-1, which did not have PCB exceedances in groundwater, is also located next to this sanitary sewer pipeline. Trichloroethene (TCE) and tetrachloroethene (PCE) were also detected in groundwater at levels exceeding the MCP GW-1 standards in well H78B-17R.

3.3.3.3 Data Gaps

Data Gaps Identified by GE Consultants

BB&L has proposed to evaluate potential off-site migration via stormwater or sanitary sewer pipelines and/or bedding material by conducting reviews of ongoing sediment, soil, surface water, and groundwater investigations, as well as free product investigations.

- Outfall 007 was proposed to be investigated under the East Street Area 1 preferential pathway analysis. Results from that evaluation are proposed to be used in the characterization of this site as well. The City of Pittsfield outfall is not proposed to be evaluated since this outfall receives stormwater flows from large off-site areas. Flows from Hill 78 site are conveyed, however, through open swales prior to reaching this outfall and therefore will be evaluated upstream.

- Sediment, soil, surface water, and groundwater investigations are proposed to assess potential of soils and groundwater to contribute to off-site migration of hazardous constituents. To support this end, existing sediment, soil surface water, and groundwater data (both analytical and hydrogeologic) will be reviewed. Rising head slug tests conducted on wells during Phase II/ RFI are proposed to be evaluated and compared with estimated hydraulic conductivities of pipeline backfill to assist in identifying preferential flow pathways.

- Free product investigations are proposed to consist of inspection of select accessible stormwater and sanitary manholes for the presence of free product in those areas where groundwater was above or within 0.5 feet of pipeline inverts.

Surface Water and Sediment

Surface water and sediment have been sampled in Swales A, B, and C (see Figure 3.3.3-1). These three surface drainage swales discharge to a culvert that runs beneath Merrill Road, emerges at another surface swale, and eventually discharges to the city stormwater outfall. It appears that more information on the surface water and sediment concentrations is necessary to analyze the potential for contribution to the river. Therefore, sediment and surface water sampling should be performed in the surface drainage swale located south of Merrill Road and south of Swale A.

Groundwater

Additional data is required to assess the Hill 78 groundwater quality and hydrogeology between Merrill Road and the Housatonic River.

3.3.3.4 Potential Impact on River Sediment

Potential migration pathways include surface soil via erosion to stormdrains and surface water drainage swales, groundwater plume to river, and airborne transport to the river.

For the Hill 78 landfill, viable pathways include groundwater, sediment, surface water, and air (01-0051). The Hill 78 landfill cover was completed in August 1991 and should prevent airborne migration of hazardous materials from the landfill surface. The storm drain and sanitary sewer runs beneath the western edge of the landfill, at a depth of 25 to 30 feet, and could serve as a migration pathway for infiltration of groundwater into the pipes.

A surface water drainage swale runs parallel to, and almost directly above, the underground sewer and drainage easement. This surface water drainage swale originates approximately 220 feet south of the landfill where a 42-inch reinforced concrete pipe (RCP) emerges from the ground (see Figures 3.3.3-1 [Swale A] and 3.3.3-2). The water emerging from this pipe and flowing into the swale consists of runoff from areas upgradient of the Hill 78 Area. No drainage from GE property enters this 42-inch line. The drainage swale drains into a 30-inch RCP that discharges beneath Merrill Road and eventually to the city stormwater outfall. Groundwater to the north of the drainage swale (south of the landfill) has had PCB detections and surface soils contains greater than 2 ppm PCBs (see Figure 3.3.3-4); posing a concern for transport of PCBs. Sediment in drainage Swale A has been sampled at two locations; the highest concentration of PCBs detected was 2.5 ppm. Sediment also contained 1.1 ppb alpha-BHC, 20 ppb delta-BHC, and 84 ppb Endosulfan I. Surface water contained 0.066 ppb PCBs and 0.031 ppb of alpha-BHC.

A second drainage ditch runs approximately north-south, parallel to and on the west side of the main Altresco paved entrance off Merrill Road. The ditch originates near the southeastern corner of the most southern Altresco Building, where a 21-inch RCP emerges from the ground. Water that enters this drainage ditch flows south to Merrill Road, then turns and flows west until it reaches the 30-inch RCP which discharges underneath Merrill Road (Swale B on Figure 3.3.3-1). Surface soils surrounding this ditch contain greater than 2 ppm PCBs (see Figure 3.3.3-4). Groundwater directly north of the ditch (H78B-16) has had detections of PCBs and flows directly to the ditch.

A third drainage ditch (swale C on Figure 3.3.3-1), which runs approximately north-south on the east side of the main Altresco entrance, flows south to Merrill Road where it enters a catch basin. Water entering the catch basin flows in to a storm drain that runs beneath Merrill Road and then ties into the storm drain that leads to the Housatonic River. This ditch accepts runoff from the entrance road and from the area north and east of the Altresco buildings where surface soil contains greater than 2 ppm PCBs (see Figure 3.3.3-4), particularly close to Merrill Road.

Based on the data reviewed, it appears that surface drainage swales and storm drains pose a concern as a potential pathway for transport of sediments and water containing hazardous constituents to the river.

3.3.4 Unkamet Brook

The Unkamet Brook area site is composed of industrial, commercial, and lowland areas. As shown in Figure 3.3.4-1, the site includes the GE property east of Plastics Avenue and south of Dalton Avenue; Buildings OP-1, OP-2, and OP-3, and their adjacent areas; portions of a small commercial area located between Merrill Road and the railroad tracks; and portions of a lowland area between the railroad tracks and the East Branch of the Housatonic River. Unkamet Brook originates north of the site and flows south to the Housatonic River. All three of the manufacturing divisions located at the facility have operated, or are operating in the Unkamet Brook area. Activities in this area have involved a wide range of research and development activities and the manufacture of power transformer related products, ordnance related product monomers, polymers, and industrial resins (01-0021).

3.3.4.1 Identified Source Areas

As a result of various manufacturing processes, various materials have been released to the environment. Table 3.3.4-1 summarizes the SWMUs located within the Unkamet Brook area. Potential source areas that have been identified in the Unkamet Brook area include (Figure 3.3.4 1):

- Interior Landfill and other fill areas.
- Former Waste Stabilization Basin/Bog Area.
- Free-phase product east of Building 51/59.
- Sediment in Unkamet Brook.
- PCBs in surface soil.

Interior Landfill

The interior landfill, approximately 14 acres in extent, was operated by GE until the late 1970s. Material placed in the landfill includes soil excavated as part of the construction of Buildings OP-1 and OP-2, and the capacitors, and waste related to bushing operations. Soil in this area was found to contain PCBs ranging up to at least 1,100 mg/kg.

A magnetometer survey of the former interior landfill was conducted by Weston Geophysical (01-0021). The survey resulted in the division of the landfill into two zones based on their magnetic signatures. Zone A, the western zone, is characterized by a chaotic magnetic signature indicating multiple buried metal objects. Zone B, the eastern zone, is characterized by a smooth signature indicative of natural materials containing no metal objects.

An Immediate Response Action (IRA) is being conducted currently (June 1998) at the Interior Landfill to address the drums, capacitors, bushings, and insulators observed at the surface along Unkamet Brook.

Table 3.3.4-1
Unkamet Brook Area
Contaminant Source Area / SWMU Summary

Operable Unit	Area / Site ID	EPA ID	Source or SWMU ID	Source Description
OU 1	Unkamet Brook Area	1	G-11	Interior Landfill
			G-12	Former Waste Stabilization Basin
			G-17	Building 119W Oil/Water Separator
			O-B	Building 51 Underground Drainage Pipe
			O-8	Building 51 Elementary Neutralization Unit
			O-41	Building OP-3 Metal Treat Area
			O-45	Building OP-3 Abandoned Storage Tank
			O-2	Building OP-1 Abandoned Anodize Tank
			O-A	Underground Fuel Storage Tanks
			O-M	Ordnance Division Active UST
			T-EEE	Transformer Division Inactive UST
			T-FFF	Transformer Division Inactive UST
			P-4	Building 109 Wastewater Tank Farm
			P-D	Plastics Division Inactive UST
			P-E	Plastics Division Inactive UST
			P-F	Plastics Division Inactive UST
			P-G	Plastics Division Inactive UST
			P-H	Plastics Division Inactive UST
			P-I	Plastics Division Inactive UST
			P-J	Plastics Division Inactive UST
			P-K	Plastics Division Inactive UST
			P-L	Plastics Division Inactive UST
			None Assigned	Underground Pipes and Tunnels

SWMU - Solid Waste Management Unit

Golder Associates reviewed aerial photos, soil boring logs, and the ground penetrating radar report (01-0020) to identify additional fill areas in the Unkamet Brook area. This study revealed five fill areas other than the interior landfill; two locations were detected north of and three were detected south of Merrill Road. The locations are at the southeast corner of Building 118, southwest of Building 119, southwest of Building OP-3, along the railroad tracks at well cluster S8, and south and west of the junction of Unkamet Brook and the Housatonic River. Of these five sites, the GPR investigation identified potential buried drums in only one site, southwest of Building OP-3. This area was excavated and sampled as part of an Immediate Response Action (01-0153).

Former Waste Stabilization Basin

The former Waste Stabilization Basin received process wastewater effluent, non-contact cooling water, and stormwater for more than 40 years. Laboratory analyses indicate that the discharge water contained a number VOCs, such as vinyl chloride. Basin sediments contained VOCs similar to the influent. The waste stabilization basin was remediated in 1981. Various investigations concluded that releases from the waste stabilization basin have impacted the groundwater quality downgradient of this area (01-0021).

Free-Phase Product

The occurrence of free-phase oil in the vicinity of Buildings 51 and 59 was initially investigated in 1986. Between 1988 and 1992, the thickness of oil has been monitored and periodically bailed. Beginning in 1997, those wells containing a significant accumulation of oil have been bailed monthly. The thickness and area of LNAPL appears to be stable and not migrating (01-0021).

Unkamet Brook Sediments

Sampling of Unkamet Brook sediments indicates a general trend of decreasing concentrations of PCBs as the sample collection location’s distance from the Interior Landfill increases.

Section of Unkamet Brook	PCB Concentrations (ppm)
Upstream of landfill	Non-Detect to 31.4
Landfill to 250' downstream	Non-Detect to 421
250' downstream to long culvert	Non-Detect to 1,100
Bottom of culvert to 1,200' upstream of river	Non-Detect to 127.4
Lower 1,200' of Unkamet Brook	Non-Detect to 12*

* MADEP reports that PCBs at a concentration of 12 ppm were detected in Unkamet Brook sediments just upstream of the confluence with the Housatonic River.

The transport of PCBs in Unkamet Brook sediments is also indicated by the pattern of PCB concentrations detected in the investigation of the Unkamet Brook floodplain. The series of soil samples collected at two transect lines located approximately 700- and 1,300-feet upstream of the Housatonic River detected PCB maximum concentrations of 52 and 190 ppm respectively (01-0021). The fact that only the samples immediately adjacent to Unkamet Brook contained detectable PCB concentrations strongly suggest the brook sediments are the transporting medium during flood events.

PCBs in Surface Soil

Figure 3.3.4-2 shows the concentrations and extent of surface soil containing PCBs. As shown, the highest concentrations are located southwest of Building OP-3 and adjacent to Unkamet Brook. The majority of PCB-contaminated soil transported via overland flow is expected to ultimately end up as sediment in Unkamet Brook.

3.3.4.2 Groundwater Contamination Plumes

Benzene, chlorobenzene, and trichloroethene have been identified in previous investigations as the primary constituents of a groundwater plume that trends toward the south from the former Waste Stabilization Area (Figure 3.3.4-1). Chlorobenzene has been detected at the highest concentration (58 ppm) of the VOCs in this plume (01-0021). PCB groundwater analyses have been conducted at the site, however, additional PCB groundwater sampling will be required to fully characterize the site.

3.3.4.3 Data Gaps

Additional study of the Unkamet Brook sediments, floodplain, soils, and sediment transport during flood events is required to characterize the potential for contaminant migration.

Additional groundwater sampling for VOCs, dioxin/furans, PCBs, and pesticides are recommended to help define the current nature and extent of the existing groundwater plume that has reached the Housatonic River. The plume may affect the river sediment quality upstream of Newell Street in the future if compounds that adsorb readily to sediments (such as PCBs) are flowing into the Housatonic riverbed dissolved in groundwater.

3.3.4.4 Potential Impact on River Sediments

Unkamet Brook is located east of the Newell Street Bridge area of the Housatonic River. Groundwater flow is toward Unkamet Brook and south to the Housatonic River. Groundwater contaminants are primarily VOCs and are not expected to be sorbed onto sediments in either Unkamet Brook or the Housatonic River to any great extent. Therefore, it is not expected that groundwater discharge from the Unkamet Brook area would have a potential impact on Housatonic River sediments unless additional PCB groundwater data indicate that PCBs or other strongly sorbed compounds are being transported onto the river sediments with groundwater flow.

Previous sediment studies performed in Unkamet Brook have shown only limited sediment transport occurring; however, the results of floodplain soil analyses show that sediment transport of PCB contamination has occurred during flood events.

The sediment contamination in the Unkamet Brook is a potential contaminant source for the reach of the Housatonic River above the Newell Street Bridge. Additional investigations will be needed to determine if the Unkamet Brook sediments will impact the sediments in the Removal Action area over time.

The LNAPL area east of Building 51/59 appears to be stable and not migrating. Groundwater flow is toward the east and southeast. Therefore, it appears that LNAPL migration would not have a potential impact on Housatonic River sediments.

3.3.5 Lyman Street/Oxbows D and E

The Lyman Street site contains two former oxbows (D and E) that were filled in approximately 1940. Oxbow D is mostly paved and used as a parking lot, and Oxbow E is grass- and shrub-covered. Oxbow E is located on property belonging to the Western Massachusetts Electric Company (WMEC). Both areas are fenced, except on the southeastern side, where the site slopes steeply down to the river.

3.3.5.1 Identified Source Areas

The identified sources in the Lyman Street Area include:

- Fill material placed in the former Oxbows D and E.
- DNAPL and LNAPL plumes.
- LNAPL seeps.
- Surface soil contamination.

Fill Material

The nature of the fill material is unknown. Boring logs at the site indicate that the fill materials are composed of brick, slag, wood, glass, burned material, metal, sand, and gravel (01-0163). The extent of the oxbow fill is outlined on Figure 3.3.5-1.

LNAPL Plume

In December 1990, LNAPL was first measured in monitoring wells. It has been detected in a total of fifteen wells and well points at the site since that time. The LNAPL plume (Figure 3.3.5-1) appears to be horseshoe-shaped and corresponds roughly with the location of former Oxbow D. The ends of the horseshoe form the downgradient end of the plume and are located near the river. Groundwater flow is southward toward the river so LNAPL migration to riverbank seeps requires continued control.

A composite LNAPL sample collected from wells LS-4, LS-23, and RW-1 in 1992 indicated that the LNAPL contained 27,000 ppm of PCB Aroclor 1254 (see Table 3.3.5-1).

Table 3.3.5-1
Lyman Street Area
Summary of LNAPL Sample Results

Analytical Parameter	Monitoring Well LS-4 LNAPL
VOLATILE ORGANICS (ppm)	
Chlorobenzene	630
Ethylbenzene	11
Xylene (Total)	160
2-Butanone	ND (2)
Carbon tetrachloride	180
Trichloroethene	15
SEMIVOLATILE ORGANICS (ppm)	
Acenaphthene	1,800
1,4-Dichlorobenzene	1,200
Benzo(a)anthracene	1,700
Benzo(b/k)fluoranthene	1,600
Chrysene	1,600
Anthracene	1,250
Fluorene	2,300
Phenanthrene	6,000
Pyrene	6,600
1-Methylnaphthalene	3,800
2-Methylnaphthalene	2,300
Hexachlorodibenzodioxin (HxCDD)	0.040
Heptachlorodibenzodioxin (HpCDD)	0.103
Octachlorodibenzodioxin (OCDD)	0.712
Hexachlorodibenzofuran (HxCDF)	0.466
Octachlorodibenzofuran (OCDF)	0.213
Heptachlorodibenzofuran (HpCDF)	0.272
Pentachlorodibenzofuran (PeCDF)	0.163
PESTICIDES/HERBICIDES/PCBs (ppm)	
Aroclor 1260	ND (2500)
Aroclor 1254	27,000
Aroclor 1248	ND (2500)
METALS (ppm)	
Arsenic	6.90
Chromium	9.40
Copper	19.20
Nickel	ND (1.2)
Zinc	ND (0.30)

ND (5) - Compound not detected (detection limit)

DNAPL Plume

DNAPL was first measured in monitoring wells during late 1990 or early 1991. It has since been detected in a total of seven wells at the site. The DNAPL plume (Figure 3.3.5-1) appears to be L-shaped, is centered on well LS-31, and extends west/southwest to well LS-12 and east/southeast to well LS-21. The plume appears to be confined by the top of the silt formation, which slopes downward in both of these directions.

A DNAPL sample analysis indicates that it contains 9.8% to 66% PCBs (Aroclor 1254), 0% to 13% polycyclic aromatic hydrocarbons (PAHs), 0.23% to 1.1% polychlorinated benzenes, 0.01% to 0.04% volatile aromatics, 0% to 0.06% volatile hydrocarbons, and 0 to 0.03% volatile solvents. Physical density ranges from 1.076 g/ml to 1.165 g/ml. Viscosity ranges from 33 centistrokes to 44 centistrokes (01-0163).

The downward migration of DNAPL appears to be confined by the top of the silt layer, which has been described as an aquitard; however, low-level concentrations of PCBs have been detected in well LS-25 that monitors groundwater beneath this unit. The top of the silt layer is shown on Figure 3.3.5-2. It appears that the lateral migration of DNAPL is affected by the topography of the silt layer, with movement westward, parallel to the river. With no geologic data available for review from under the river or on the opposite bank, the potential for DNAPL movement southward has not been determined. Also, a full characterization of the top till has not been completed since many of the site borings and wells do not intersect the till layer. The top of the silt layer is approximately 5 feet below the river surface elevation at Lyman Street, so DNAPL in this area may be a problem during sediment excavation.

Product Seeps

LNAPL was observed entering the Housatonic River via seeps in the vicinity of the Lyman Street parking lot in August 1990. No seeps have been observed since the installation and operation of recovery well RW-3 in August 1996, with the exception of a riverbank LNAPL seep observed during April 1998 near RW-1.

Site Soils

Site soils appear to be contaminated with PCBs (Figure 3.3.5-3). In October 1997, BBL estimated that the following quantities of soil are contaminated with PCBs on the portion of the property owned by GE (01-0032):

PCB concentration (ppm)	Volume (cubic yards)
1 to 10	170,000
10 to 50	90,000
50 to 1,000	60,000
Greater than 1,000	30,000

3.3.5.2 Groundwater Contamination Plumes

Groundwater contamination plumes are present at the site. Figure 3.3.5-4 shows groundwater flow at the site during pumping of recovery wells.

VOCs

Both BTEX and chlorinated hydrocarbons are present in site groundwater. The highest concentrations occur in the vicinity of the LNAPL zone along the southwestern perimeter of the site. The highest total BTEX levels are approximately 1 ppm. The highest total chlorinated VOC levels are approximately 3 ppm (01-0032).

SVOCs

SVOCs are present in the southern portion of the site and in areas where DNAPL has been detected. The highest total SVOC levels are approximately 1 ppm (01-0032).

PCBs

PCBs are widely distributed in the groundwater at the site and appear to be present in both the upper aquifer and the aquifer below the partially confining silt layer. Data have been collected for both filtered and unfiltered samples. No data on filtered samples have exceeded the Aroclor 1254 solubility. BB&L believes that NAPL or PCBs absorbed to fine-grained particulants account for high levels of PCBs detected in unfiltered samples. The most recent filtered sample data (from August 1997) indicate that PCBs were detected in LS-12 at 0.0052 ppm and in LS-43 at 0.0051 ppm. Filtered sample data were detected at a historical high of 0.42 ppm in LS-12 during 1995 (01-0032).

Pesticides/Herbicides

Pesticides/Herbicides were detected in the southern portion of the site. Concentrations ranged from non-detected to 0.276 ppm. Highest concentrations were detected in wells LS-12 and LS-34 (01-0032).

Dioxins/Furans

Concentrations of dioxins/furans are observed in the groundwater in the vicinity of Oxbow D in monitor wells LS-12 and LS-34 at levels above 0.01 ppb (01-0032).

3.3.5.3 Data Gaps

LNAPL and DNAPL

The existing monitoring well network includes shallow wells (in the fill and upper sand), intermediate wells (wells which screen both the top of the water table in the fill and upper sand and the intermediate water table above the silt layer), and deep wells that screen water in the zone beneath a partially confining silt layer. There exists a lack of aerial and vertical coverage in the monitoring well system where product plumes are poorly defined and the extent of PCB contamination in the lower unit is unknown.

The existing wells appear to effectively delineate both the LNAPL and DNAPL plumes in the southeast central portion of the site near the river; however, they do not appear to effectively delineate the plume in the other directions (01-0032). In October 1997, BBL proposed the installation of an intermediate well to monitor the potential for DNAPL east of existing well LS-31. BBL indicated that if DNAPL was encountered in the new well, additional well and soil boring installations would be necessary (01-0032).

Boring logs for the wells installed west of Lyman Street (LS-42 to LS-45) show elevated field instrument readings for soil samples collected near the top of the water table. However, because these wells are deep wells that do not screen the top of the water table, it is not possible to determine if LNAPL in this area may be present.

Boring logs for the wells in the northeastern and eastern portions of the site (wells E-1, E-3, E-4, and E-7 on the Western Mass Electric Company property and wells L-36 and L-37 on the GE property) indicate that these wells are shallow wells that screen the top of the water table. Therefore, the possible presence of DNAPL in this area cannot be determined.

The extent of residual LNAPL needs to be addressed since fluctuating water levels could mobilize the LNAPL and the DNAPL extent requires further delineation, especially under the river.

Groundwater Quality Data Gaps

The upgradient groundwater quality beneath the till is unknown. This information would assist in determining whether the low level PCBs detected at the site beneath the till have migrated from off-site or have migrated vertically through the silt at the site.

In 1997, BBL proposed that well LS-25, which monitors the deep aquifer, be redeveloped and resampled to determine whether the presence of PCBs in the samples from this well was due to cross-contamination (01-0032).

Surface Water Quality Gaps

In 1997 the agencies required that surface water sampling be conducted at the stormwater outfall (01-0032).

Soil Quality Data Gaps

The estimated volumes of soils contaminated with PCBs do not include soils on the WMEC portion of the site (01-0032).

The agencies requested in 1997 that soil sampling be conducted on several properties adjacent to the site. Included in this soil sampling is 10 Lyman Street (tax parcel I9-4-23), located across Lyman Street and adjacent to the river. Although, 10 Lyman Street encompasses a portion of the former Oxbow B, previous sampling has been conducted at this location for the Lyman Street site. Proposed soil sampling includes surface soil samples collected along the riverbank and subsurface samples collected near the riverbank.

3.3.5.4 Effectiveness of Existing Source Control Measures

In 1990, GE installed an oil-absorbent boom along the riverbank when the seeps were first noticed as a short-term corrective measure. Weekly inspections of the riverbank, weekly inspections of the booms, and boom maintenance/replacement have been conducted from then to the present (March 1998).

Weekly water level measurements and product thickness measurements have been taken from December 1990 through the present (March 1998). Passive removal of product with a bailer or skimmer has also occurred weekly in wells where the LNAPL thickness exceeds 0.25 ft and in wells where the DNAPL thickness exceeds 1 foot.

A three well recovery system is currently in operation at the site to recover groundwater and product and to create cones of depression in order to prevent the flow of contamination to the river. The system began operation in August 1992 as Stage A Short Term Measure (STM). Under Stage A STM the system included two recovery wells (RW-1 and RW-2) and a mobile on-site treatment system. Due to the continued presence of oil seeps at the site, the recovery system was expanded. In November 1994, construction activities were begun for Stage B STM, which included a below-grade water pipe to convey groundwater pumped at the site to the 64G Groundwater Treatment Facility. Installation of this pipe was completed in early 1995. A third recovery well (RW-3) was installed and active recovery began in August 1996 from this well. Groundwater contour maps included in monthly inspection reports show effective cones of depression.

Monthly inspection logs indicate that the downtime for the recovery system is typically less than 0.3% per month. LNAPL and DNAPL are recovered from RW-1. No product is present in RW-2. During the twelve month period from August 1996 to July 1997, a total volume of 3,921,084 gallons of water were pumped from these three recovery wells. A total of 24 gallons of LNAPL and 40 gallons of LNAPL was pumped from well RW-1 and a total of 998 gallons of LNAPL was pumped from well RW-3 during this period. It appears that the apparent LNAPL and DNAPL thicknesses may be decreasing in the wells.

In October 1997, BBL concluded that underground utilities in the vicinity of the Lyman Street site lie above the water table, and therefore would not serve as preferential pathways for contaminants. However, at that time GE began conducting weekly inspections of the storm drain pipe outfall to determine whether seeps or a sheen are present.

The October 1997 Effectiveness Evaluation of Short Term Measures Lyman Street (01-0075) states that the current groundwater/product recovery system appears effective in providing the degree of capture necessary to prevent or abate seep along the river. No bank seeps were observed in the evaluation period of August 1996 through July 1997. Monthly reports from August 1997 to March 1998 do not indicate that seeps were observed. However, occasional sheens were observed on the river within the boom area during these time periods (01-0075) and an LNAPL riverbank seep was observed near RW-1 during April 1998.

Figure 3.3.5-4 shows groundwater flow and cones of depression during pumping of the three well groundwater/product recovery systems. As presented by the groundwater flow modeling, the recovery systems appear to be containing most of the mobile LNAPL at Lyman Street under normal conditions, however, additional data review is recommended to fully assess the recovery system.

Due to the proximity of the LNAPL to the river, flood stage river/groundwater level fluctuations, and potential mobilization of residual LNAPL in the riverbank soils, the recovery systems have not eliminated LNAPL seeps to the river.

3.3.5.5 Potential Impact on River Sediments

DNAPL

The detected DNAPL at Lyman Street is very shallow near the river and its extent under the river is unknown. DNAPL is anticipated to be a potential problem at Lyman Street during sediment excavation. There is a potential for DNAPL occurrence within the river sediments.

LNAPL

The continued presence of sheen on the river in the vicinity of the Lyman Street suggests that LNAPL could be discharging to the river. The LNAPL was found to have a high concentration of PCBs (see Table 3.3.5-1). River sediments would be expected to be impacted by LNAPL discharging directly to the river sediments through seeps. In general, booms will not prevent contamination of the sediments through direct discharge. Residual LNAPL in the riverbank area will be a continuing source of LNAPL seeps even if the mobile LNAPL is contained by the recovery wells. Due to the close proximity of the source, LNAPL is expected to continue to discharge to the river.

Groundwater

Groundwater is potentially discharging to the river at concentrations that could result in recontamination of sediments. Available data on groundwater quality, plume extent, and capture zone of the recovery system (vertical and horizontal) do not permit conclusive statements.

Surface Soils

Overland transport of PCB-contaminated soil is possible due to the proximity of the river. The soil contains PCB with concentrations exceeding 100 mg/kg. Therefore, surface soil would be expected to impact river sediment.

3.4 OU 2—HOUSATONIC RIVER

The evaluation of the OU 2 area focuses primarily on the river reach between Newell Street Bridge and the Lyman Street Bridge, which is the time-critical Removal Action location (see Figure 2.1-1).

Although a DNAPL source from Building 68 has impacted this segment of the river, this issue is addressed in Subsection 3.3.2.

3.4.1 Newell Street Bridge to Lyman Street Bridge

The texture of the shallow sediment located between the Newell and Lyman Street bridges is composed primarily of coarse sand and gravel. The flow is generally slow to moderate and water depths range from 1- to 3-feet deep (02-0087).

Prior to 1996, a total of 22 sediment samples were collected from 12 locations between the two bridges for PCB analysis. With the exception of one sample, which was collected from 2.0 to 2.5 feet below the bottom of the Housatonic River, the other samples were collected from depths less than 2 feet. Of the 22 sediment samples, two were analyzed for Appendix IX compounds. Total PCB concentrations for the 22 sediment samples ranged from non-detect to 100 ppm. The average PCB concentration was 12.9 ppm (02-0087).

The SVOC analytical results for the two sediment samples indicated that only benzo(a)pyrene was detected in one sample at a concentration of 0.9 ppm. The pesticide analytical results indicated that pesticides were not detected in the two sediment samples (02-0087).

In 1997, 46 sediment and soil samples were collected from the river bottom adjacent to, and down stream of Building 68. The 46 sediment samples were submitted for PCB analysis only.

Soil and sediment samples were collected during 1996 at Building 68 and analyzed for Appendix IX+3 compounds (01-0202). The samples were collected from areas where sediment and soil had been removed from the bottom of the river. The 46 soil and sediment samples were collected between 1 to 13 feet below the river bottom. The PCB analytical results indicated concentrations ranged from non-detected to 2,240 ppm. The average PCB concentration was 85 ppm (01-0165).

A review of the available Housatonic River sediment and floodplain soil analytical data was completed in June 1998 to identify other chemicals of potential concern beside PCBs (02-0159). Based on the review, a total of 22 SVOCs, 7 polychlorinated dibenzodioxins/furans, and 3 metals were identified as chemicals of potential concern.

3.4.2 Riverbanks

PCB contamination in soils of the riverbanks throughout the 2-mile reach from Newell Street to the confluence of the east and west branch constitutes a potential source of contamination to the sediments of the river bottom. Most of the PCB-contaminated riverbanks are within the area from the Newell Street Bridge to the Elm Street Bridge.

3.4.3 Upstream of Newell Street

River sediment analytical data upstream of the Newell Street Bridge were reviewed in order to assess their possible impact on sediment removal in the first half mile. A total of 20 sediment samples were collected from 8 locations upstream of the Newell Street Bridge. The maximum sample depth was 4.4 feet, and the samples were only analyzed for PCBs. Total PCB concentrations ranged from non-detected to 6 ppm.

3.4.4 Data Gaps

The following data gaps have been identified for the Housatonic River:

- Riverbanks soil quality data is needed to determine if the bank may present a recontamination threat to clean sediments.
- Deeper sediment contaminant concentrations below 2 feet need to be determined between Unkamet Brook and Elm Street.

- The potential presence of shallow DNAPL (see Subsection 3.3.2 and 3.3.5) directly under the river needs to be investigated.

3.4.5 Potential Impact on River Sediments

Sediments in the river adjacent to and immediately downstream of Building 68 have PCB concentrations that may recontaminate any sediment placed back in the river channel after the Removal Action. In addition, contaminated riverbank soil may recontaminate the remediated sediments, especially between the Newell Street and Elm Street Bridges. Shallow DNAPL may exist in the sediments beneath the river along Lyman Street, Newell Street, and Building 68 Areas as discussed in Subsections 3.3.2, 3.3.5, and 3.7.

If deeper sediment contamination below 2 feet is detected under the sediment removal areas, this deeper contamination may recontaminate the shallow river sediments due to scouring and upward groundwater transport.

The available PCB analytical results for shallow sediment samples upstream of the Newell Street bridge suggest that these sediments will not likely recontaminate newly placed sediment above 1 ppm.

3.5 OU 3—ALLENDALE SCHOOL

The Allendale School Property is located to the north of the GE facility across the Tyler Street Extension. The property is located approximately 1,500 feet north of the Housatonic River. At the time of the school's construction in 1950, GE entered into an agreement under which GE allowed the City to remove soil material from GE property for use as fill material at the school property. Due to the presence of PCBs in soil at the GE property, the potential existed for PCBs in the fill at the Allendale School Property. Subsequent soil sampling indicated concentrations of PCBs greater than the level of concern of 2 mg/kg established by MADEP. A MCP Short-Term Measure (STM) was conducted in 1991 to reduce the potential for human contact with soils containing levels of PCBs greater than 2 mg/kg. The STM consisted of the placement of a geotextile layer overlain with a minimum of 2 feet of clean soil over areas where PCB soil concentrations exceeded 2 mg/kg within the top 3 feet of existing soil. The area covered by the cap, as shown on Figure 3.5-1, is approximately 5 acres.

Additional soil sampling activities were conducted in 1996 and 1997 in support of Imminent Hazard Evaluation and Supplemental Phase II activities. As the primary contaminants of concern at the Allendale School Property are PCBs, the discussions in this section are limited to PCBs detected in soil and groundwater. As described in the MCP Supplemental Phase II Report for the Allendale School Property, based on these soil sampling activities, the horizontal extent of surficial (0 to 3 feet bgs) soil with PCB concentrations greater than 2 mg/kg appeared to be limited to soil beneath the cap, with the exception of areas along the eastern and northwestern sides of the cap (03-0023). The horizontal extent of contamination (at the time of submittal of the MCP Supplemental Phase II Report) is shown on Figure 3.5-1. Excavation of soils containing greater than 2 mg/kg PCBs in surficial soils outside of the capped area was performed during April 1998 and the capped area was expanded. PCB concentrations greater than 2 mg/kg are also present in soil greater than 2 feet bgs, both within and outside of the capped area. Based on existing analytical data presented in the MCP Supplemental Phase II Report, the vertical extent of PCBs greater than 2 mg/kg is limited to 7 feet bgs, however, the vertical extent of PCBs in soil has not been fully defined in several areas. MADEP has requested that GE collect additional soil samples to delineate the vertical extent of PCB contamination in these areas, with the results to be submitted as part of the MCP Phase II Report Addendum (03-0022). As part of the partial Feasibility Study (FS) for the Allendale School Property, TechLaw, Inc. estimated 8,033 yd^3 of soil with PCB concentrations greater than 2 mg/kg and 2,993 yd^3 of soil with PCB concentrations greater than 50 mg/kg to be present on the property (03-0029).

Surface water runoff from the Allendale School is collected in stormwater catchbasins at the southwest corner of the property, which convey the water southeasterly via a 42-inch diameter reinforced concrete pipe. The 42-inch pipe conducts the water beneath the western edge of the Hill 78 Landfill to a discharge point south of Merrill Road (01-0017). The drainage continues overland, passing under the railroad grade via a 36-inch diameter culvert, and enters another 36-inch diameter culvert north of the intersection of East and Commercial Streets (03-0007). The culvert follows Commercial Street southeasterly to where it discharges to the Housatonic River (01-0017). In July 1997, sediment and surface water samples were collected from the stormwater line at the intersection of Brighton and Dalton Avenues, a location upstream of the school property. A surface water sample was also collected downstream of the property from the manhole located on the 42-inch diameter stormwater line. Sediment was not present at this location during the sampling event. PCBs were not detected in the sediment or surface water samples. The detection limits were 0.039 mg/kg and 0.001 mg/L for the sediment and surface water samples, respectively. As the surficial soils with PCB concentrations greater than 2 mg/kg have been either capped or the potential for PCB-contaminated surface water runoff from the Allendale School Property is minimal.

Groundwater at the Allendale School Property was characterized in the MCP Supplemental Phase II Report using historical groundwater monitoring data from six wells. As four of the monitoring wells were installed in 1997, only one round of groundwater monitoring data is presented for these wells. A maximum of 0.96 mg/L PCBs was detected in 1991 in an unfiltered groundwater sample collected from monitoring well NY-4, located to the west of the Allendale School Property. However, PCBs were not detected above the detection limit of 0.001 mg/L in the filtered sample collected from this well during the same sampling event. PCBs were not detected in the filtered and unfiltered samples collected from this well in May 1997, the latest groundwater monitoring event presented in the MCP Supplemental Phase II Report. PCBs were not detected in the filtered groundwater samples collected from the six monitoring wells during this sampling event. PCBs were detected only in one of the unfiltered groundwater samples. A concentration of 0.0059 mg/L PCBs was detected in the unfiltered sample from well 78-6, located on the southern boundary of the Allendale School Property.

The groundwater data are somewhat difficult to interpret, as the groundwater table contours presented in the Supplemental Phase II Report for the Allendale School Property are reported to be anomalous by BBL (03-0023). The report proposed the installation of four temporary piezometers to better define the groundwater flows on the property. The results of water level measurements from these piezometers were scheduled to be installed in Spring 1998, with the results presented in the Supplemental Phase II Report Addendum due to be submitted in late June 1998. Based on limited existing groundwater monitoring data and the distance to the Housatonic River, groundwater at the Allendale School Property does not appear to be a significant threat to impact the river.

In summary, PCB contamination at the Allendale School Property does not appear to pose a significant threat to the Housatonic River, based on available analytical data and the distance from the property to the river. Surficial soils containing PCBs greater than 2 mg/kg have been either capped or removed. PCBs were not detected in a surface water sample collected from the storm drain system exiting the Allendale School Property. Although subsurface PCB contamination exists at the property, based on available analytical data, the groundwater does not appear have been significantly impacted.

3.6 OU 4—SILVER LAKE

The Silver Lake Area is located west of the GE facility adjacent to East Street Area 2, a part of OU 1. The lake has a surface area of approximately 26 acres and a maximum depth of around 30 feet.

At the southwest end of Silver Lake there is a 48-inch diameter concrete conduit that discharges lake water into the Housatonic River just downstream from the Lyman Street Bridge. The conduit has a maximum capacity of 50 cubic feet per second and an overflow weir that maintains the water level of Silver Lake at approximately 976 feet above mean sea level. Annual fluctuations in the lake level range from 975.60 to 976.23 feet above mean sea level (04-0004). A former discharge pipe from Silver Lake to the Housatonic River is located just upstream of the current 48-inch diameter conduit.

3.6.1 Characterization of the Source Area

Bordering East Street Area 2, Silver Lake has a history of extensive contamination. Discharges from several buildings and lots in this area include stormwater, process water, and non-contact cooling water (see Figure 3.6-1). There are also several documented incidents where oils and detergents were inadvertently discharged from GE. Additionally, five municipal stormwater outfalls feed this lake containing yard drain and stormwater runoff from adjacent streets as shown in Figure 3.6-2 (04-0005). PCBs and other contaminants have been detected in the lake's sediment, floodplain soil, and surface water. There is no evidence that free product is present in the lake (04-0004).

3.6.1.1 Sediment Contamination

The main contamination found in the Silver Lake sediment is PCBs. Data collected over the course of several years are illustrated on Figure 3.6-3 (04-0004) with locations, depths, and concentrations of the contamination. The data show the highest concentrations of PCBs along the east edge of the lake directly adjacent to East Street Area 2, with concentrations ranging from 20,689 ppm to less than 1 ppm PCBs. Overall, the sediments in the lake are heavily contaminated and have evidence of ‘silting over,’ meaning the highest concentrations of PCBs are found below the top 6 inches of sediment (sedimentation rates range from 0.2 to 0.5 inches per year) (04-0004). Approximate volumes of PCB-contaminated sediments in Silver Lake are shown in Table 3.6-1. PCB contamination has been found in deep lake sediments.

Table 3.6.1-1

Estimated Volume of PCB Contaminated Soil in Silver Lake Sediments

Approximate Volumes (cubic yards)						
Level of Contamination	>1 ppm PCBs	>10 ppm PCBs	>50 ppm PCBs	>100 ppm PCBs	> 500 ppm PCBs	Total Volume of Soil
Silver Lake Sediment	175,000	140,000	70,000	60,000	46,000	491,000

The lake sediments have been analyzed for other hazardous constituents and showed the presence of organics (mainly acetone, methylene chloride, PAHs, dioxins/furans, and phenols) and metals (aluminum, calcium, chromium, iron, lead, and zinc) (04-0004).

3.6.1.2 Floodplain Soils

Soils adjacent to Silver Lake in the Housatonic River floodplain were sampled and analyzed to determine the migration of PCBs beyond the banks of the lake. The data and locations of these samples are presented in Figure 3.6-4 (04-0003) and show that PCBs were detected in the range from 250 ppm to non-detectable quantities around the perimeter of the lake. Similar to the sediment samples, the higher concentrations of PCBs are found below the first 6 inches of soil. The volume of contaminated soil in the floodplain was estimated as shown in Table 3.6-2 (04-0004).

Table 3.6.1-2

Estimated Volume of PCB Contaminated Soil in Silver Lake Floodplain

Approximate Volumes (cubic yards)				
Level of Contamination	>1 ppm PCBs	> 10 ppm PCBs	> 50 ppm PCBs	Total Volume of Soil
Silver Lake Floodplain	5,000	3,200	800	9,000

Six floodplain soil samples were collected from the 0- to 6-inch depth interval and analyzed for SVOCs, metals, and phenols. The results show the presence of similar constituents and concentrations as found in the sediments of Silver Lake. (04-0004)

3.6.1.3 Surface Water

The surface water of Silver Lake and its outfall were tested for PCBs and other hazardous constituents in 1990. Unfiltered surface water has been found to contain total PCB concentrations ranging from below detection limit to 0.23 ppb. The maximum PCB concentration in filtered surface water samples was slightly lower at 0.21 ppb. Outfall concentrations of PCBs detected averaged 0.14 and 0.29 ppb during high- and low-flow conditions respectively. Elevated concentrations of lead and zinc have also been found in the outfall.

3.6.1.4 Groundwater Contamination

There are three monitoring wells (RF-2, RF-3, and RF-16) along the east edge of the lake that were used to determine the groundwater gradient adjacent to Silver Lake (Figure 3.6-5 (04-0004). The well water was sampled and analyzed in 1991 to find any potential contamination in this area. PCBs were detected in the groundwater of all three wells.

Total PCBs detected in the unfiltered groundwater are as follows:

RF-2 3.7 ppm
RF-3 7.2 ppm

RF-16 18.8 ppm

Total PCBs were found in filtered groundwater as follows:

RF-3 0.77 ppm
RF-16 1.4 ppm (01-0002)

Low concentrations of VOCs and SVOCs were detected in RF-3 and RF-16. Metals were somewhat elevated in RF-3 (01-0024).

To estimate the groundwater flow gradients, the water levels in the wells were measured monthly for 14 months and compared to the water level in Silver Lake. In well RF-2, the groundwater was shown to flow toward Silver Lake in eight out of thirteen samples. During those eight events, the difference in elevation averaged 6 inches. During the five events that the groundwater was flowing away from the lake, the difference in elevation averaged 8 inches (04-0004).

Well E-7 is located south of Silver Lake between the lake and the Housatonic River. Because of its proximity, E-7 was used to determine the hydraulic flow of contaminants in the lake to the Housatonic River. The groundwater was found to flow toward the Housatonic on all five sampling occasions with an average elevation difference of 12 inches. A water sample taken from this well indicates the presence of PCBs (0.33 ppb unfiltered, 0.42 ppb in filtered fraction) and several metals (04-0004).

3.6.1.5 Data Gaps

The data from Silver Lake are relatively complete and representative. The sediment in the lake is well characterized as is the surface and outfall water. Remaining data needs are listed below:

- Sample the sediment in the wetland area at the mouth of the Silver Lake outfall to gain more information about the transport of PCB-contaminated sediment into the Housatonic River.
- Collect and evaluate additional groundwater samples from the existing wells to the east and south of the lake. Install wells along the perimeter of the lake for contaminant and gradient determination to fully understand the impact of the groundwater flow on contaminant migration from Silver Lake to the Housatonic River.

- Sample the Housatonic River sediment and surface water directly upstream and downstream of the Silver Lake outfall to better assess the impact on the Housatonic River.

3.6.1.6 Impact on the Housatonic River

The impact of Silver Lake on the Housatonic River has been studied since 1991 and has been characterized by GE as minimal. Transport of sediment and dissolved constituents in surface water via the lake's outfall and movement of dissolved constituents via groundwater flow are the two migration pathways that could potentially convey the contamination to the river.

The outfall water has been analyzed for PCBs as well as other hazardous contaminants. Based on these analyses, PCBs, lead, and zinc would be the contaminants of concern that could potentially enter the river. As discussed earlier, the concentration of PCBs detected in the outfall water in 1995 was 0.14 and 0.29 ppb during high- and low-flow condition. The flow from the Silver Lake outfall measured 3.1 and 0.6 cfs during the high- and low-flow sampling events. Based on the flow measurements and assuming that high-flow conditions occur 10% of the time, the Silver Lake outfall contributes 0.4 pounds of PCBs per year. Table 3.2-1 of this report indicates that PCB concentrations as low as 0.38 ppb (Arochlor 1260) could recontaminate sediments. Since the outfall discharges downstream of the time critical Removal Action area, it is not considered a significant issue at this time. However, further evaluation may suggest the need to more fully and reliably eliminate sediment impacts to the river from Silver Lake. This is not considered a significant contribution to the river sediments in the areas downstream of the outfall. (04-0004)

With respect to other hazardous constituents, the concentrations of a few constituents (acetone, toluene, bis(2-ethylhexyl)phthalate, phenol, methylphenol, lead, and zinc) are slightly higher in the outfall than those in the river water. These concentrations are still low and are being fed into the river at a low rate when compared to the flow of the river. Therefore, these constituents likely have a minimal effect on contamination levels in the river. (04-0004)

Although there is little information about the groundwater movement in this area, it is not considered likely to be a significant mode of contaminant migration from Silver Lake to the Housatonic River. This is largely due to the fact that PCBs have a relatively strong affinity for soil and sediment particles versus groundwater. However, further data should be gathered to confirm groundwater conditions between Silver Lake and Housatonic River.

3.7 OU 5—SOURCE AREAS (NEWELL STREET)

OU 5 is divided into two contiguous sites (Figure 3.7-1). The first site is the Newell Street Area I Site (Area I), which contains former Oxbow I, and the second site is the Newell Street Area II Site (Area II), also referred to as EPA Area 5B, which contains former Oxbows G and F.

For the purpose of this report, the two sites are discussed separately within each subsection.

3.7.1 Identified Source Areas

3.7.1.1 Area I

There are two identified source areas in Area I. The first source area is the fill located in the former Oxbow I and the second source is surficial soil located along the Housatonic Riverbank and two intermittent swales (Figure 3.7-1).

The majority of the subsurface data from Area I indicates that PCBs are the primary contaminants. Detected PCB concentrations range up to 290,000 ppm, with the primary Aroclor being 1254, and to a lesser extent Aroclor 1260. The horizontal extent of contaminants detected at the site, primarily PCBs, is well correlated to the presence of fill materials within the former Oxbow I and low-lying areas of the site (05-0008). The vertical distribution of soil PCB concentrations is generally limited to the fill material (05-0016). The estimated volume of affected material at Area I is 50,000 cubic yards (05-0008).

The second source in Area I is surficial soil located along the southern bank of the Housatonic River and within an intermittent swale which discharges to the Housatonic River. Total PCB concentrations in these areas are generally greater than the MCP Method 1, S-1 Standard of 2 ppm. Areas of surface soils containing greater than 2 ppm total PCBs that are within the 10-year floodplain are shown on Figure 3.7-2. The shaded area on Figure 3.7-2 is not paved and is therefore susceptible to erosion.

3.7.1.2 Area II

The known source areas in Area II are similar to those in Area I and include fill located in and around former Oxbows G and F, as well as surficial soil on the southern bank of the River and an intermittent swale located west of the GE parking lot (Figure 3.7-1). In addition, DNAPL is present in Area II, but its source has not been identified.

The primary contaminants for Area II are PCBs. Detected PCB concentrations from subsurface soil samples from the former Oxbow F and G areas ranges from 1,800 to 80,000 ppm, respectively. The primary Arolcor for former Oxbow F and G is Aroclor 1254 (05-0011). The relationship between the depth of fill in former Oxbow G and PCB concentrations is not well defined (05-0016). In addition, the aerial extent of Oxbow F has not been identified (05-0007, 05-0011). Therefore, a volume estimate of affected materials for former Oxbows F and G has not been made.

The second identified source in Area II is surficial soil located along the southern bank of the Housatonic River adjacent to the site and surficial soil located around an intermittent swale that flows through former Oxbow F (Figure 3.7-1). Total PCB concentrations in these areas are generally greater than the MCP Method 1, S-1 Standard of 2 ppm. Areas of surface soils containing greater than 2 ppm total PCBs that are within the 10-year floodplain are shown on Figure 3.7-2. The shaded area on Figure 3.7-2 is not paved and is therefore susceptible to erosion. The swale receives stormwater runoff from Newell Street and the GE parking lot before discharging to the Housatonic River (05-0005).

In addition to the identified sources discussed above, the source of DNAPL measured in Area II monitoring wells has not been identified. LNAPL has also been measured in an Area II monitoring well. A discussion of DNAPL and LNAPL at Area II follows.

DNAPL has been consistently measured in four deep monitoring wells (NS-15, NS-30, NS-31, and NS-32) since February 1996 (Figure 3.7-3). The deep wells are screened on top of till. The measured thickness of the DNAPL at monitoring wells NS-15, NS-30, and NS-32 typically ranges between 2 and 3 feet, with NS-32 having up to 5 feet. Monitoring well NS-31 has generally had a DNAPL thickness of between 0.05 and 0.1 feet (05-0011, 01-0162). Figure 3.7-3 shows only the monitoring well locations where DNAPL has been measured. The aerial extent of DNAPL has not been identified and therefore a volume can not be estimated.

Stratigraphically, the DNAPL is located on top of the till surface. In the area of the four wells where DNAPL is present, the till dips from the north to the south (05-0011). It should be noted that this is consistent with the till surface on the north bank of the Housatonic immediately east of the footbridge (01-0164). A possible source of the DNAPL may be located up dip of the till, to the north and possibly east of the four wells. In this possible scenario, the DNAPL source would be located north of the Housatonic River and the DNAPL would be migrating along the till surface from the north to the south. However, the DNAPL located in Area II contains Aroclors that are different than the Aroclors identified in DNAPL located north of the Housatonic River. Therefore, the source of the DNAPL identified in Area II may be located south of the Housatonic River.

The chemical consistency of the DNAPL has been evaluated directly and indirectly. The direct evaluation involved a comparison of a DNAPL sample from monitoring well NS-15 to the Aroclor standards. The chromatogram from the NS-15 DNAPL sample compared favorably with the chromatogram of the Aroclor-1254 standard (01-0164). The indirect evaluation of the DNAPL chemical consistency was conducted by collecting soil samples for VOCs and SVOCs analysis during the drilling of monitoring wells NS-30 and NS-32. The soil samples were collected from an elevation where DNAPL had been measured. The analytical results for a soil sample collected during the installation of monitoring well NS-30 indicated a TCE concentration of 1800 ppm (05-0011). This suggests the possibility that the DNAPL in NS-30 may in part be composed of TCE.

LNAPL has been measured in monitoring well NS-10 since July 1995 (Figure 3.7-3). The thickest LNAPL measurement occurred in September 1997 and was approximately 0.9 feet thick. From December 1997 to March 1998 when the last data was available, the measured LNAPL thickness in NS-10 was less than 0.1 of a foot (01-0162). The composition of the LNAPL has not been evaluated.

3.7.2 Groundwater Contamination Plumes

3.7.2.1 Area I

PCBs were the only compounds detected in groundwater samples from Area I that were above the MCP GW-3 criteria. The MCP GW-3 criteria for PCBs is 0.3 ppb and the PCB concentrations detected in the Area I monitoring wells ranged from non-detected to 10.4 ppb (05-0008). Groundwater flow in Area I is generally from south to north at a gradient of approximately 0.01 to 0.02. Groundwater from Area I discharges to the Housatonic River (05-0008).

3.7.2.2 Area II

As with Area I, the only compounds detected above the MCP GW-3 criteria in groundwater samples from Area II are PCBs. The PCB concentrations detected in the monitoring wells at Area II ranged from non-detected to 12 ppb (05-0011). Within the general area of the PCB groundwater contamination, vinyl chloride has been detected at concentrations that ranged from non-detected to 3260 ppb, which is below the MCP GW-3 criterion of 40,000 ppb. Three groundwater samples from monitoring wells located within approximately 80 feet of the Housatonic River have vinyl chloride concentrations of 944 ppb or greater (05-0011). It should be noted that there are no groundwater analytical data for the four deep monitoring wells where DNAPL has been measured (NS-15, NS-30, NS-31, NS-32). In addition, groundwater analytical data do not exist for four additional deep wells NS-34 through NS-37 that were installed between May 1996 and March 1998. Groundwater flow in Area 5B is from south to north at an average gradient of 0.01. Groundwater from Area II discharges to the Housatonic River (05-0011). The source of the PCB and vinyl chloride groundwater contamination has not been identified.

Groundwater analytical results from 1991 for monitoring well NS-10, where LNAPL has been measured, indicated total VOC and SVOC concentrations of 37 ppb and 54 ppb, respectively. These total VOC and SVOC groundwater concentrations are lower than might be expected since LNAPL is present in NS-10. No other groundwater analytical data exist for NS-10 and the composition of the LNAPL has not been evaluated.

Groundwater data only exist for one monitoring well, F-1, located near former Oxbow F. Total PCBs were detected in groundwater sample F- 1 at a concentration of 0.3 ppb, which is equal to the MCP GW-3 criteria for PCBs. No monitoring wells exist down gradient of Oxbow F, between the oxbow and the Housatonic River.

3.7.3 Data Gaps

The following data gaps have been identified for OU 5:

- Bedrock groundwater quality has not been addressed.
- The source of the DNAPL measured in monitoring wells NS-15, NS-30, NS-31, and NS-32 has not been identified.
- Overburden groundwater quality at the site has not been fully characterized.
- The aerial extent of the DNAPL has not been fully evaluated.
- The chemical composition of the DNAPL has not been completely characterized.
- The aerial and vertical extent of fill located in former Oxbow F has not been evaluated.
- The chemical composition of the LNAPL in monitoring well NS-10 has not been characterized.
- Surface water quality in the intermittent stream next to Oxbow F has not been assessed.
- Riverbank erosion potential has not been determined.

3.7.4 Effectiveness of Existing Source Control Measures

The source control measure for DNAPL was started in July 1995, with weekly bailing of DNAPL from monitoring well NS-15. The weekly DNAPL removal program was expanded in February 1996 with the addition of monitoring wells NS-30 and NS-32. Although DNAPL has been measured in monitoring well NS-31, none has been removed because the thickness has been less than 1 foot.

Based on the criteria discussed in Section 3.2, Evaluation Criteria of Source Control Measures, the DNAPL removal program for Area II is not considered fully effective for the following reasons:

- The current monitoring well network does not assess the full extent of DNAPL.
- The dissolved groundwater contamination has not been assessed in the four monitoring wells where DNAPL is measured on a weekly basis.
- Although the weekly removal of DNAPL was initiated over two years ago in monitoring wells NS-15, NS-30, and NS-32, the recovered volumes have not decreased with time.

The source control measure for LNAPL was started in July 1995, with weekly bailing of LNAPL from monitoring well NS-10 when the thickness was measured to be 0.25 feet or greater. This source control measure appears to be effective. From December 1997 to March 1998, when the last data were available, the measured LNAPL thickness in NS-10 was less than 0.1 of a foot. However, only one round of groundwater analytical data exists for monitoring well NS-10, and it is from December, 1991. In addition, the composition of the LNAPL has not been evaluated.

3.7.5 Potential Impact on River Sediments

The potential impact on river sediments has been divided into five groups: fill and affected soils, DNAPL, LNAPL, dissolved groundwater contamination, and erosion of surficial soils.

3.7.5.1 Fill and Affected Soils

Fill and affected materials associated with the former Oxbows F, G, and I do not appear to be a source that poses an immediate threat to Housatonic River sediments except as a potential source of groundwater contamination.

3.7.5.2 DNAPL

As shown on Figure 3.7-3, the four monitoring wells where DNAPL is monitored are located between 50 and 100 feet from the Housatonic River. The DNAPL composition has been identified in part to consist of Aroclor 1254 and possibly TCE. Since the vertical gradient adjacent to the river is upward, the dissolution of the DNAPL contaminants will discharge to the

Housatonic River. The dissolved concentration of PCBs discharging from the DNAPL to the Housatonic River has not been characterized, but is potentially greater than the recontamination criteria of 2.54 ppb for Arochlor 1254 (Table 3.2-1).

An evaluation of the possibility that DNAPL located on top of till near Building 68 (located in OU 1) may discharge directly to the Housatonic River was conducted in May 1998. The report concluded that the average vertical gradient is not sufficient to cause the DNAPL to discharge upward to the Housatonic River (01-0164). Based on a review of site data and the methodology discussed in 01-0164, it does not appear likely that the DNAPL in Area II will discharge to the Housatonic River. However, this requires further data collection on the full extent of the DNAPL.

The chemical composition of the DNAPL and its location adjacent to the Housatonic River suggest that the dissolution of the DNAPL may recontaminate Housatonic River sediments.

3.7.5.3 LNAPL

The measured LNAPL thickness in monitoring well NS-10, which is located approximately 300 feet from the Housatonic River, has decreased with time. For the four month period between December 1997 and March 1998, the measured LNAPL thickness has been 0.1 foot or less. Although groundwater samples from NS-10 have not been collected since 1991, it appears that the LNAPL and dissolved organics around NS-10 will not likely impact Housatonic River sediment.

3.7.5.4 Groundwater Contamination Plume

The PCB groundwater contamination in Area I and Area II have concentrations that are two and three orders of magnitude above the MCP GW-3 criteria, respectively. These contaminants have been detected in monitoring wells located between approximately 40 and 370 feet from the Housatonic River. Groundwater flow in both Area I and Area II discharges to the Housatonic River. Although PCB concentrations have been detected above the MCP GW-3 criteria, this groundwater contamination does not appear likely to impact river sediments significantly.

3.7.5.5 Surficial Soil

Surficial soil along the southern bank of the Housatonic River in Area I and Area II, as well as surficial soil in an intermittent swale that flows through former Oxbow F, are located within the 10-year flood plain and have total PCB concentrations above the MCP Method 1, S-1 Standard of 2 ppm (Figure 3.7-2). The shaded area on Figure 3.7-2 is not paved and is therefore susceptible to erosion. Surficial soil erosion from these areas would likely recontaminate Housatonic River sediments. Therefore, these surficial soils pose a potential threat to the Housatonic River. In addition, the riverbank area next to Area II receives precipitation runoff from the GE parking lot that may also contribute to sediment erosion.

3.8 OU 6—SOURCE AREAS (OXBOWS)

In the 1940s, oxbows along the Housatonic River in Pittsfield, Massachusetts, were isolated during the rechannelization of the river performed by the City of Pittsfield, in conjunction with ACOE, to straighten the Pittsfield stretch of the river for flood control purposes. Over a period of approximately 40 years following the rechannelization of the river, the majority of the oxbows were backfilled with various fill materials (06-0001). Subsequent aerial photographs show that the former oxbows were still surface water bodies or wetlands when they were filled (06-0001). It is possible that the oxbows contain sediment deposited from upstream sources prior to filling. All of the oxbows are located within the 100-year floodplain. Portions of Oxbows B, C, J, and K are within the 10-year floodplain (06-0006). Some of the filled oxbows have been found to contain PCBs and/or other hazardous constituents. Oxbows A, B, C, J, and K are discussed in this section.

Analytical results from GE sampling events indicate the presence of VOCs, SVOCs, PCBs, pesticides/herbicides, polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDDs/PCDFs), and metals in soil samples collected from Oxbows A, B, C, J, and K. VOCs, SVOCs, PCBs, PCDDs/PCDFs, and metals were also detected in groundwater beneath the former oxbows. The groundwater is likely to discharge to the Housatonic River. For the purposes of this report, only PCBs are discussed in detail in this subsection. However, it should be noted that PAHs have been detected at elevated concentrations (above MCP Method 1 Standards) in soil samples collected from Oxbows A, B, C, and J. PAHs were not detected at significant concentrations in groundwater samples collected from monitoring wells located at these oxbows (06-0001). Additional information regarding the presence of PAHs and other constituents may be found in the MCP Phase I and Interim Phase II Report for Former Housatonic River Oxbow Areas A, B, C, J, and K by BB&L (06-0001). Oxbows A, B, C, J, and K are further described in the following subsections.

3.8.1 Oxbows A, B, and C

Oxbows A, B, and C are located on the Housatonic River downstream from Lyman Street (refer to Figure 3.8-1). Oxbows A and C are approximately 5-acres and 2-acres in area, respectively, and are located adjacent to each other on the south side of the river. The fill in Oxbows A and C may be contiguous (06-0006). Oxbow B formerly occupied an approximately 3-acre area across the river from Oxbows A and C.

3.8.1.1 Oxbow A

Former Oxbow A is currently an undeveloped, generally flat, open field (02-0085). Surface water runoff appears to flow toward the Housatonic River or a manmade drainage ditch located adjacent to the southeastern border of Oxbow A. From Oxbow A, the drainage ditch runs through Oxbow C and discharges to the river. The drainage ditch is approximately 5- to 10-feet deep. However, as the southern portion of the area is generally flat, the surface water run-off into the ditch is likely to be minimal (06-0001). Additional smaller drainage ditches are also present at Oxbow A (06-0006). Surface water run-off into the river is limited by a thick growth of vegetation along the riverbank (06-0001).

Soil samples have been collected from three soil boring locations (A-1, A-2, and A-3) in the Oxbow A area. PCB concentrations in soil samples collected at Oxbows A, B, and C are shown on Figure 3.8-2. A maximum concentration of 50 mg/kg was detected in a sample collected from a depth of 8-10 feet from soil boring A-3. PCBs were not detected in the surficial soil sample (0- to 2-foot depth) collected from soil boring A-1. PCB concentrations in surficial soil samples collected from soil borings A-2, and A-3 in 1992 were 0.38 and 25 mg/kg, respectively. However, a soil sample collected from a depth of 0 to 0.5 feet at the location of soil boring A-3 in 1995 indicated 0.397 mg/kg PCBs. Groundwater samples have been collected from one well point (WP-9) and two monitoring wells (A-1 and A-3) at Oxbow A. PCBs were not detected in groundwater samples collected from monitoring wells A-1 (detection limit of 0.0005 mg/L) and A-3 (detection limit of 0.00053 mg/L). A concentration of 0.0244 mg/L PCBs was detected in the groundwater sample from well point WP-9, however the sample was not filtered.

3.8.1.2 Oxbow B

A portion of the Oxbow B area is covered with asphalt paving or commercial buildings (02-0085). Surface water runoff appears to flow towards the River (06-0001). The outfall for Silver Lake is located in the vicinity of Oxbow B.

Soil samples have been collected from two soil boring locations and five surficial soil sample locations at Oxbow B (refer to Figure 3.8-2). PCB concentrations in surficial soil samples (0- to 2-feet deep) ranged from 3.5 mg/kg at surficial sampling location I9-4-14E to 180 mg/kg at soil boring B-2. However, it should be noted that the duplicate sample collected from a depth of 0- to 2-feet deep from soil boring B-2 indicated 14 mg/kg PCBs. PCBs were also detected in subsurface soil samples, with maximum PCB concentrations of 49 mg/kg (4- to 6-foot depth) and 17 mg/kg (10- to 12-foot depth) detected in soil samples collected from soil borings B-1 and B-2, respectively. Groundwater samples were collected from monitoring wells B-1 and B-2 as part of MCP Phase II Investigations in 1991-1992. PCBs were not detected above the detection limit of 0.0005 mg/L in either sample.

3.8.1.3 Oxbow C

Former Oxbow C is currently undeveloped (02-0085). Oxbow C is bisected by the manmade drainage ditch that also drains a portion of Oxbow A as well as collects surface and storm water runoff from catchbasins located along Day Street. The ditch discharges into the Housatonic River (06-0001). The ditch has been observed to have a substantial spring flow, although it is dry in the summer (06-0007). Surface water runoff in the central and southern portions of Oxbow C flows toward this ditch, while surface water runoff in the northern portion of Oxbow C flows toward the River. Smaller drainage ditches are also located at Oxbow C (06-0006). The potential for surface water runoff to migrate to the ditch and the River appears to be somewhat limited by the vegetation present at Oxbow C (06-0001).

The MCP Phase I and Interim Phase II Report for Former Housatonic River Oxbows A, B, C, J, and K includes analytical data from 3 soil boring locations and 8 surficial soil sampling locations at Oxbow C (refer to Figure 3.8-2). A maximum concentration of 750 mg/kg PCBs was detected in surficial soil (0- to 2-foot depth) at Oxbow C. In deeper soil, maximum PCB concentrations of 57 mg/kg (12-14 foot depth), 150 mg/kg (14-16 foot depth), and 24 mg/kg (6-8 foot depth) were detected in soil samples collected from soil borings C-1, C-2, and C-3, respectively. PCBs were not detected above the detection limit of 0.0005 mg/L in groundwater samples collected from the two monitoring wells (C-1 and C-2) located at Oxbow C. PCBs were detected at concentrations of 0.0278 and 0.0056 mg/L in groundwater samples collected from well points WP-7 and WP-8, respectively, located adjacent to the river at Oxbow C. However, these groundwater samples were not filtered.

Due to the presence of PCBs at concentrations greater than 10 mg/kg in surficial soils within 500 feet of a residence at Oxbow C, GE notified MADEP of a potential imminent hazard under the MCP. As a result, Immediate Response Action (IRA) activities were conducted at the site, including additional soil sampling to further delineate the surficial PCB contamination, followed by excavation of surficial soils. These sample locations are not shown on Figure 3.8-2. Surficial soils were excavated in grassy areas where PCBs exceeded 30 mg/kg and in vegetated areas where PCBs exceeded 50 mg/kg. Approximately 130 yd^3 of soil was removed from the grassy areas, with approximately 6 inches of soil removed from a total area of 7,200 square feet. Approximately 160 yd^3 of soil was removed from vegetated areas, with approximately 6 inches of soil removed over a total area of 8,400 square feet. Excavated areas were lined with geotextile and backfilled with clean fill. In addition to soil excavation, additional vegetation was planted in vegetated areas (approximately 1,100 square feet) where PCB concentrations in surficial soil exceeded 30 mg/kg in order to enhance the vegetative barrier (06-0005).

3.8.1.4 Data Gaps and Potential Impacts on River Sediments

Soil in Oxbows A, B, and C has been found to contain PCBs. Although surficial soil in portions of Oxbow C has been removed, PCB-contaminated surficial soil exists in the remaining areas of Oxbow C, as well as at Oxbows A and B. Subsurface soil at each oxbow has also been determined to contain PCBs. Limited soil sampling data exists for surficial soil at Oxbows A and

B and for subsurface soil at all three oxbows. In addition, the extent of fill, as shown on Figure 3.8-1, may not be accurate. Additional fill materials may be present in other areas, including the area between Oxbows A and C (06-0006).

PCBs in surficial soil at Oxbows A, B, and C may be transported to the River through surface water runoff, either directly to the river or via drainage ditches at Oxbows A and C. However, overland flow is limited by vegetation along the riverbank (06-0001). Because the oxbows are located within the flood plain of the river, PCB-contaminated soil may also be transported into the river through erosion during flood events.

PCBs in subsurface soil may be transported to the river through leaching to groundwater, as the direction of groundwater flow is primarily toward the river (06-0001). Groundwater data presently available do not indicate that PCBs in Oxbows A, B, and C are leaching to groundwater, however limited sampling data exist for groundwater. Although PCBs were detected in groundwater samples collected from well points, the data are suspect because of the poor construction techniques used for well points. In addition, the PCBs detected may be adsorbed onto the sediment in the groundwater, rather than dissolved in the groundwater, as the samples were not filtered or collected using low-flow sampling techniques.

PCBs have been detected in Housatonic River sediment samples in the vicinity of Oxbows A, B, and C, and in the riverbanks and floodplain of the Housatonic River downstream of Oxbows A, B, and C (04-0004). However, there are several other potential sources upstream of these oxbows that may have contributed to the contamination.

3.8.2 Oxbows J and K

Former Oxbows J and K, approximately 4- and 1-acre in size, respectively, are shown on Figure 3.8-3. A portion of Oxbow J is covered by commercial buildings and asphalt pavement or gravel parking areas. Oxbow K is currently undeveloped (02-0085). The oxbow areas are generally flat, with a slight slope towards the river. Surface water runoff in the Oxbow J area flows toward East Street and flows into the river through an open channel located east of Longview Terrace. This channel also receives flow from a storm drain that collects runoff from East Street and Merrill Road. The potential for surface water runoff to enter the river via overland flow is somewhat limited by the well-vegetated riverbank (06-0001). Surface water runoff in the Oxbow K area appears to flow toward the river or into a drainage ditch (06-0006).

PCB concentrations in soil samples collected at Oxbows J and K are shown on Figure 3.8-4. A maximum PCB concentration of 13 mg/kg was detected in soil samples collected from Oxbow J, however PCB results for the majority of soil samples collected at Oxbow J were below 2 mg/kg. PCBs were not detected in the two groundwater samples collected at Oxbow J from well point WP-3 (detection limit of 0.001 mg/L) and monitoring well J-1 (detection limit of 0.0005 mg/L). Soil samples have been collected from two soil boring locations at Oxbow K. PCBs were detected only in the samples collected from the 0 to 2-foot depth at each location, with a maximum PCB concentration of 0.15 mg/kg detected at soil boring location K-1. Groundwater samples have been collected from 2 well points (WP-1 and WP-2) at Oxbow K. Analytical results from an unfiltered groundwater sample collected from well point WP-1 indicated 0.00361 mg/L PCBs. PCBs were not detected (detection limits of 0.001 to 0.0015 mg/L) in a groundwater sample collected from well point WP-2.

3.8.2.1 Data Gaps and Potential Impacts to River Sediments

Soil in Oxbows J and K has been found to contain PCBs, however the analytical results for the majority of soil samples collected indicated less than 2 mg/kg PCBs. While the potential exists for PCBs to be transported to the river through surface runoff, either directly or via drainage channels, erosion during flooding events, or leaching to groundwater, the extent of PCB contamination at Oxbows J and K appears to be limited based on existing analytical data. However, only limited soil sampling data for Oxbow K and groundwater sampling data for Oxbows J and K are available. Specifically, only two soil samples were collected in the former channel areas at each oxbow. In addition, fill materials may be present in additional areas in the vicinity of Oxbows J and K, including an area west of Oxbow K on either side of the Longview Terrace footbridge (06-0006). PCBs were not detected at significant concentrations in the stretch of the Housatonic River in the vicinity of Oxbows J and K, indicating that any PCBs present in the fill materials at Oxbows J and K may not be a significant threat to the river (04-0004).

SECTION 4

PRELIMINARY EVALUATION OF ADDITIONAL SOURCE CONTROL MEASURES

4. PRELIMINARY EVALUATION OF ADDITIONAL SOURCE CONTROL MEASURES

This section provides a preliminary evaluation of additional source control measures that could be taken at and near the GE facility to further limit potential contaminant inputs to the Housatonic River. This preliminary evaluation is based on a review of available data by WESTON. Its conclusions are subject to change as additional data on the nature and extent of the source areas and performance of source control measures are made available and/or generated. Potential additional source control measures include:

- Additions or modifications to existing source control measures.
- New source control measures.
- Measures to be implemented as part of, or in tandem, with the Removal Action.

The primary focus of this evaluation is the area along the Housatonic River stretching from Newell Street (East Street Area 1 within OU 1) down to Lyman Street. This coincides with the approximately one-half mile stretch of river (Newell Street to Lyman Street) that is the subject of the time-critical Removal Action, and includes parts of OUs 1, 2, and 5. This stretch of river is subject to potential impact from a number of types of sources including the following:

- LNAPL plumes (East Street Areas 1 and 2; Lyman Street Parking Lot).
- DNAPL plumes (East Street Area 2, Lyman Street Parking Lot, Newell Street).
- Dissolved groundwater contamination from PCBs and other constituents.
- Residual PCBs and other contaminants in river sediments and riverbank soils.

These sources of contamination are present extensively within and adjacent to the time-critical Removal Action area of the river. They could be mobilized during the time-critical Removal Action or could recontaminate river sediments after the time-critical Removal Action is completed.

As described in various subsections of Sections 1 and 3 of this report, GE has undertaken a number of measures intended to control sources of contamination that could affect sediment and water quality in the river. Review of available information indicates that although many of these measures are effective to a degree, additional measures will need to be undertaken for the time-critical Removal Action to be successful. A description and preliminary evaluation of potential additional source control measures that would be necessary within OUs 1, 2, and 5 prior to, during, and/or after the time-critical Removal Action on the Newell Street bridge to Lyman Street Bridge reach of the river are summarized.

Within OU 1, there are three areas with significant contaminant sources undergoing active control as described in Subsection 1.3. These areas are East Street Area 1, East Street Area 2, and Lyman Street. In general, contaminated groundwater associated with NAPL is likely present at these three areas of OU 1 and at Newell Street (OU 5). However, data on dissolved phase contaminants are relatively limited. Based on a review of available data, PCBs and other contaminants, including VOCs, pesticides, PAHs, and metals are present in groundwater in these areas.

Of the three areas mentioned above, East Street Area 1 has some localized LNAPL that appears to be effectively contained by an active/passive recovery system first installed in 1986 by GE. However, LNAPL seeps into the river have been observed within both the East Street Area 2 and Lyman Street Parking Lot areas. There also are outfalls that could contribute NAPL and/or contaminated sediment to the river in these areas.

DNAPL has been observed in wells in the East Street Area 2 (OU 1), Lyman Street (OU 1), and Newell Street (OU 5) areas. In general DNAPL appears to be incompletely characterized, particularly directly beneath the river itself.

DNAPL migration into the river from the banks and from beneath the river is a significant potential issue both for implementation of the Removal Action itself and for potential long-term recontamination of river sediments. However, possibly most significant to the effectiveness of the time-critical Removal Action is the likely presence of DNAPL on top of the till layer below the river itself, as well as residual contamination that will remain in deeper sediments below the time-critical Removal Action excavation. Both of these conditions constitute sources that need to be assessed and mitigated to prevent recontamination.

A number of general data gaps associated with these sources and the active control measures currently being implemented by GE are as follows:

- The overall subsurface geologic structure and hydrologic system within these three areas and along the river from Newell Street to Lyman Street is not well enough defined to allow adequate assessment of NAPL movement and interactions with the river.

- There are minimal recent performance data other than oil recovery amounts for the LNAPL recovery systems. To date, it appears that GE has not been totally successful in preventing seeps to the river. Confirmation needs to be made on whether the existing seeps are the leading edges of LNAPL plumes or periodic remobilization of residual contamination by changes in river level. At Lyman Street, piezometers immediately adjacent to the river indicate that the LNAPL does in fact reach the river.

- Areal extent of DNAPL is poorly defined at East Street Area 2, Lyman Street, and Newell Street. The proximity of DNAPL to the river, along with evidence of DNAPL observed in excavations in the river during the recent Building 68 removal action suggest that DNAPL is present under the river along portions of the reach from Newell Street to Lyman Street.

- Data on dissolved constituents in groundwater in East Street Area 1, Lyman Street, Newell Street, and the Oxbows are sparse and not adequate to determine the potential for recontamination of river sediment after the removal action. This is a critical data gap due to the proximity of LNAPL and DNAPL to the river.

While acknowledging these data gaps, we have identified known or potential source areas that we believe will potentially require new control measures or augmentation of existing control measures in order to achieve the goals of the time-critical Removal Action. To date, data gathering and source control measures have typically been undertaken in specific areas within the OUs. This has resulted in a compartmentalized approach to the contamination problems along this reach of river. In some areas, there still exists an incomplete overall representation and understanding of the areawide conditions on both sides of the river, particularly on the river reach between Newell Street and Lyman Street. Since the time-critical Removal Action in this reach cuts across several OUs, we believe it is beneficial to discuss the source control measures below in terms of specific types of sources or conditions that are found within and adjacent to the time-critical Removal Action area.

4.1 LNAPL CONTROL

East Street Area 2 includes the Building 68 area where a massive PCB spill occurred into the river and riverbank soil and river sediment has been previously removed. Building 68 is approximately 500 feet upstream of the Lyman Street Bridge. Based on the available data in this area, seeps may still be occurring into the river. However, some diminishment of previously observed seeps has been noticed during the past year. Seeps are occurring at Lyman Street (immediately upstream of Lyman Street Bridge, April 1998), and LNAPL does appear to be reaching the river.

Preliminary analysis indicates that a combination of sheet piling and groundwater/NAPL extraction behind/upgradient of the sheet piling could accomplish the necessary control of the LNAPL plume in this area. The sheeting could potentially be limited to critical areas where LNAPL is known to be directly proximal to the river. The extent to which additional recovery wells would be needed is unclear. It might be possible to use the existing recovery system with some modifications. In any event, hydraulic control would have to be sufficient to prevent back-up of water on the upgradient side of the sheeting, which could cause undesirable mobilization of LNAPL. Hydraulic control alone has to date apparently not proven sufficient to block or eliminate seeps to the river. However, further performance data on the existing recovery systems in this area are necessary to fully assess their effectiveness. Without a sheet pile barrier, the hydraulic control system would almost certainly require more well points and likely larger extraction volumes to create a continuous barrier to further NAPL movement. The advantage to the sheet piling is that it provides a relatively reliable barrier to LNAPL movement to the river. A slurry wall could provide the same type of barrier, but would likely be a more expensive, more permanent structure not as amenable to modification in the future.

4.2 DNAPL CONTROL

DNAPL is present at East Street Area 2, Lyman Street, and Newell Street. It is also likely present under portions of the river between Building 68 and Lyman Street, where evidence of DNAPL was observed during excavation in the river. The first priority is clearly to address potential migration of DNAPL into the river both during and after the time-critical Removal Action. Further delineation of the DNAPL along and under the river is required. However, full delineation of all the DNAPL is not likely to be possible. Due to its potential proximity to the river bottom in some locations, measures will be necessary to mitigate DNAPL mobilization into the river both during and after the time critical-Removal Action. These could include:

- Reducing the excavation depth in areas of shallow DNAPL.

- Installing a sump or sumps at low points in the till confining layer to collect DNAPL within the river.
- Lining the bottom of the river excavation to block DNAPL intrusion.
- Installing deep sheet piling to key into the DNAPL confining layer along the river; and excavate to depth within the river to remove DNAPL to extent practicable.
- Increasing active removal of DNAPL adjacent to the river to the maximum extent possible.

Of these measures, reducing the excavation depth is likely the most reliable way to successfully mitigate DNAPL movement into the river and its sediments during the time-critical Removal Action. It could also be combined with increased DNAPL removal adjacent to the river. However, it would almost certainly not address the on-going threat from DNAPL or associated dissolved contaminant migration into the river and backfilled sediments. It also would result in less overall removal of the PCB mass from the river sediments, thereby achieving less benefit in this regard.

In-river measures such as collection of DNAPL in sumps in the till or lining of the excavation bear further investigation. These measures are limited to a potentially achievable goal of limiting DNAPL intrusion during excavation and do not necessarily require full characterization or remediation of DNAPL. Installation of a liner could also have long-term benefits by limiting recontamination. Both these alternatives would require further analysis to determine their feasibility of implementation as part of the time-critical Removal Action.

Alternatively, aggressive DNAPL removal in the river through excavation and pumping with associated sheet piling to prevent further DNAPL migration under the river would be extremely difficult and expensive, with no guarantee of success in removing all the DNAPL in the area. Experience at other sites has shown that aggressive DNAPL remediation efforts often have limited effect.

4.3 CONTROL OF DISSOLVED GROUNDWATER CONTAMINATION

As stated above, there are limited data available on dissolved constituents in groundwater in the areas of OU 1 and OU 5 which are adjacent to the Newell Street to Lyman Street reach of the river. Because of the extensive presence of both LNAPL and DNAPL, it is likely that dissolved contamination is present adjacent to the river and is discharging to the river in this area. The level at which this is occurring is not fully known, and this constitutes a significant data gap. It is relatively well established that groundwater discharges to the river throughout this area.

Most VOCs that might be present in the groundwater in this area (e.g. TCE, chlorobenzene) are not nearly as strongly sorbed to soil as PCBs, and would not likely significantly recontaminate sediments. Therefore, our preliminary evaluation considered only PCBs sorbing onto clean backfilled sediments from discharging groundwater. From Section 3.2, based on a simple linear sorption equation and known partitioning coefficients, the concentration in groundwater that could recontaminate sediment to 1 mg/kg would be 0.38 μg/l for Arochlor 1260 and between 2.45 and 38.9 μg/l for Arochlor 1254. If these conditions are found to exist in groundwater discharging to the river, then measures to control or eliminate them might be necessary.

In order to control this type of discharge, significant groundwater control and collection would be necessary along the banks of the river. This could involve significant augmentation of the existing groundwater/NAPL recovery systems and a large increase (likely several hundred gallons per minute) in the treatment capacity of the existing systems. In addition, installation of a cap or barrier of some type would be necessary, as it is very unlikely that hydraulic control adjacent to the river alone could eliminate groundwater discharge to the river. A potential way to effect a significant hydraulic barrier at the river would be installation of a recovery/discharge wall. This could involve reinjecting treated water near the river to assist in creating a hydraulic barrier at the riverbanks. Well points could be used for recovery and a recharge trench could be used for reinjection.

As described above, the measures necessary to limit or eliminate groundwater discharge to the river in the Newell Street to Lyman Street reach, or even a portion of it, would require extensive control measures both adjacent to and in the river. Since it could have such a large impact on the scope and cost of source control measures as well as the long-term success of the time-critical Removal Action, an evaluation of the potential risks posed by dissolved PCBs and other constituents in groundwater discharging to the river is necessary.

4.4 RESIDUAL SOILS/SEDIMENTS

The Newell Street to Lyman Street reach of the river contains, in many areas, high concentrations of PCBs in riverbank soils and river sediments at depth. These contaminated soils could result in recontamination of surficial sediments in the river in the following ways:

- Exposure and redistribution of soil/sediment in the river through erosion/scouring of bank materials and river sediments.
- Deposition of contaminated sediment from upriver.
- Transport of PCBs up to surficial soil/sediments by dissolution in groundwater and subsequent re-adsorption.

Measures to mitigate the first mechanism of recontamination are under consideration as part of the time-critical Removal Action itself. These would include:

- Installation of a stable layer of rock backfill along the river bottom.
- Installation of vegetation and biodegradable erosion control blankets in low erosion/shallow bank areas.
- Installation of armor stone, gabions, or sheet piling along steep banks with high erosion potential.

Based on the available river sediment and floodplain soil PCB data upstream of the Newell Street Bridge, it does not currently appear that significant recontamination from upstream PCB transport would occur. However, to confirm this, a more detailed assessment of the PCB data is necessary including further sediment transport modeling in the river, additional sediment sampling, and evaluation of Unkamet Brook.

Recontamination through transport of PCBs from deeper soils to surficial soils could potentially occur based on the sorption/partitioning mechanisms described previously. The simple partitioning model used in Section 3.2 indicates that recontamination of surficial soils above 1 mg/kg PCBs could potentially occur due to the contaminated soils located at depths greater than 2 feet below the river and in the riverbanks. Further analysis of additional physical and analytical data will be required to better quantify the potential for recontamination by this mechanism.

Measures to address this recontamination issue include the hydraulic control measures described in Subsection 4.3, as well as conducting deeper excavation in the river and riverbank areas where significant PCB levels at depth have been identified. The required effort to implement hydraulic control over groundwater discharge to the river has been discussed. Deeper excavation within the river to directly remove deeper contamination in localized areas may prove a more feasible approach to this issue in terms of cost, implementability, and reliability of success. The degree to which deeper excavation would be conducted would depend on:

- Determination of actual PCB transport potential.
- A predetermined maximum allowable recontamination level.
- A solid understanding of the extent of PCB contamination at depth in the river and adjacent riverbanks.
- The location of potential areas of DNAPL under the river.

These factors have not been fully addressed to date and will require further evaluation.

SECTION 5

SUMMARY AND CONCLUSIONS

5. SUMMARY AND CONCLUSIONS

There are a number of potential contaminant sources along the Housatonic River between Unkamet Brook and the Lyman Street Bridge that have the potential to negatively impact the quality of the river sediments following the planned time-critical Removal Action. These sources can potentially impact the river sediments directly or through several contaminant migration pathways. Table 5-1 summarizes the contaminant source areas identified in Subsection 3.3. The critical contaminant sources are concentrated in East Street Area 2, Newell Street Area and the Lyman Street Area (See Figure 5-1). The following list of identified contaminant sources and transport mechanisms are described in detail in Section 3:

- Erosion of contaminated riverbank surface and subsurface soil and subsequent deposition as contaminated river sediment.
- Erosion of 10- and 100-year contaminated floodplain surface and subsurface soil (primarily in oxbow, stream, and wetland areas) during flood events and subsequent deposition as contaminated river sediment.
- Mobile DNAPL in the riverbank soils and riverbed sediments that can seep directly into sediment removal excavations.
- Mobile LNAPL in riverbank soils seeping into the river.
- Residual LNAPL in riverbank soils, mobilized by water level fluctuations, seeping into the river.
- Groundwater contamination, flowing up through the Housatonic riverbed, re-contaminating clean fill through absorption of contaminants with high sorption coefficients such as PCBs, PAHs, pesticides and metals.
- Discharge of contaminated sediments from storm-water run-off and process wastewater directly into the Housatonic River through NPDES permitted and municipal outfalls.
- Transport of contaminated river sediments from above Newell Street Bridge downstream into the sediment removal area.

Several of these sources and transport mechanisms either alone or in combination, can directly recontaminate the river sediments above the 1 ppm cleanup goal. Other sources and mechanisms would only recontaminate the river sediments incrementally and several sources would have to combine to elevate river sediment concentrations above the cleanup goal.

Table 5-1

Summary of Potential Contaminant Sources to the Housatonic River

OU Number	Site Name	Identified or Potential Contaminant Source
1	East Street Area 1	▪ Building 12F tank Farm (SWMU T-61) LNAPL ▪ Surface Soil Contamination. Storm water sewers may discharge contaminated soil runoff to river. ▪ Groundwater contamination discharging to river.
1	East Street Area 2	▪ Erosion of contaminated soils along riverbank. ▪ Erosion of Oxbow H fill materials. ▪ Mobile and residual LNAPL seeps into river. ▪ Building 68 DNAPL. ▪ Surface Soil Contamination. Storm water sewers may discharge contaminated soil runoff to river. ▪ Groundwater contamination discharging to river.
1	Hill 78 Area	▪ Groundwater contamination discharging to river. ▪ Surface water and sediment contamination in swales discharging to river.
1	Unkamet Brook Area	▪ Groundwater contamination discharging to river. ▪ Unkamet Brook contaminated sediment transport.
1	Lyman Street Area	▪ Mobile and residual LNAPL seeps into river. ▪ DNAPL in riverbank. ▪ Groundwater contamination discharging to river. ▪ Erosion of contaminated soils along riverbank. ▪ Erosion of Oxbow D & E fill materials.
2	Housatonic River	▪ DNAPL in the riverbed sediments. ▪ Erosion of contaminated soils along riverbank. ▪ Erosion or groundwater transport of deeper sediment contamination up into the shallow river sediments.
3	Allendale School	▪ None.
4	Silver Lake	▪ Silver Lake outfall water and sediment contamination. ▪ Groundwater contamination discharging to river.
5	Newell Street Area	▪ Groundwater contamination discharging to river. ▪ Erosion of contaminated soils along riverbank. ▪ Erosion of Oxbows F, G, and I fill materials.
6	Oxbows A, B, C, J & K	▪ Erosion of Oxbows A, B, C, J, and K fill materials. ▪ Groundwater contamination discharging to river.

Additionally, any future excavation activities in the riverbank and storm drainage areas will need to be planned for and controlled to ensure that contaminated soils do not reach the river.

5.1 DATA GAPS

During the review of the existing reports for OU 1 through 6, data gaps were identified concerning a variety of investigation and remediation issues. The data gaps identified in Subsection 3.3 are summarized in Table 5-2.

In order to achieve the necessary source control to allow for a successful time-critical Removal Action, these data gaps need to be addressed through further analysis of existing information and collection of physical and chemical data at the GE Pittsfield site. Proposed data review and investigation activities to address these identified data gaps are included in Table 5-2.

5.2 POTENTIAL ADDITIONAL SOURCE CONTROL MEASURES

Preliminary analysis indicates that in order to successfully complete the time-critical Removal Action, additional source control measures beyond those currently being conducted by GE will be necessary. A list of measures which are under consideration for specific types of sources or conditions which could recontaminate the river follow.

5.2.1 LNAPL Control

The following measures are being considered as potential additional LNAPL control measures:

- LNAPL pumping and hydraulic control.
- Physical barriers – sheet piling, slurry walls.

It is likely that a combination of these above actions would be effective for LNAPL control.

Table 5-2

General Summary of Data Gaps

OU/Area	Data Gaps	Proposed Data Gap Activities
Combined OUs	▪ Comprehensive evaluation of site geology and hydrogeology across OU boundaries. ▪ Comprehensive evaluation of NAPL and groundwater contamination extent across OU boundaries. ▪ Comprehensive groundwater quality and synoptic water level data for entire Removal Action area. ▪ Aroclor- and congene specific PCB data are needed.	▪ Additional geologic/hydrogeologic data review and compilation. ▪ Produce cross-OU maps and 3D model between Newell &Lyman Street Bridges using earthVision software. ▪ Conduct soil boring sampling and geophysical program to better define mobile and residual NAPL near and under the river. ▪ Conduct coordinated water level measurements and groundwater sampling activities for all OUs.
OU 1 East Street Area I	▪ Evaluation of stormwater and sanitary sewer pipelines as preferential pathways ▪ Evaluation of process/product lines as preferential pathways. ▪ Evaluation of the 6” french drain as a preferential pathway. ▪ Nature & extent of groundwater contamination in the vicinity of Well RF-13 and south of Merrill Road. ▪ Capture zone and oil thickness south of the Southside Caisson. ▪ Additional evaluation of Lakewood area soils.	▪ Determine if GE conducted proposed preferential pathway analyses. Evaluate results if completed. ▪ Conduct additional groundwater sampling at RF-13 and existing wells south of Merrill Road and install and sample any additional wells needed to characterize the area groundwater quality. Analyze for all COCs including PCBs. ▪ Review raw site data for the Southside Caisson to determine if additional wells and sampling are required. ▪ Conduct soil sampling program to fully characterize Lakewood area soils.

Table 5-2

General Summary of Data Gaps (Continued)

OU/Area	Data Gaps	Proposed Data Gap Activities
East Street Area 2	▪ Extent of DNAPL along the riverbanks and beneath the river. ▪ Groundwater PCB concentrations adjacent to the river. ▪ Groundwater quality adjacent to the river throughout East Street Area 2. ▪ Sediment quantity and quality discharging to the river from Area 2 outfalls. ▪ Nature and extent of residual LNAPL along the riverbanks. ▪ Evaluate stratigraphy to access potential DNAPL flow paths. ▪ Determine bedrock groundwater quality and hydraulic relationships to shallow groundwater and surface water. ▪ Determine riverbank areas that pose recontamination risks to the river. ▪ Impact of wastewater treatment facility oil/water separator bypass during high flow events. ▪ Data needed to more thoroughly evaluate the effectiveness of existing source control measures.	▪ Conduct soil boring sampling and geophysical program to better define mobile and residual NAPL near and under the river. ▪ Review & evaluate raw groundwater and well construction data. Install monitoring wells needed to complete groundwater assessment and recovery system evaluation. ▪ Conduct groundwater sampling in new & existing wells for all COCs including PCBs. ▪ Review results of GE preferential pathway analysis sampling, if available. Sample sediment at the end of outfalls. Collect water and sediment samples during high storm water flow (potential separator bypass) events. ▪ Conduct data review and site study to determine riverbank area erosion potential. ▪ Install and sample several bedrock monitoring wells paired with shallow wells. Evaluate soil contamination, water quality, and groundwater flow gradients.
Hill 78 Area	▪ Evaluation of preferential pathways associated with sanitary/storm sewer lines and process/product lines that may impact river sediments. ▪ Determine quality of groundwater between the Hill 78 site and the river. ▪ Determine surface water and sediment quality in drainage swales that may impact the river.	▪ Review results of GE preferential pathway analysis sampling, if available. Conduct additional sampling. ▪ Conduct groundwater sampling at existing wells south of Merrill Road. ▪ Conduct surface water and sediment sampling in drainage swales.
Unkamet Brook	▪ Additional PCB groundwater quality data required.	▪ Conduct groundwater sampling in existing wells.

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Table 5-2

General Summary of Data Gaps (Continued)

OU/Area	Data Gaps	Proposed Data Gap Activities
Lyman Street/ Oxbows D & E	▪ Extent of the LNAPL and DNAPL plumes, including potential for DNAPL under the river. ▪ Extent of the dissolved groundwater plume in the shallow and deep aquifer. ▪ Stormwater outfall potential impacts on the river. ▪ Riverbanks soil quality and potential impacts to the river.	▪ Conduct soil boring sampling and geophysical program to better define mobile and residual NAPL at the site. ▪ Review & evaluate raw groundwater and well construction data. Install monitoring wells needed to complete groundwater assessment and recovery system evaluation. ▪ Conduct groundwater sampling in existing & new wells for all COCs including PCBs. ▪ Review results of GE preferential pathway analysis sampling, if available. Sample sediment at the end of outfalls. ▪ Conduct data review and site study to determine riverbank area erosion potential. Conduct additional riverbank sampling.
OU 2 (Housatonic River)	▪ Riverbank soil quantity and potential impacts to the river. ▪ Nature & extent of DNAPL under the river. ▪ Vertical extent of river sediment contamination.	▪ Conduct data review and site study to determine riverbank area erosion potential. Conduct additional riverbank sampling. ▪ Conduct soil boring sampling and geophysical program to better define mobile and residual NAPL under the river. ▪ Conduct deeper (> 2 ft.) sediment sampling in river.
OU 3 (Allendale School)	▪ None	▪ None
OU 4 (Silver Lake)	▪ Sediment quality in the mound formed by the Silver Lake outfall to the Housatonic River. ▪ Overall surface water and sediment quality upstream and downstream of the Silver Lake outfall. ▪ Groundwater quality between Silver Lake and the river.	▪ Sample Silver Lake outfall wetland area. ▪ Review & evaluate raw groundwater and well construction data. Install monitoring wells needed to complete groundwater assessment. ▪ Conduct groundwater sampling in existing & new wells for all COCs including PCBs.

Table 5-2

General Summary of Data Gaps (Continued)

OU/Area	Data Gaps	Proposed Data Gap Activities
OU 5 (Newell Street)	▪ Extent and composition of the LNAPL plume. ▪ Extent and composition of the DNAPL plume. ▪ Extent of groundwater plumes.	▪ Sample and analyze (constituents & fingerprint) DNAPL and LNAPL. ▪ Conduct soil boring sampling and geophysical program to better define mobile and residual NAPL at the site. ▪ Review & evaluate raw groundwater and well construction data. Install monitoring wells needed to complete groundwater assessment and recovery system evaluation. ▪ Conduct groundwater sampling in existing & new wells for all COCs including PCBs.
OU 6 (Oxbows)	▪ Extent of soil contaminated with PCBs that may impact the river. ▪ Extent of contaminated groundwater that may present a recontamination threat.	▪ Review soil contamination data and sample additional locations as needed to characterize oxbows. ▪ Review & evaluate raw groundwater and well construction data. Install monitoring wells needed to complete groundwater assessment. ▪ Conduct groundwater sampling in existing & new wells for all COCs including PCBs.

5.2.2 DNAPL Control

The following measures are being considered as potential additional DNAPL control measures:

- Reduction of excavation depth in areas of shallow DNAPL.
- Collection of DNAPL in sumps within the river during excavation.
- Lining of the bottom of the river excavation.
- Direct excavation of DNAPL and residual contamination to depth in river.
- Increased active removal of DNAPL adjacent to the river.

Of the above measures, in-river measures to redirect and collect DNAPL and lining the excavation or modifying excavation depth likely offer the best chance of success, due to the anticipated difficulty in fully characterizing and removing all the DNAPL in the area.

5.2.3 Control of Contaminated Groundwater

Control of contaminated groundwater discharge to the river would likely require significant additional measures to alter and reverse the hydraulic gradient near the river. This could involve new and augmented groundwater extraction and reinjection systems. The cost and potential scope of these measures makes it critical to more quantitatively evaluate impacts from contaminated groundwater discharge.

5.2.4 Control of Recontamination by Deeper Residual Contaminated Soils

Similar mechanisms would operate in potential recontamination of clean river backfill by desorption/adsorption of contaminants from deeper, unremediated riverbank soils and river sediments. Measures to address this potential recontamination pathway include:

- Hydraulic control of groundwater near the river to limit groundwater discharge
- Excavation of deeper sediments or riverbank soils in selected areas

The alternative of limited additional excavation would potentially be more readily feasible, depending on the maximum required depth of excavation. Further analysis is necessary to assess if any additional measures would be necessary to address this recontamination mechanism.

5.2.5 Control of Contaminated Soil/Sediment Transport

Potential measures to limit recontamination by transport of contaminated river sediment or riverbank soils have been outlined in the draft Removal Action Work Plan prepared by the Army Corps of Engineers and include:

- Installation of stable rock backfill in the river, and installation of armor stone, gabions, or sheet piling along the riverbanks.
- Installation of vegetation and biodegradable erosion control structures along the riverbanks.

Additional potential sediment control measures could include sediment control structures in outfalls or areas draining directly to the river.

Currently available data do not indicate a strong likelihood for transport of significant amounts of PCB-contaminated sediment or soil from upriver into the time-critical Removal Action area. Therefore, measures to control this type of sediment/soil transport have not been considered as part of the preliminary analysis.

The measures mentioned above, and potentially several others not yet under consideration, will be subjected to further analysis as part of the development of the Conceptual Source Control Work Plan.

SECTION 6

REFERENCE LOG

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GE Pittsfield Reference Log

WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
00-0001				Apr-07	1997	General Electric - Gabion Sampling, Justin Pimpare - EPA, April 7, 1997
00-0005				Sep, Oct, Apr	1981, 1982	Five Sets, PCB Data, September 13, 1981; October 13, 1981; April 5, 1982
00-0006				Feb-03	1982	Correction for PCB Data, State of Connecticut, February 3, 1982
00-0012				Jul-07	1981	Report on Residential Air Monitoring for PCBs in Pittsfield, Massachusetts, US EPA, July 7, 1981
00-0013				Aug-04 and 11	3-Jun	Two Internal EPA Memoranda from Frank J. Gory to Donald P. Porteous RE: PCB and Air Monitoring, August 4 and 11, 1981
00-0014				September	1981	Report on Residential Air Monitoring for PCBs in Pittsfield, Massachusetts, US EPA, September 1981
00-0017						Climatological Data: Annual Summary for New England by the National Oceanic and Atmospheric Administration and Other Information, Central Berkshire Chamber of Commerce, No dates available
00-0028				Jul-19	1985	Order of Conditions - Massachusetts Wetlands Protection Act, Lee Conservation Commission, July 19, 1985
00-0064				Jul-30	1981	Comments on PCBs in Lakewood Residents, Massachusetts Department of Public Health, July 30, 1981
00-0076				Apr-16	1983	Evaluation of Remedial Action Effectiveness at Lakewood Area, Pittsfield, Massachusetts, Arthur D. Little, Inc., April 16, 1983
00-0079				Apr-16	1984	Evaluation of Remedial Action Effectiveness and Potential Exposure Pathways, Lakewood Area, Pittsfield, Massachusetts, Arthur D. Little, Inc., April 16, 1984
00-0080				Jan-16	1987	Truck Routes to PCB Disposal Sites, Berkshire County Regional Planning Commission, January 16, 1987
00-0084				July	1979	Phase I Inspection Report - National Dam Inspection Program, US Army Corps of Engineers, July 1979
00-0085				Oct-08	1982	Field Investigation Report of Uncontrolled Hazardous Waste Sites - FIT Project - Preliminary Assessment of Subsurface Contamination: Lakewood Area, Volume I, Ecology and Environment, Inc., October 8, 1982
00-0101				September	1991	Ambient Trend Monitoring and PCB Fate and Transport Model, Lawler, Matusky & Skelly Engineering, September 1991
00-0102				March	1992	Stabilization Collaborative Initiative Interim Report, General Electric, Pittsfield, Golder Associates, March 1992
00-0109				Apr-20	1994	Memorandum from Ms. Celeste Philbrick Barr, US EPA, to Ms. Nancy Barmakian, MS. Vickie Maynard, Ms. Susan Svirsky and Ms. Patti Tyler, US EPA; Mr. Steve Mierzykowski, Mr. Ken Munney and Mr. Tim Pryor, USFWS; and Ken Finkelstein, NOAA, RE: Region I ESD Fi

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
00-0113				Nov-01	1995	Letter from EPA New England Risk Assessors, to Mr. Jim Cogliano, US EPA, RE: Comments on "PCBs: Cancer Does-Response Assessment and Application to Environmental Mixtures", and Internal Review Draft dated September 1995, November 1, 1995
00-0123				Apr-07	1998	GE - Gabion Sampling (Addressee) Bryan Olson - EPA (Author) Justin Pimpare - EPA (Date) April 7, 1998, Letter (AR No.) 02.01.7, Doc. No. 000031.
00-0125				Mar	1998	GE - John D. Ciampa (Addressee) Bryan Olson - EPA (Date) March 12, 1998, Letter . 108 Pages. (AR No.) 02.02.15, Doc. No. 000028.
00-0130				Jun-25	1993	Memorandum from Ms. Nancy Bettinger, MA DEP, to Ms. Catherine Want, MA DEP, Re: Evaluation of the Need for Short Term Measures and Exposure Reduction Recommendations.
00-0144				Jun	1997	Blasland, Bouck & Lee, Inc. 1995. Scope of Work for Additional Investigation & Assessment - 325 Benedict Road.
00-0145				Jul	1997	Blasland, Bouck & Lee, Inc. 1997. Scope of Work for Additional Investigation & Assessment - Parcel F14-5-4.
00-0146				Jul	1997	Geophysical Applications Incorporated, 1997. Report of Magnetic and GPR Surveys Soccer and Baseball Field Areas Richmond, MA School.
00-0147					1988	Geological Survey of Pittsfield East Massachuestts, Topographic Map, 42073-D1-TM-025, Department of the Interior, 1988
00-0148					1987	Geological Survey of East Lee Massachuestts, Topographic Map, 42073-C1-TM-025, Department of the Interior, 1987
00-0149					1984	Bedrock Geologic Map of the Pittsfield East Quadrangle, Berkshire Count, Massachuestts, US Geological Survey Geologic Quadrangle Map GQ-1574, Ratcliffe, N.M., 1984
00-0150				October	1985	Tectonic Synthesis of the Taconian Orogeny in Western New England, Geological Society of America Bulletin, v.96, R.S. Stanley, N.M. Ratcliffe, October 1985
00-0151					1983	Bedrock Geologic Map of Massachusetts, US Geological Survey and the Commonwealth of Massachuestts Department of Public Works, J.A. Sinnot, State Geologist, Zen, E-An, Editor, with R. Goldsmith, N.M. Ratcliffe, P. Robinson, and R.S. Stanley, 1983
00-0152					1988	Pittsfield West, Massachuestts - New York, Topographic Quadrangle Map, US Geological Survey, 1988
00-0153					1984	Glaciers and Landscape, Butler & Tanner, Ltd London, England, Sugden, D.E., and B.S. John, 1984
00-0154				Feb-07	1997	Schmidle, J. (START). 1997. Project Note, RE: Population Calculations-Residential Population within 1 mile of Areas A,B,C. TDD No. 96-10-0010. 7 February.

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
00-0155					1988	USGS 1988 U.S. Geological Survey Great Barrington Quatriangle, Massachusetts 7.5 x 15 minute topographic map.
01-0001	23.54	1	East Street Area 2	January	1996	Occurrence of Oil at East Street Area 2/USEPA Area 4 - Fall 1995, Blasland, Bouck, & Lee, Inc., January 1996
01-0002	23.57	1	East Street Area 2	May	1996	Addendum to Phase II/RFI Proposal - East Street Area 2/USEPA Area 4 - Pittsfield, MA, Golder Associates, May 1996
01-0003	1.13	1	East Street	Jan-04	1980	Draft - Hydrogeological Analysis of Insulating Oil Leakage in the Vicinity of East Street, Pittsfield, Geraghty & Miller, Inc., January 4, 1980
01-0004	1.24	1	East Plant Area	Nov-01	1982	Geologic Logs for Wells Installed in the East Plant Area, Geraghty & Miller, Inc., November 1, 1982
01-0005	2.13	1	Unkamet Brook Area	June	1982	Study of Housatonic River - Unkamet Brook Investigation, Groundwater Investigation, O'Brien & Gere, June 1982
01-0006		1	Unkamet Brook Area	Sep-13	1982	Review of Study of Housatonic River Unkamet Brook Investigation and Groundwater Investigation, US EPA, September 13, 1982
01-0007	2.15	1	Unkamet Brook Area	Nov-12; Mar-02	1982; 1983	Three Sets, Review: Unkamet Brook Investigation, November 12, 1982; March 2, 1983, No data available
01-0008	2.17	1	Unkamet Brook Area	November	1983	Ambient Air Study - Unkamet Brook Landfill Area, Zorex Corporation, November 1983
01-0009	2.18	1	Unkamet Brook Area	December	1983	Unkamet Brook Area Monitoring Program, Geraghty & Miller, Inc., December 1983
01-0010	2.21	1	East Street Area 1 and 2	Jun-05,27; Feb-13; May-29; Jul-22	1985;1986	Seven Sets, East Street Areas I and II Semi-Annual Monitoring Report, Geraghty & Miller, Inc., June 5, 1985, June 27, 1985, February 13, 1986, May 29, 1986, July 22, 1986
01-0011	2.22	1	Unkamet Brook Area	January	1986	Unkamet Brook Sediment Monitoring Program, Blasland & Bouck Engineering, P.C., January 1986
01-0012	2.23	1	Unkamet Brook Area	January	1986	Results of the Two-Year Monitoring Program, Unkamet Brook Area, Pittsfield Massachusetts, Geraghty & Miller, Inc., January 1986
01-0013	2.24	1	East Street Area 1 and 2	December; September; January; July	1986; 1987; 1988	Ten Sets, Occurrence of Oil, East Street Areas I and II, Geraghty and Miller, Inc., December 1986, September 1987, December 1987, January 1988, July 1988, December 1988
01-0014	2.26	1	Unkamet Brook Area	April; June; December	1988	Evaluation of Groundwater Conditions, Unkamet Brook Area, Geraghty & Miller, Inc., April 1988, June 1988, December 1988
01-0015	2.3	1	Unkament Brook Area			Monitoring Protocols, Unkament Brook Area, General Electric Company, no dates available
01-0016	4.39	1	Unkament Brook Area	Aug-13	1986	Letter from Mark Valentine (GE) to US EPA Region I and DEQE - Boston RE: Discharge of a PCB - Contaminated Liquid from an Excavated Pit North of Building 59 into a Storm Sewer which Discharges to the Building 1119W Oil/Water Separator and then to the NPDE
01-0017	16.12	1	Hill 78 Area	Sep-09	1991	Current Assessment Summary for Hill 78 Area, Volume I, September 9, 1991

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
01-0018	19.278	1	East Street Area 1 and 2; Hill 78 Area	Aug-21	1997	Letter from J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, and Bryan Olson, EPA, To Jane Magee, General Electric Company, RE: East Street Area I; East Street Area II; Hill 78 Landfill Area; Conditional Approval of Replacement Well Proposal for Merrill
01-0019	24.155	1	Lyman Street/USEPA Area 5A Site	Jun	1996	Blasland, Bouck & Lee, Inc. 1996. MCP Supplemental Phase II/RCRA Facility Investigation Report for Lyman Street/USEPA Area 5A Site. June.
01-0020	20.40	1	Unkament Brook Area/USEPA Area 1	Nov	1995	Blasland, Bouck & Lee, Inc. 1995. MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation of Unkamet Brook Area/USEPA Area 1. November.
01-0021	20.13, 20.14	1	Unkamet Brook Area/USEPA Area 1	Jan	1995	Blasland, Bouck & Lee, Inc. 1995. MCP Interim Phase II Report and Current Assessment Summary for Unkamet Brook Area/USEPA Area 1, Volumes I and II. January.
01-0022	20.17, 20.18	1	Hill 78 Area/Area 2	May	1995	O'Brien & Gere Engineers, Inc. 1995. Phase I Report (MCP)/Current Assessment Summary, Hill 78 Area/Area 2. May.
01-0023	22.24	1	East Street Area 1/USEPA Area 3	Jun	1995	Blasland, Bouck & Lee, Inc. 1995. Occurrence of Oil at East Street Area 1/USEPA Area 3 - Spring 1995. June. Fig. 2.
01-0024	23.29, 23.30, 23.31, 23.32, 23.33, 23.34, 23.35, 23.37, 23.38	1	East Street Area 2/USEPA Area 4	Aug	1994	Blasland Bouck & Lee, Inc. 1994. MCP Interim Phase II Report and Current Assessment Summary for East Street Area 2/USEPA Area 4. Volumes I, II, III, IV, V, VI, VII, IX, X.
01-0025	22.18, 22.19	1	East Street Area 1	Oct	1994	Blasland, Bouck & Lee, Inc. 1994. MCP Interim Phase II Report and Current Assessment Summary for East Street Area 1/USEPA Area 3. Volumes I, II, III and IV.
01-0026	23.54	1	East Street Area 2/USEPA Area 4	Jan	1996	Occurrence of Oil at East Street Area 2/USEPA Area 4 - Fall 1995. (Author) Blasland, Bouck & Lee, Inc. January 1996, Report, Study (AR No. 02.02.1, 46 Pages, Doc. No. 000010. Attached to Doc. No. 000009 in 02-01.
01-0027		1	Oxbow Area D	Feb	1994	Blasland, Bouck & Lee, Inc. 1994. MCP Phase I Report for Lyman Street Parking Lot (Oxbow Area D) and Current Assessment Summary for USEPA Area 5a. Volumes I, II, III and IV. February. Vol. I.
01-0028		1	Unkamet Brook Area	April/May	1980	Laboratory Sheets for Priority Pollutant Analysis of Water Samples Collected from Wells Downgradient of the Waste Stabilization Basin, Geraghty & Miller, Inc., April/May 1980

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
01-0029	23.59	1	East Street Area 2/USEPA Area 4	Jul	1996	Blasland, Bouck, & Lee, Inc. 1996. Occurrence of Oil at East Street Area 2/USEPA Area 4. Report, Study. 44 Pages (AR. No. 02.02.6, Doc. No. 000012.
01-0030	23.64	1	East Street Area 2/USEPA Area 4	Feb	1997	Blasland, Bouck, & Lee, Inc. 1997. Occurrence of Oil at East Street Area 2/USEPA Area 4. Report, Study. 44 Pages (AR No.) 02.02.7, Doc. No. 000014.
01-0031	23.70	1	East Street Area 2/USEPA Area 4	Aug	1997	Blasland, Bouck, & Lee, Inc. 1997. Occurrence of Oil at East Street Area 2/USEPA Area 4. Report, Study. 45 Pages (AR No.) 02.02.8, Doc. No. 000016.
01-0032	24.188E	1	Lyman Street/USEPA Area 5A Site	Oct	1997	Blasland, Bouck, & Lee, Inc. 1997. Addendum to MCP Supplemental Phase II/RCRA Facility Investigation Proposal for Lyman Street/USEPA Area 5A Site. Report, Study. 113 Pages (AR No.) 02.02.10, Doc. No. 000023.
01-0033	24.187	1	Oxbow Area D	Oct	1997	Golder Associates. 1997. Effectiveness Evaluation of Short Term Measures - Lyman Street (Oxbow Area D) - Pittsfield. October. Report, Study, 86 Pages (AR No. 02.02.11. Doc. No. 000024.
01-0034		1	East Street Area 2/USEPA Area 4	Feb	1998	Blasland, Bouck, & Lee, Inc. 1998. Occurrence of Oil at East Street Area 2/USEPA Area 4 - Fall 1997. Report, Study. 41 Pages. (AR No.) 02.02.13, Doc. No. 000018. (Attached to Document No. 000017 in 02.01).
01-0035	23.49	1	East Street Area 2/USEPA Area 4	Jul	1995	Blasland, Bouck, & Lee, Inc. 1995. MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation of East Street Area 2/USEPA Area 4. Report, Study. 295 Pages. (AR No.) 02.08.1, Doc. No. 000007.
01-0036		1	GE Facility	Dec-16	1974	NPDES Permit for the General Electric Company - Pittsfield Facility, December 16, 1974
01-0037		1	GE Facility	Jul-21	1975	National Pollutant Discharge Elimination System Permit, Modification No. 1, July 21, 1975
01-0038		1	GE Facility	Feb-03	1978	National Pollutant Discharge Elimination System Permit, Modification No. 2, February 3, 1978
01-0039		1	GE Facility	June	1979	National Pollutant Discharge Elimination System Permit Information, US EPA, June 1979
01-0040		1	GE Facility	Jun-29	1979	PCB Processing and Distribution Exemption Petition, General Electric Company, June 29, 1979
01-0041		1	GE Facility	Aug-12	1980	RCRA Part A Permit Application, General Electric Company, Pittsfield, Massachusetts, August 12, 1980
01-0042	23.33	1	Unkamet Brook Area/USEPA Area 1	May-25	1995	Letter from Ms. Christina M. Bramante, A.T. Kearney, to Ms. Kathy Castagna, U.S. EPA, Re: Review of the RFI Proposal and Current Assessment Summary for Area 1; Interim Deliverable for Task 03, May 25, 1995.

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
01-0043	20.33A	1	Unkamet Brook Area/USEPA Area 1	Jan	1995	A. T. Kearney, January 1995. Technical Review of the MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation of Unkamet Brook Area/USEPA Area 1 and the MCP Interim Phase II Report and Current Assessment Study for Unkamet Brook
01-0044	20.34	1	Unkamet Brook Area/USEPA Area 1	Jun-13	1995	Memorandum from Ms. Meg Harvey, MA DEP, to Mr. Tony Kurpaska, MA DEP, Re: Review of Preliminary Health and Environmental Assessment Proposal for the General Electric Company's Unkamet Brook Area/US EPA Area 1 Site (DEP Site #1-0148).
01-0045	20.35	1	Unkamet Brook Area/USEPA Area 1	Aug-17	1995	Letter from Ms. J. Lyn Cutler, MA DEP and Mr. Matthew Hoagland, US EPA, to Mr. Ronald F. Desgroseilliers, General Electric Company, Re: GE/Unkamet Brook; Phase II/RFI Proposal comments and requirements for resubmittal, schedule, and conditional PHEAP app
01-0046		1	GE Facility	November	1984	NPDES Outfalls for the General Electric Company - Summary of Discharge Points and Sources, November 1984
01-0047	20.37	1	Unkamet Brook Area/USEPA Area 1	Sep-19	1995	Letter from Mr. Mark C. Phillips, General Electric Company, to Ms. Anna Symington, MA DEP and Mr. Bryan Olson, US EPA, Re: GE/Unkamet Brook; Phase II/RFI Proposal Comments, September 19, 1995.
01-0048		1	GE Facility	Feb-25	1985	Case Development Inspection Report of GE, November 25 and 26, 1984, US EPA Control Technology and Compliance Section, February 25, 1985
01-0049		1	GE Facility	May	1985	RCRA Part B Permit Application, Volumes I and II, Blasland and Bouck Engineers, Inc., May 1985
01-0050	21.19	1	Hill 78 Area/EPA Area 2	May-01	1995	Preliminary Health and Environmental Assessment Proposal for the Hill 78 Area/EPA Area 2 Site, Prepared by ChemRisk, May 1, 1995.
01-0051	21.29	1	Hill 78 Area/EPA Area 2	Mar	1997	Blasland, Bouch & Lee, Inc. March 1997. Assessment of Potential preferential Pathways Hill 78 Area/US EPA Area 2.
01-0052	22.9	1	East Street Area 1	Dec	1992	Geraghty & Miller, Inc. December 1992. Occurrence of Oil - East Street Area 1, Fall 1992, GE Company.
01-0053	22.12	1	East Street Areas 1 & 2	Feb	1994	Blasland Bouck & Lee, Inc. February 1994. Interim Measure Proposal - Oil Recovery programs in East Street Areas 1 and 2.
01-0054	22.14	1	East Street Area 1/USEPA Area 3	Aug	1994	Blasland, Bouck & Lee, Inc. August 1994. Occurrence of Oil at East Street Area 1/US EPA Area 3 - Spring 1994.
01-0055	22.22	1	East Street Area 1/USEPA Area 3	Jan	1995	Blasland, Bouck & Lee, Inc. January 1995. Occurrence of Oil at East Street Area 1/US EPA Area 3 - Fall 1994
01-0056	22.27	1	East Street Area 1/USEPA Area 3	Oct	1995	Blasland, Bouck & Lee, Inc. 1995. MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation for East Street Area 1/US EPA Area 3.
01-0057	23.11	1	East Street Area 2	Dec	1991	Geraghty & Miller, Inc. December 1992. Occurrence of Oil - East Street Area 2, Fall 1991, GE Company.

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
01-0058	23.13	1	East Street Area 2	Apr	1992	Golder Associates, April 1992. Pumping Test Analyses and Evaluation of Recovery measures.
01-0059	23.13A	1	East Street Area 2	Apr-30	1992	Letter from Mr. Grant Bowman, General Electric Company, to Ms. Catherine Want, MA DEP, Bureau of Waste Cleanup, Re: Pumping Test Analyses and Evaluation of Recovery Measures for East Area 2.
01-0060	23.14	1	East Street Area 2	Jun	1992	Geraghty & Miller, Inc. June 1992. Occurrence of Oil East Street Area 2, Spring 1992, GE Company, Pittsfield, Massachusetts.
01-0061	23.21	1	East Street Area 2	Jun	1993	Geraghty & Miller, Inc. June 1993. Occurrence of Oil East Street Area 2.
01-0062	23.22	1	East Street Area 2	Jun	1993	Golder Associates, June 1993. Evaluation of River Bank Recovery Measures: RW-1(X) System East Street Areas; Pittsfield, MA.
01-0063	23.25	1	East Street Area 2	Dec	1993	RUST Environment & Infrastructure, December 1993. East Street Area 2 - Supplemental Monitoring Wells.
01-0064	23.26	1	East Street Area 2	Feb	1994	Geraghty & Miller, Inc., February 1994. Occurrence of Oil East Street Area 2, Fall 1993. General Electric Company.
01-0065	23.28	1	East Street Area 2/USEPA Area 4	Aug	1994	RUST Environment & Infrastructure, August 1994. Evaluation of Recovery Measures and Groundwater Flow Modeling, East Street Area 2/US EPA 4 .
01-0066	23.42	1	East Street Area 2/USEPA Area 4	Aug-02	1994	ChemRisk, August 2, 1994. Preliminary Health and Environmental Assessment Proposal for the East Street Area 2/EPA Area 4 Site.
01-0067	23.43A	1	East Street Area 2/USEPA Area 4	Aug	1994	A. T. Kearney, August 1994. Technical Review of the MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation of the East Street Area 2/US EPA Area 4 and the MCP Interim Phase II Report and Current Assessment for East Street Area
01-0068	23.44	1	East Street Area 2	Jan-25	1995	Memorandum from Ms. Meg Harvey, MA DEP, to Ms. Susan Steenstrup, MA DEP, Re: Review of the Preliminary Health and Environmental Assessment Proposal for the General Electric Company's East Street Area 2 Site, Pittsfield, Massachusetts (DEP Site Number 1-0146).
01-0069	23.45	1	East Street Area 2/US EPA Area 4	Feb	1995	Blasland, Bouck & Lee, Inc., 1995. Occurrence of Oil at East Street Area 2/US EPA Area 4 - Fall 1994.
01-0070	23.48	1	East Street Area 2/US EPA Area 4	Jul	1995	Blasland, Bouck & Lee, Inc. 1995 - Occurrence of Oil at East Street Area 2/US EPA Area 4 - Spring 1995.
01-0071		1	GE Facility	Jul-11	1985	Letter from J. H. Thayer (GE) to Robin Lind (EPA) RE: Response to Information Request, July 11, 1985
01-0072	24.1	1	Lyman Street Parking Lot			Lyman Street Parking Lot STM Well Measurements (Author Unknown, Date Unknown).
01-0073		1	GE Facility	Oct-23	1985	Response to Information Request on Solid Waste Management Units, General Electric Company, October 23, 1985
01-0074	24.163A	1	Lyman Street (Oxbow Area D)	Sept	1996	Golder Associates, Inc. 1996. Effectiveness Evaluation of Short Term Measures Lyman Street (Oxbow Area D) Pittsfield, MA.

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01-0075	24.187	1	Lyman Street	Oct	1997	Golder Associates, Inc. 1997. Effectiveness Evaluation of Short Term Measures Lyman Street (Oxbow Area D) Pittsfield, MA.
01-0076	24.188A	1	Lyman Street	Oct	1997	Blasland, Bouck & Lee, Inc. 1997. Addendum to MCP Supplemental Phase II/RCRA Facility Investigation Proposal for Lyman Street/US EPA Area 5A Site, Volume I of V.
01-0077		1	Building 68 Area	Sep-02	1997	Letter from Andrew T. Silver, GE Company, to Dean Tagliaferro, EPA, and J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, Re: Project Status Report for the Period of August 24 through 30, 1997 for Building 68 Area Removal Action Work Plan.
01-0078		1	Building 68 Area	Oct-03	1997	Letter from Andrew T. Silver, GE Company, to Dean Tagliaferro, EPA, and J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, Re: Project Status Report for the Period of September 28 through October 4, 1997 for Building 68 Area Removal Action Work Plan.
01-0079		1	GE Facility	Dec-01	1985	Revisions to General Electric Company, Pittsfield's Part B Permit Application, J. H. Thayer, December 1, 1985
01-0080		1	GE Facility	Jun-27	1986	Letter from Arthur Granfield (GE) to Stephen Joyce (DEQE) RE: Notice of Violation (NOV) Degreasing Facilities, June 27, 1986
01-0081		1	GE Facility	Mar-24	1987	Letter from GE to US EPA Surveillance Branch - Water, Lexington, MA RE: NPDES Permit MA 003891, Sources of Discharges to Outfalls, March 24, 1987
01-0082		1	GE Facility	August	1988	RCRA Facility Assessment - Preliminary Review/Visual Site Inspection Report of the General Electric Facility, Pittsfield Massachusetts, A.T. Kearney, Inc., August 1988
01-0083		1	GE Facility	Sep-30	1988	NPDES Permit for GE-Pittsfield (US EPA NPDES Permit No. MA 0003891), September 30, 1988
01-0084		1	GE Facility	Oct-05	1970	Letter from Thomas McMahon (Massachusetts Water Pollution Control) to James Thayer (GE) RE: Oil Separator 119-W, October 5, 1970
01-0085		1	GE Facility	Jun-22	1971	Figures Illustrating Existing Discharge Points (001 through 011), General Electric Company, June 22, 1971
01-0086		1	GE Facility	Jun-26-28	1975	Reconnaissance Survey General Electric Company, Pittsfield, Massachusetts, US EPA, June 26-28, 1975
01-0087		1	GE Facility	Aug-29	1975	Report on Use of PCBs at GE Facilities for July, 1974 through June 1975, General Electric Company, August 29, 1975
01-0088		1	GE Facility			Report on Use of PCBs at GE Facilities for 1971 through June 1975, General Electric Company
01-0089		1	GE Facility	Jan-21; Feb-10	1976;1986	2 Sets, Draft - PCB Plant Inspection, US EPA, Massachusetts Department of Environmental Quality Engineering, January 21, 1976; February 10, 1986

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01-0090		1	GE Facility	October	1977	Addendum to 1976 Engineering Report on Plans for Reduction of PCB Discharges at the General Electric Company, Pittsfield, Massachusetts, Richard L. Reinhart, General Electric Company, October 1977
01-0091		1	GE Facility	Apr-22	1981	Investigation of Oil Leakage in Area South of and Adjacent to 3-C Storage Yard, Pittsfield Massachusetts, Geraghty and Miller, Inc., April 22, 1971
01-0092		1	GE Facility	January	1982	Report on Past Hazardous Waste Disposal Practices, O'Brien & Gere, January 1982
01-0093		1	GE Facility	January	1982	Employee Interviews, Report on Past Hazardous Waste Disposal Practices, General Electric Company, January 1982
01-0094		1	GE Facility	Sep-11	1985	Letter from Arthur Granfield (GE) to Stephen Joyce (DEQE) RE: Spill of Materials in Building 51, September 11, 1985
01-0095		1	GE Facility		1985	List of Non-Exempt Degreasers Used by GE, General Electric Company, 1985
01-0096		1	GE Facility	Mar-22	1985	Letter from Dave Fierra (US EPA) to J.H. Thater (GE) RE: Discharges from Oil/Water Separators 64W and64X to NPDES Permitted Outfalls 005 and 006, NPDES Permit No. MA 0003891, March 22, 1985
01-0097		1	GE Facility	May	1985	Plant-wide RACT, VOC Emissions from Otherwise Unregulated Operations for GE, Zorex Corporation, May 1985
01-0098		1	GE Facility	Nov-13	1985	Letter from Arthur Granfield (GE) to Stephen Joyce (DEQE) RE: Spill of ten gallons of Waste Oil Containing 13 ppm PCB in Building 19 Parking Area, November 13, 1985
01-0099		1	GE Facility	May	1986	Underground Storage Tank Notification Report, Blasland and Bouck Engineers, May 1986
01-0100		1	GE Facility	Aug-13	1986	Letter from General Electric to Suzannah Grady (US EPA) and Glen Gilmore (DEQE) RE: PCB Discharge to Oil/Water Separator 119W from Building 59 Area, August 13, 1986
01-0101		1	GE Facility	December	1986	Draft - Underground Storage Tank Management Program at GE Pittsfield, Blasland and Bouck Engineers, December 1986
01-0102		1	GE Facility	Oct-26	1987	Preliminary Historical Aerial Photography Interpretation Report for GE-Pittsfield, EPIC Laboratories, October 26, 1987
01-0103		1	GE Facility	Nov-03	1987	1987 Chemical Use Inventory for Plastics Division of GE, General Electric Company, November 3, 1987
01-0104		1	GE Facility	Dec-07	1987	Material Safety Data Sheet for Polyamide-Imide resin, P.D. George Co., December 7, 1987
01-0105		1	GE Facility	June	1988	Closure and Post-Closure Plan, Thermal Oxidizer and Associated Facilities, Blasland and Bouck Engineers, P.C., June 1988
01-0106		1	GE Facility, Woods Pond, Housatonic River	October	1989	Photographic Log of the General Electric Pittsfield Facility, Woods Pond and the Housatonic, A.T. Kearney, Inc., October 1989

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01-0107		1	GE Facility	Nov-27	1989	Letter and enclosures from Gran Bowman (GE) to Mary Garren (US EPA) and Stephen Joyce (DEP) RE: Amendment ot GE-Pittsfield's 1986 Underground Storage Inventory, November 27, 1989
01-0108		1	GE Facility			Material Safety Data Sheets for Shell Rimula 10W Lubricating Oil, Univolt 60 Petroleum Electrical Insulating Oil Exxon Electrical Insulating Oil, Amide Imide Vehicle
01-0109		1	GE Facility			Plastics Division Map, General Electric Company, No date available
01-0110		1	GE Facility	Aug-25	1971	Letter from James Thayer (DEQE) to Thomas McMahon (Massachusetts Division of Water Pollution Control) RE: Oil/Water Separator Installation Notification, August 25, 1971
01-0111		1	GE Facility	September	1980	A Report on Subsurface Contamination by Transformer Oil Containing Poly-chlorinated Biphenyls in Pittsfield, Massachusetts, Walter Schwartz, Massachusetts Department of Environmental Quality Engineering, September 1980
01-0112		1	GE Facility	Oct-24	1983	RCRA-TSD Inspection of GE-Pittsfield, J. Thomas (DEQE), October 24, 1983
01-0113		1	GE Facility	Oct-24	1983	Field Memorandum of Evan Johnson (DEQE) and Tim Maginnis (DEQE) RE: Discussion with former GE Employee Regarding Former Disposal Sites, October 24, 1983
01-0114		1	GE Facility	Feb-28	1984	DEQE Field Memorandum of Inspection, February 29, 1984
01-0115		1	GE Facility	Jun-01	1984	Housatonic River Agreement Between Connecticut Department of Environmental Protection and General Electric Company, June 1, 1984
01-0116		1	GE Facility	Mar-14	1985	Field Memorandum by Mark Haley (DEQE) to file RE: PCB Oil Spill at groundwater recovery system, March 14, 1985
01-0117		1	GE Facility	Sep-09	1985	DEQE Oil and Hazardous Material Spill/Incident Initial Inspection Report RE: Spill in 3C Vault, September 9, 1985
01-0118		1	GE Facility	Nov-06	1985	DEQE Oil and Hazardous Material Spill/Release Incident Initial Inspection Report, Massachusetts Department of Environmental Quality Engineering, November 6, 1985
01-0119		1	GE Facility	Aug-04	1986	Memorandum from Lawrence Galonka (DEQE) to Mark Schleeweis (DEQE) RE: Notification of Discharge in Excess of Permit Limitations, August 4, 1986
01-0120		1	GE Facility	Jan-31	1987	DEQE Oil and Hazardous Material Spill/Incident Initial Inspection Report, Massachusetts Department of Environmental Quality Engineering, January 31, 1987
01-0121		1	GE Facility	Mar-24	1987	Memorandum from M. Hawkins-Coniglio (DEQE) to file RE: Building Inspection of Processes in Buildings 112-114, March 24, 1987
01-0122		1	GE Facility	Jan-24	1990	A Case - Control Study of Cancer Mortality at the General Electric Pittsfield Facility, Volumes I and II, David H. Wegman, M.D., University of Lowell, January 24, 1990
01-0123		1	GE Facility	Jan-25	1982	PCB Human Health Studies, General Electric Company, January 25, 1982

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01-0124		1	GE Facility	Mar-09	1985	Letter from James Thayer (GE) to Stephen Joyce (DEQE) RE: Spill in hose from tank to thermal oxidizer, March 9, 1985
01-0125		1	GE Facility	Mar-26	1986	Letter from Arthur Granfield (GE) to Craig Goff (DEQE) RE: Disposal of Oil-Impregnated Wood and Wood Products, March 26, 1986
01-0126		1	GE Facility	Mar-28	1986	Letter from Arthur Granfield (GE) to Stephen Joyce (DEQE) RE: Hazardous Waste Annual Report, March 28, 1986
01-0127		1	GE Facility	Apr-04	1986	Letter from Ronald Desgroseilliers (GE) to Suzannah Grady (US EPA) and Glen Gilmore (DEQE) RE: PCB Exceedance Causes, April 4, 1986
01-0128		1	GE Facility	May-28	1986	Letter from Ronald Desgroseilliers (GE) to US EPA Region I and DEQE-Boston RE: Groundwater infiltration into the plant sewer system resulting in exceedances of permit limits for PCBs at Outfall 005, May 28, 1986
01-0129		1	GE Facility	Aug-13	1986	Letter from Mark Valentine (GE) to Suzannah Grady (US EPA) and Glen Gilmore (DEQE) RE: PCB discharge to 119W oil-water separator, August 13, 1986
01-0130		1	GE Facility	Jan-27	1987	Letter from Mark Valentine (GE) to Ronald Dupis RE: Building 31 Boiler Washwater, January 27, 1987
01-0131		1	GE Facility	Sep-22	1987	Letter from Richard Gates (GE) to Mr. Edward Conley (US EPA) RE: January 31, 1987 Methylene Chloride Release, September 22, 1987
01-0132		1	GE Facility	Jan-31	1991	Final RCRA Corrective Action Permit, General Electric Facility, Pittsfield, Massachusetts, US EPA, January 31, 1991
01-0133		1	GE Facility	Nov-30	1993	Final RCRA Corrective Action Permit Modification, General Electric Facility, Pittsfield Massachusetts, US EPA, November 30, 1993
01-0134		1	Unkamet Brook	April	1992	Phase II - Underground Storage Tank Removals - Naval Industrial Reserve Ordnance Plant, O'Brien & Gere Engineers, Inc., April 1992
01-0135		1	GE Facility	Nov-13	1992	Ambient Air Monitoring for PCB; August 20, 1991 - August 14, 1992; General Electric Company, Pittsfield, Massachusetts, Zorex Environmental Engineers, Inc., November 13, 1992
01-0136		1	GE Facility	June	1993	Site Health and Safety Plan; General Electric, Pittsfield, Massachusetts, Blasland, Bouck & Lee, Inc., June 1993
01-0137		1	GE Facility	Nov-08	1993	Ambient Air Monitoring for PCB - May 4, 1993 to August 17, 1993, Book 1 of 3, Zorex Environmental Engineers, Inc., November 8, 1993
01-0138		1	GE Facility	Nov-08	1993	Ambient Air Monitoring for PCB - May 4, 1993 To August 17, 1993, Book 2 of 3 (Appendices I - VII), Zorex Environmental Engineers, Inc., November 8, 1993
01-0139		1	GE Facility	Nov-08	1993	Ambient Air Monitoring for PCB - May 4, 1993 To August 17, 1993, Book 3 of 3 (Appendices VIII - XX), Zorex Environmental Engineers, Inc., November 8, 1993
01-0140		1	GE Facility	May	1994	Sampling and Analysis Plan/Data Collection and Analysis Quality Assurance Plan, Blasland, Bouck & Lee, Inc., May 1994

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01-0141		1	GE Facility	August	1995	Evaluation of Potential Imminent Hazards, Blasland, Bouck & Lee, Inc., August 1995
01-0142		1	GE Facility	Jan-26	1996	PCB Sampling Analysis data taken between 11/16/95 through 11/27/95 for the General Electric Company, prepared by General Electric Environmental Laboratory, December 11, 1995; and the Excavation sampling data taken between 11/16/95 through 1/5/96 for the G
01-0143		1	GE Facility	April	1996	Background Sampling Plan Report for the GE Facility Sites, Blasland, Bouck & Lee, Inc., April 1996
01-0144		1	GE Facility	November	1996	Standard Operating Procedure for Sampling Groundwater Monitoring Wells, General Electric Company, November 1996
01-0145		1	GE Facility	Nov-14	1996	Letter from John D. Ciampa, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, and Bryan Olson, EPA, RE: GE Pittsfield MCP/RCRA Corrective action Sites Update to Sampling and Analysis Plan/Data Collection and Analysis Quality A
01-0146		1	GE Facility	Jul-25	1997	Letter from John D. Ciampa, General Electric Company, to Julie E. Theroux, Massachusetts Highway Department, RE: General Electric (GE) Pittsfield - Monitoring Well Replacement due to Merrill Road Reconstruction Project, July 25, 1997
01-0147		1	Building 68 Area	Feb	1998	Blasland, Bouck, & Lee, Inc. 1998. Report on Supplemental Characterization Activities - Building 68 Area. 113 Pages. (AR No.) 02.02.14, Doc. No. 000026.
01-0148		1	Building 68 Area	Mar	1998	GE - Andrew T. Silfer to Dean Tagliaferro - EPA. Building 68 Area Supplemental Characterization Activities - Status Report and Proposal - EPA Region I CERCLA Docket #I-97-1003/DEP File #1-1047P. 22 Pages (AR No.) 02.02.16, Doc. No. 000025.
01-0149		1	GE Facility	Apr	1998	Roy F. Weston, Inc. to EPA, 1998. Removal Program Sampling Quality Assurance/Quality Control Plan for the General Electric Preliminary Assessment/Site Investigation. Sampling and Analysis Data, 88 Pages. (AR No.) 02.03.1, Doc. No. 000040. Attached to
01-0150		1	GE Facility	Mar	1944	GE - Pittsfield, MA (T-8345757-1), March 1944. Exhibit A: Map of Ground-Plan Plastics Division.
01-0151		1	GE Facility	Mar	1985	GE - Pittsfield, MA (T-8345757-2), March 1985. Exhibit B: Map of Ground-Plan Plastics Division.
01-0152		1	Unkamet Brook	July	1997	1997 Assessment of Potential Preferential Pathways in Unkament Brook Area/USEPA Area 1, Blasland, Bouck & Lee, Inc., July 1997
01-0153		1	Unkamet Brook	May	1997	Status Report for the Phase II RCRA Facility Inestigation of Unkamet Brook Area/USEPA Area 1, Golder Associates, May 1997
01-0154		1	East Street Area 1	November	1996	Assessment of Potential Preferential Pathways in East Street Area 1/USEPA Area 3, Blasland, Bouck & Lee, Inc., November 1996

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01-0155	22.37	1	East Street Area 1	November	1996	Addendume to MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation for East Street Area 1/USEPA Area 3, Golder Associates and BBL, November 1996
01-0156		1	East Street Area 1	January	1998	Occurance of Oil at East Street Area 1/USEPA Area 3 - Fall 1997, Blasland, Bouck & Lee, Inc., January 1998
01-0157		1	East Street Area 1	June	1997	Occurance of Oil at East Street Area 1/USEPA Area 3 - Spring 1997, Blasland, Bouck & Lee, Inc., June 1997
01-0158		1	East Street Area 1	December	1996	Occurance of Oil at East Street Area 1/USEPA Area 3 - Fall 1996, Blasland, Bouck & Lee, Inc., December 1996
01-0159		1	East Street Area 1	June	1996	Occurance of Oil at East Street Area 1/USEPA Area 3 - Spring 1996, Blasland, Bouck & Lee, Inc., June 1996
01-0160		1	Hill 78 Area	October	1994	Preliminary Health and Environmental Assessment Proposal for the East Street Area 1/EPA Area 3 Site, ChemRisk, October 1994
01-0161		1	Hill 78 Area	September	1991	Phase I Limited Site Investigation Current Assessment Summary Report Hill 78 Area, Pittsfield, MA, Volume I, Geraghty & Miller, September 1991
01-0162		1	Hill 78 Area	Nov, Jan, Mar	1995, 1998	Monthly Status Reports MCP, EPA RCRA Corrective Action Activities, November 1995 through January 1998 and March 1998
01-0163		1	Lyman Street	February	1994	MCP Phase I Report for Lyman Street Parking Lot (Oxbow D) and current Assessment Summary for USEPA Area 5, Blasland, Bouck, & Lee, Inc., Feburary 1994
01-0164		1	Building 68 Area	May-22	1998	Supplemental Characterization Activities Status Report and Proposed Remedial Action, HIS Geotrans, May 22, 1998
01-0165		1	Building 68 Area	Nov-14	1997	Removal Action - Building 68 Area - Restoration of Sediment Removal Cells 3 and 4, Blasland, Bouck, & Lee, Inc., November 14, 1997
01-0166		1	East Street Area 2	July	1997	Additional Oil Recovery Measures Groundwater Flow Model East Street Area 2/USEPA Area 4 Pittsfield, MA Golder Associates, Inc., July 1997
01-0167		1	East Street Area 2	April	1989	Groundwater Technology, Inc., April 1989. Occurrence of Oil East Street Area 2, Spring 1989.
01-0168		1	Unkamet Brook	Nov-06	1992	Environmental Appeals Board. General Electric Company. RCRA Appeal No. 91-7. Remand Order. Decided 6 November 1992.
01-0169		1	Unkamet Brook	Jul-29	1997	Church, A. (START). 1997. Project Note, RE: Flow Rate for Unkamet Brook. TDD No. 96-10-0010. 29 July.
02-0001	1.1	2	Housatonic River		1955	Housatonic River Sampling Program, New England Interstate Water Pollution Control Commission, 1955
02-0002	1.2	2	Housatonic River		1959	Housatonic River Sampling Stations, 1959
02-0003	1.3	2	Housatonic River	Jul-24	1963	Housatonic River Sampling Results, Massachusetts Department of Public Health, July 24, 1963
02-0004	1.4	2	Housatonic River	Jul-25; Aug-5	1963, 1964	(2 Sets) Microsopical Examination, Housatonic River, July 25, 1963; August 5, 1964

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02-0005	1.5	2	Housatonic River	Sep-28,29,30	1964	Notes Relative to: WPC - Housatonic River Special Sampling, C. J. O'Leary, September 28,29,30, 1964
02-0006	1.6	2	Housatonic River	Aug & Sep	1964	Housatonic River Waste Analysis, Massachusetts Department of Public Health, August and September 1964
02-0007	1.7	2	Housatonic River	May	1975	The Housatonic River - 1974 Water Quality Analysis, Massachusetts Water Resources Commission, May 1975
02-0008	1.9	2	Housatonic River	Aug-15	1977	Letter from David Wiggin, Connecticut Department of Health to Angelo Iantosca (DEQE), RE: PCB Data on Housatonic River Fish, August 15, 1977
02-0009	1.10	2	Housatonic River	Jul-05	1977	New Release: PCB Levels in Trout in the Housatonic, Connecticut State Department of Health, July 5, 1977
02-0010	1.11	2	Housatonic River	Aug-01	1977	PCB Sampling - Housatonic River, Commonwealth of Massachusetts Department of Environmental Quality Engineering, August 1, 1977
02-0011	1.15	2	Housatonic River	Dec-24	1980	PCDF & PCDD Contamination Study in Housatonic River Fish, Columbia National Fishery Research Laboratory, December 24, 1980
02-0012	1.16	2	Housatonic River	April	1981	Housatonic River PCB Study, Statistical Analysis, Gerald J. Beck, Ph.D., April 1981
02-0013	1.17	2	Housatonic River	May-08	1981	Letter from Charles Fredette (CT DEP) to William Nuzzo (US EPA) RE: Data Sheets on Housatonic River Trout, May 8, 1981
02-0014	1.19	2	Housatonic River	January	1982	PCBs in Housatonic River Fish - Statistical Analysis, Gerald J. Beck, January 1982
02-0015	1.23	2	Housatonic River	Oct-12	1982	Housatonic River Study, Split Sample Fish Program, US EPA, October 12, 1982
02-0016	1.25	2	Housatonic River	December	1982	Polychlorinated Biphenyls in Housatonic River Sediments in Massachusetts and Connecticut: Determination, Distribution, and Transport, The Connecticut Agricultural Experimentation Station, December 1982
02-0017	1.27	2	Housatonic River	Feb-16	1983	Sport Fish - Housatonic River, NUS Corporation, February 16, 1983
02-0018	1.32	2	Housatonic River	Dec-11	1984	Results of PCB Sampling in the Housatonic River near Great Barrington, MA, US EPA, December 11, 1984
02-0019	1.33	2	Housatonic River	Jun-21	1985	Housatonic River Study - PCDF Analysis of Sediment and Fish Samples, General Electric Company, June 21, 1985
02-0020	1.34	2	Housatonic River	May & Aug	1987, 1989	Preliminary Findings on PCB Concentrations in Fisheries from the Housatonic River, in 1986, The Academy of Natural Sciences, May 14, 1987, August 28, 1989
02-0021	2.2	2	Housatonic River	Jan-05	1978	PCBs in the Housatonic River, Susan L. Santos, US EPA, January 5, 1978
02-0022	2.4	2	Housatonic River	Apr-20	1981	Industrial Facilities, Landfills, and Other Sources of PCB Contamination Along the Housatonic River and its Tributaries, Versar, Inc., April 20, 1981
02-0023		2	Housatonic River	Sep-27	1982	Review of Report on Past Hazardous Waste Monitoring and Remedial Actions, and Study of Housatonic River, US EPA, September 27, 1982

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02-0024	2.19	2	Housatonic River	Jun-01	1984	1984 Housatonic River Fish Monitoring Study, Connecticut Department of Environmental Protection, June 1, 1984
02-0025	2.20	2	Housatonic River		1985	Distribution of Polychlorinated Biphenyls in the Housatonic River and Adjacent Aquifer, Massachusetts, US Department of the Interior, 1985
02-0026	6.8	2	Housatonic River	May-21	1985	Interim Report on PCB Levels in Fish from the Housatonic River, Connecticut, The Academy of Natural Science of Philadelphia, May 21, 1985
02-0027	7.3	2	Housatonic River	November	1983	PCB Contamination in the Housatonic River: An Overview of PCBs in Sediment and Fish of the Housatonic and Regulatory Concerns with Respect to Future Remedial Actions, Patricia Hynes, US EPA, November 1983
02-0028		2	Housatonic River	Sep-27	1953	Notes Relative to Housatonic River Treatment with Sodium Nitrate, E. Lincoln Swett, September 27, 1953
02-0029		2	Housatonic River	Feb-08	1983	Alternative Strategies for the Housatonic River PCB Problem, State of Connecticut, February 8, 1983
02-0030	9.6	2	Housatonic River	December	1982	Housatonic River Study 1980 and 1982, Volumes I and II, Stewart Laboratories, Inc., December 1982
02-0031	9.6a	2	Housatonic River	March	1983	Review of Housatonic River Study 1980 and 1982, Volumes I and II, HydroQual, Inc., March 1983
02-0032	9.6b	2	Housatonic River	Feb-15	1983	Review of Housatonic River Study, NUS Corporation, February 15, 1983
02-0033	9.6c	2	Housatonic River	Apr-19	1983	Draft - Review of Stewart Laboratories Study of Sediment Distribution and Transport in the Housatonic River, NUS Corporation, April 19, 1983
02-0034	9.6d	2	Housatonic River			Review of Housatonic River Study, John F. Paul, ERL - Narraganset, No date available
02-0035	9.9	2	Housatonic River	September	1985	Report on Wet Excavation of PCB Contaminated Sediments in the Housatonic River, Berkshire County Regional Planning Commission, September 1985
02-0036	25.105	2	Housatonic River Floodplain Properties	Feb	1994	Blasland, Bouck & Lee, Inc. 1994. Housatonic River Floodplain Properties - Results of Supplemental Site Characterization Sampling. February.
02-0037		2	Housatonic River Floodplain Property	Feb	1993	Blasland & Bouch Engineers, P.C. 1993. Report of January 1993 Housatonic River Floodplain Property Sampling and Analysis. February. pp. 2-2, Att. 3, pp. 0018, 0024, 0079, 0086.
02-0038	25.31	2	Housatonic River	Aug	1992	Blasland, Bouck & Lee, Inc. 1992. Addendum to MCP Interim Phase II Report/Current Assessment Summary for Housatonic River, Volume I of II.
02-0039	25.32	2	Housatonic River	Aug	1992	Blasland, Bouck & Lee, Inc. 1992. Addendum to MCP Interim Phase II Report/Current Assessment Summary for Housatonic River, Volume II of II.
02-0040		2	Housatonic River	Aug	1992	Blasland, Bouck & Lee, Inc. 1992. Addendum to MCP Interim Phase II Report/Current Assessment Summary for Housatonic River, Appendix D (Topographic Mapping).
02-0041	25.34A	2	Housatonic River	Aug	1992	Blasland, Bouck & Lee, Inc. 1992. Attachment 1: Topographic Mapping of Potentially Affected Area of Housatonic River Floodplain.

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WESTON Ref. No.	EPA Record No.	OU No.	Site/Area Name	Month-Day	Year	Reference Title
02-0042	25.69A	2	Housatonic River	Jul	1993	A. T. Kearney, Inc. 1993. Technical Review of MCP Phase II Scope of Work and Proposal for RCRA Facility Investigation of Housatonic River and Silver Lake.
02-0043	25.74	2	Housatonic River	Aug-02	1993	ChemRisk, 1993. Alternative Exposure Assumptions and Risk Calculations for Selected Properties in the Housatonic River Flood Plain.
02-0044	25.89	2	Housatonic River	Aug-31	1993	The Academy Environmental Research, 1993. PCB Concentrations in the Fishes from the Housatonic River, CT in 1984 to 1992.
02-0045	25.114	2	Housatonic River	Mar-25	1994	ChemRisk, 1994. Letter from Ms. Ellen S. Ebert, ChemRisk, to Ms. J. Lyn Cutler, MA DEP, Bureau of Waste Site Cleanup, and Mr. Bryan Olson, US EPA, Waste Management Division, Re: Creel Survey for the Housatonic River.
02-0046		2	Housatonic River	Mar-24	1994	ChemRisk, 1994. Methodology and Results of the Housatonic River Creel Survey.
02-0047	25.123	2	Housatonic River	May	1994	Chadwick & Associates, Inc. 1994. Aquatic Ecology Assessment of the Housatonic River.
02-0048	25.143	2	Housatonic River	Jul-26	1994	ChemRisk, 1994. Evaluation of the Terrestrial Ecosystem of the Housatonic River Valley.
02-0049	25.183	2	Housatonic River	Dec-30	1994	Hill Engineers, Architects and Planners, 1994. GE Area Environmental and Facility programs Housatonic River Flood Plain Short Term Measures: As-Built Report GE-963.
02-0050	25.215	2	Housatonic River	May-08	1995	The Academy Environmental Research, 1995. PCB Concentrations in the Fishes and Benthic Insects from the Housatonic River, CT in 1984 to 1994.
02-0051		2	Housatonic River	Mar-12	1976	PCB Results from Split Samples, U.S. EPA and G.E., March 12,1976
02-0052		2	Housatonic River	Oct-31	1977	PCB Test Data and Press Release, Massachusetts Department of Environmental Quality Engineering, October 31, 1977
02-0053		2	Housatonic River	Sep-13	1982	Minutes of Meeting at U.S. EPA Regional Lab (July 21, 1982) RE: Protocol for Split-Sample Fish Program Report of Laboratory Examination, September 13, 1982
02-0054		2	Housatonic River	Sep-13	1982	Report on Laboratory Examination, Brown Trout, Connecticut Department of Health Services, September 13, 1982
02-0055		2	Housatonic River		1983	Berkshire County Interim Soil Survey Report, Berkshire Conservation District, 1983
02-0056		2	Housatonic River	Sep-28	1983	Fish and Eel Sample Analysis - Various Locations, Stewart Laboratories, September 28, 1983
02-0057		2	Woods Pond	Apr-26	1990	Letter from Mary Jane Incorvia Mattina (The Connecticut Agricultural Experiment Station) to Mary Garren (US EPA) RE: Analysis of Fish and Sediment from Woods Pond for Dioxins and Furans, April 26, 1990

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02-0058		2	Housatonic River	Sep-01	1981	PCBs in Housatonic River Sediments: Determination Distribution, and Transport, The Connecticut Agricultural Experimentation Station, September 1, 1981
02-0059		2	Woods Pond	Nov-30	1989	Request for Permit to Perform Research and Development on a Biological Method of Elimination of Polychlorinated Biphenyls (PCBs) from Sediments in Woods Pond, Berkshire County, Massachusetts, General Electric Company, November 30, 1989
02-0060		2	Woods Pond	Jan-29	1988	Notice of Responsibility, RE: Lee/Lenox SA 1-147 Woods Pond Dam and Reaceway, Massachusetts Department of Environmental Quality Engineering, January 29, 1988
02-0061		2	Housatonic River	Jun-01	1988	An Angler Survey and Economic Study of the Housatonic River Fishery Resource, State of Connecticut Department of Environmental Protection Bureau of Fisheries, June 1, 1988
02-0062		2	Housatonic River	September	1986	Addendum - Housatonic River Study - 135 Day Interim Report, Blasland & Bouck Engineers, P.C., September 1986
02-0063		2	Housatonic River	August	1988	Draft - Literature Review and Technical Evaluation of Sediment Resuspension During Dredging, John B. Herbich and Shashikant B. Brahme, Texas A&M University, August 1988
02-0064		2	Housatonic River	January	1988	US EPA Office of Research and Development Project Summary: Report on Decontamination of PCB - Bearing Sediments, Donald L. Wilson, January 1988
02-0065		2	Housatonic River			Sediment Removal Requirements, No Date Available
02-0066		2	Housatonic River		1983	Berkshire Environmental Report, The Berkshire Natural Resources Council, Inc., 1983
02-0067		2	Woods Pond	Sep-19	1985	Wood Pond Draw Down Study, Commonwealth of Massachusetts Division of Fisheries and Wildlife, September 19, 1985
02-0068		2	Woods Pond	Feb-26	1987	Dam Safety Evaluation, Woods Dam, Lenox, Massachusetts, US Army Corps of Engineers, February 26, 1987
02-0069		2	Housatonic River	Mar-04	1987	Velocity Control and Sediment Control - Stop-Log Baffle System Study Overview, General Electric, March 4, 1987
02-0070		2	Housatonic River	Jul-14	1995	Letter from Ms. Stacey Kingsbury, CT DEP, Natural Diversity Data Base, to Mr. Charles Fredette, CT DEP, RE: Endangered & Threatened Species, July 14, 1995
02-0071		2	Housatonic River	Dec	1991	Blasland, Bouck & Lee, Inc. 1991. MCP Interim Phase II Report/Current Assessment Summary for Housatonic River. Volumes I, II and III. December. Pp. ES-1, 1-1, 1-2, 3-6, 8-3, Table 8-1, Figs. 5-1 to 5-5, 8-2, App. H, p.8.
02-0072		2	Housatonic River/Floodplain	May-10	1993	Attachment A: Memorandum covering the Development of the Allowable Intake (ADI) Value for PCBs, Prepared by MA DEP.

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02-0073		2	Housatonic River/Floodplain	May-06	1993	Attachment B: Memorandum Documenting the Adoption of Allowable Daily Intake Value for PCBs, Prepared by MA DEP.
02-0074		2	Housatonic River/Floodplain	Jun-14	1993	Attachment C: Memorandum Covering Soil Concentrations Associated with Specified Risk Levels for Residential, Recreational and Occupational Exposures, Prepared by MA DEP.
02-0075		2	Housatonic River/Floodplain	Apr-12	1993	Attachment D: Floodplain Sampling Results, Compiled by ChemRisk.
02-0076		2	Housatonic River/Floodplain	May-17	1993	Attachment E: Memorandum Documenting the Evaluation of Risks from River Cleanup Activities, Prepared by MA DEP.
02-0077		2	Housatonic River/Floodplain			Attachment F: PCB Concentrations in River Sediments, (Date Unknown).
02-0078		2	Housatonic River/Floodplain			Attachment G: Risk Estimates for Exposures from River Cleanup Activities, (Date Unknown).
02-0079		2	Housatonic River/Floodplain			Attachment H: PCB Concentrations in the Decker Launch Area, (Date Unknown).
02-0080		2	Housatonic River/Floodplain	Jun-17	1993	Attachment I: Memorandum Documenting the Assessment of Risk from Exposures Resulting from Regular and Continuing Use of the Decker Canoe Launch Area, Prepared by MA DEP.
02-0081		2	Housatonic River/Floodplain			Attachment J: Risk Estimates Associated with Regular and Continuing Exposures, to Contaminated Soil in the Decker Launching Area. (Date Unknown).
02-0082		2	Housatonic River/Floodplain	Nov-22	1991	ChemRisk, 1991. Creel Survey for the West Branch of the Penobscot River.
02-0083		2	Housatonic River/Floodplain		1992	ChemRisk, 1992. "The Effect of Sampling Bias on Estimates of Angler Consumption Rates in Creel Surveys", Prepared by Mr. Paul S. Price, Mr. Steve H. Su and Mr. Michael N. Gray.
02-0084		2	Housatonic River/Floodplain		1993	ChemRisk, 1993. "Estimating Consumption of Freshwater Fish among Maine Anglers", Prepared by Ms. Ellen S. Ebert and Ms. Natalie Harrington.
02-0085		2	Housatonic River		1998	Final Hazard Ranking System (HRS) Evaluation for the GE-Housatonic River Site, Pittsfield, MA, USEPA, 1998
02-0086		2	Housatonic River		1968	Hydrologic Investigations Atlas HA-281 (Sheet 2 of 4), Hydrology and Water Resources of the Housatonic River Basin, Massachuestts, Ralph F. Norvitch, Donald F. Farrell, Felix H. Pauszek, and Richard G. Petersen, Department of the Interior, 1968
02-0087		2	Housatonic River	January	1996	Supplemental Phase II/RCRA Facility Investigation Report for Housatonic River and Silver Lake Volume I of II, Blasland, Bouck, & Lee, Inc., January 1996
02-0088		2	Housatonic River	September	1994	Stewart and MCP Phase II Sediment Sampling Results Housatonic River, Blasland, Bouck, & Lee, Inc., September 1994
02-0089		2	Housatonic River		1994	USGS (United States Geological Survey). 1994. Water Resources Data, Massachusetts and Rhode Island, Water Year 1994, USGS Water-data Report MA-RI-94-1. pp. 149, 150.

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03-0001	1.36	3	Allendale School	Feb-14	1990	Letter from Stephen Joyce (DEP) to Jacqueline Sacchetti, Office of City Clerk, City of Pittsfield, RE: Allendale Schoolyard Sampling, February 14, 1990
03-0002	1.37	3	Allendale School	Feb-22	1990	Letter from Stephen Joyce (DEP) to Jacqueline Sacchetti, Office of City Clerk, City of Pittsfield, RE: Allendale Schoolyard Sampling, February 22, 1990
03-0003		3	Allendale School	May	1992	Allendale School Property, MCP Phase II Scope of Work, May 1992
03-0004	27.18, 27.19	3	Allendale School Property	Nov	1996	Blasland, Bouck & Lee, Inc. 1996. MCP Supplemental Phase II Scope of Work for the Allendale School Property. November. pp. 2-1 to 203, Fig. 7.
03-0005		3	Allendale School	Mar-31	1998	Fax from Time Walker, Agency for Toxic Substances and Disease Registry, to Stephanie Carr, RE: Draft for Review, March 31, 1998
03-0006		3	Allendale School	April	1991	Study of Potential Remedial Options for PCB-Containing Soils at the Allendale School Property, Blasland, Bouck & Lee, Inc., April 1991
03-0007		3	Allendale School	January	1993	MCP Interim Phase II Report for the Allendale School Property, Blasland & Bouck Engineers, P.C., January 1993
03-0008		3	Allendale School	May-29	1996	Letter from J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, to Stephen Barry, Barry Architects, Inc., RE: Pittsfield 1-0960 Allendale Schoolyard Additional Sampling Requirements for PCBs, May 29, 1996
03-0009		3	Allendale School	Jul-26	1996	Letter from J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, to Stephen Barry, Barry Architects, Inc., RE: Pittsfield 1-0960 Allendale Schoolyard Additonal Approval of Sampling Plan, July 26, 1996
03-0010		3	Allendale School	Sep-13	1996	Letter from J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, to Ronald F. Desgroseilliers, General Electric Company, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Review of Phase II; Requirements for Additional Phase II Investigations and an Imminent Hazard Evaluation, September 13, 1996
03-0011		3	Allendale School	Nov-18	1996	Letter from Richard W. Gates, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Laboratory Results for Imminent Hazard Evaluation, November 18, 1996
03-0012		3	Allendale School	Nov-18	1996	Letter from Richard W. Gates, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Laboratory Results for Imminent Hazard Evaluation, November 18, 1996
03-0013		3	Allendale School	Nov-18	1996	Letter from Richard W. Gates, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: 1-0960 Pittsfield MCP Supplemental Phase II Scope of Work for the Allendale School Property, November 18, 1996

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03-0014		3	Allendale School	Dec-06	1996	Letter from Richard W. Gates, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Imminent Hazard Evaluation Report, December 6, 1996
03-0015		3	Allendale School	November	1996	MCP Supplemental Phase II Scope of Work for the Allendale School Property, Blasland, Bouck & Lee, Inc., November 1996
03-0016		3	Allendale School	September	1996	Imminent Hazard Evaluation Proposal for the Allendale School Property, Blasland, Bouck & Lee, Inc., September 1996
03-0017		3	Allendale School	Feb-07	1997	Letter from Linda M. Murphy, EPA to Kim Stegner, Pittsfield, MA, RE: PCB Contaminated Soil at the Allendale School, February 7, 1997
03-0018		3	Allendale School	Feb-21	1997	Letter from J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, to Jacqueline M. Sacchetti, Office of the City Clerk, Pittsfield City Hall, RE: Pittsfield 1-0960 Allendale Schoolyard Site, Response to Requests from City Council, February 21, 1997
03-0019		3	Allendale School	Mar-05	1997	Letter from J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, to Ronald F. Desgroseilliers, General Electric Company, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Conditional Approval of Supplemental Phase II Scope of Work, March 5, 1997
03-0020		3	Allendale School	Mar-27	1997	Letter from Ronald F. Desgroseilliers, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: No. 1-0960P, Allendale Schoolyard, March 27, 1997
03-0021		3	Allendale School	Aug-01	1997	Letter from Jane Magee, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960; Allendale School Property MCP Supplemental Phase II Report, August 1, 1997
03-0022		3	Allendale School	Dec-24	1997	Letter from Anna G. Symington, DEP, Bureau of Waste Site Cleanup, to Jane Magee, GE, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Conditional Approval of Phase II Report; Additional Phase II Investigations, December 24, 1997
03-0023		3	Allendale School	August	1997	MCP Supplemental Phase II Report for the Allendale School Property, Blasland, Bouck & Lee, Inc., August 1997
03-0024		3	Allendale School	Jan-05	1998	Letter from David J. Tierney, General Contractor, to Anna G. Symington, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Conditional Approval of Phase II Report; Additional Phase II Investigations, January 5, 1998
03-0025		3	Allendale School	Jan-22	1998	Letter from Richard W. Gates, GE, to Anna G. Symington, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960; Allendale School Property Analytical Data Validation Report and Proposal for Supplemental Soil Investigation, January 22, 1998
03-0026		3	Allendale School	Apr-08	1998	Letter from Richard W. Gates, GE, to Mr. John Kreiger, Superintendent of Schools, RE: Notice of Intent from White Engineering, April 8, 1998

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03-0027		3	Allendale School	Apr-08	1998	Letter from Richard W. Gates, GE, to Ms. Anna Symington, DEP, Bureau of Waste Site Cleanup, RE: Health and Safety Plans for Remedial Work at Allendale School Pittsfield High School and 15 Longfellow Avenue Adjacent Properties, April 8, 1998
03-0028		3	Allendale School	Apr-09	1998	Letter from Ms. Anna Symington, DEP, Bureau of Waste Site Cleanup, to Ms. Jane Magee, GE, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Approval of Additional Soil Removal Actions, April 9, 1998
03-0029		3	Allendale School	May-19	1998	Letter from Mark D. Heaney, TechLaw Inc., to Ms. Kathy Castanga, US EPA, RE: EPA Contract No. 68-W4-0013; EPA Work Assignment No. R01074; General Electric II; Pittsfield, Massachusetts; Special Studies and Ongoing or New Initiatives (AIS); Allendale School Property Feasibility Study (In development)(Task 03) May 19, 1998
03-0030		3	Allendale School	Nov-07	1996	Letter from Richard W. Gates, General Electric Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, RE: Pittsfield 1-0960 GE/Allendale Schoolyard Laboratory Results for Playset Location, November 7, 1996
04-0001		4				
04-0002		4				
04-0003	25.129	4	Silver Lake	Jun	1994	Blasland, Bouck & Lee, Inc. 1994. MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation of Housatonic River and Silver Lake. June. p. 2-31.
04-0004		4	Housatonic/Silver Lake	Jan	1996	Blasland, Bouck, & Lee, Inc. 1996. Supplemental Phase II/RCRA Facility Investigation Report for Housatonic River and Silver Lake. January 1996. Report, Study. 375 Pages, (AR No. 02.02.2, Doc. No. 000019.
04-0005	25.99	4	Silver Lake	Nov	1993	Blasland, Bouck & Lee, Inc. 1993. Silver Lake Data Summary.
04-0006	25.137	4	Silver Lake	Jul	1994	Blasland, Bouck & Lee, Inc. 1994. Report on Silver Lake Short-Term Measure Evaluation and Related Activities.
04-0007		4	Silver Lake	Mar	1996	Supplemental Phase II/RCRA Facility Investigation for Housatonic River and Silver Lake Analytical Data for September 1994 through December 1995, Vol. I of IV.
04-0008		4	Silver Lake	Mar	1996	Supplemental Phase II/RCRA Facility Investigation for Housatonic River and Silver Lake Analytical Data for September 1994 through December 1995, Vol. III of IV.
04-0009		4	Silver Lake	Mar	1996	Supplemental Phase II/RCRA Facility Investigation for Housatonic River and Silver Lake Analytical Data for September 1994 through December 1995, Vol. IV of IV.
05-0001	24.169	5	Newell Street Area II	Mar-12	1997	DEP: Pittsfield 1-1057; EPA: Area 5b - GE/Newell Street Area II - Updated PCB and Appendix IX Data, Richard W. Gates, General Electric - Housatonic, March 12, 1997

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05-0002	1.35	5	Newell Street	May-01	1989	Surficial Soil Sampling at Newell Street Site, Geraghty & Miller, Inc., May 1, 1989
05-0003	2.27	5	Newell Street	April	1989	Supplemental Investigation of Soil and Groundwater Conditions at the Newell Street Site, General Electric Company, Pittsfield Massachusetts, Geraghty & Miller, Inc., April 1989
05-0004	19.88	5	Newell Street	Nov-04	1993	Memorandum from Mr. Mark Maritato, ChemRisk, to Mr. G. Grant Bowman, General Electric Company, RE: PCB Inhalation Risk Issues at Newell Street and Silver Lake Sites, November 4, 1993
05-0005	24.61, 24.62	5	Newell Street Parking Lot Site	Mar	1994	Blasland, Bouck & Lee, Inc. 1994. MCP Interim Phase II Report for Newell Street Parking Lot Site and Current Assessment summary for USEPA Area 5B. Volumes I, II, III, and IV. March.
05-0006	24.63	5	Newell Street Oxbow Area I Site	Mar	1994	Blasland, Bouck & Lee, Inc. 1994. MCP Supplemental Phase II Scope of Work for Newell Street Oxbow Area I Site. March. Fig. 2-1
05-0007		5	Newell Street Area II	Mar-12	1997	DEP Pittsfield 1-1057; EPA: Area 5b - GE/Newell Street Area II - Updated PCB and Appendix IX Data. (Addressee) Bryan Olson - EPA (Author) Richard W. Gates - GE - Housatonic (Date) March 12, 1997, Letter (AR No.) 02.01.4, Doc. No. 000006.
05-0008		5	Newell Street 1 Site	Sept	1997	Blasland, Bouck, & Lee, Inc. 1997. MCP Supplemental Phase II Report for the Newell Street 1 Site. Report, Study. 329 Pages. (AR No.) 02.02.9, Doc. No. 000005.
05-0009	24.149	5	Newell Street Area II	May-10	1996	GE - Richard W. Gates to Bryan Olson - EPA. 1996. GE/Newell Street Area II - Phase II/RFI Data and Boring Logs. 1996. Sampling and Analysis Data. 167 Pages. (AR No.) 02.03.2, Doc. No. 000030
05-0010	24.110	5	Newell Street, Oxbow Area 1 Site	Jul	1995	Blasland, Bouck & Lee, Inc. 1995. MCP Supplemental Phase II Scope of Work for Newell Street, Oxbow Area 1 Site.
05-0011		5	Newell Street, Area II	May-10	1996	Letter from Richard W. Gates, GE Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup and Bryan Olson, EPA, Re: Pittsfield 1-057, US EPA Area 5B GE/Newell Street Area II - Phase II/RFI Data and Boring Logs.
05-0012		5	Newell Street Area II	Mar-12	1997	Letter from Richard W. Gates, GE Company, to J. Lyn Cutler, DEP, Bureau of Waste Site Cleanup, and Bryan Olson, EPA, Re: DEP: Pittsfield 1-1057; EPA: Area 5B GE/Newell Street Area II Updated PCB and Appendix IX Data.
05-0013	24.184, 24.184A	5	Newell Street	Sep-30	1997	ChemRisk, 1997. Proposal for Risk Assessment of the Newell Street I Site.
05-0014		5	Newell Street	Sept	1997	Blasland, Bouck & Lee, Inc. 1997. MCP Supplemental Phase II Report for the Newell Street I Site.
05-0015	24.186	5	Newell Street	Sept	1997	Berkshire Environmental Consultants, Inc. 1997. Ambient Air Monitoring for PCB July 7, 1996 through September 27, 1996, 191 Newell Street, GE, Pittsfield, MA.

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05-0016		5	Newell Street	February	1992	MCP Interim Phase II Report for the Newell Street Site, Blasland, Bouck, & Lee, Inc., February 1992
06-0001		6	Oxbow Areas A, B, C, J and K	February	1996	MCP Phase I and Interim Phase II Report for Former Housatonic River Oxbow Areas A, B, C, J, and K (Vol. I of II), Blasland, Bouck, & Lee, Inc., February 1996
06-0002		6	Oxbow Areas A, B, C, J and K	Feb	1996	Blasland, Bouck & Lee, Inc. 1996. MCP Phase I and II Report for Former Housatonic River Oxbow Areas A, B, C, J, and K. Volume II. February.
06-0004		6				
06-0005		6	Oxbow Area C	Dec	1997	Blasland, Bouck, & Lee, Inc. 1997. Immediate Response Completion Report Oxbow Area C, December. Report, Study. 75 Pages. (AR No.) 02.02.12, Doc. No. 000027.
06-0006		6	Oxbow Areas	Jan-23	1998	Letter from Anna G. Symington, Action Section Chief, Special Projects to Ms. Jane Magee, General Electric Company, RE: Pittsfield 1-1085; GE/Former Oxbow Areas; Comments on Phase II Report and requirements for resubmittal; requirements for additonal investigations, MADEP, January 23, 1998
06-0007		6	Oxbows	Feb-27	1997	Memorandum from Susan J. Steenstrup, to J. Lyn Cutler, RE: Site File 1-1085, GE/Former Oxbows; Comments and Summary of February 1996 Phase II Report, February 27, 1997