Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision
GE Fort Edward Plant Site
Town of Fort Edward, Washington County
Site Number 5-58-004
Operable Units 3 and 4

January, 2000

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

GE Fort Edward Plant Inactive Hazardous Waste Site
Town of Fort Edward, Washington County, New York
Site No. 558004

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for Operable Units 3 and 4 of the GE Fort Edward Plant Site class 2 inactive hazardous waste disposal site, which was chosen in accordance with the New York State Environmental Conservation Law. The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40 CFR 300).

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the GE Fort Edward Plant Site inactive hazardous waste disposal site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix D of the ROD.

Assessment of the Site

Actual and threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, present a significant threat to the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the GE Fort Edward Plant Site, and the criteria identified for evaluation of alternatives, the NYSDEC has selected hydraulic control with pretreatment as the remedy for Operable Unit 3. The components of the remedy are as follows:

-control of the migration of contaminated groundwater and non-aqueous phase liquids (NAPLs) through expansion of the existing collection and treatment system;

-removal and off-site disposal of contaminated soils excavated during construction activities;

-long term monitoring and maintenance;

-review of the remedial program on five year intervals to determine if the remedy is still protective of human health and the environment.

Based on the results of the RI/FS for the GE Fort Edward Plant Site, and the criteria identified for evaluation of alternatives, the NYSDEC has selected removal and off-site disposal as the remedy for Operable Unit 4. The components of the remedy are as follows:

-excavation of soil and sediment in the 004 outfall area extending from approximately 160 feet upstream of the former 004 outfall location downstream to the northern end of remnant deposit 3/3A ;

-off-site disposal of all excavated material from this area;

-confirmatory sampling to ensure that the contaminated materials have been completely removed, including testing of the underlying bedrock.

New York State Department of Health Acceptance

The New York State Department of Health concurs in the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

1/28/2000
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

GE Fort Edward Plant Site
Town of Fort Edward, Washington County
Site No.5-58-004
January, 2000

SECTION 1: SUMMARY OF THE RECORD OF DECISION

As more fully described in Sections 3 and 4 of this document (see pages 3 to 12), General Electric Company's operations at its Capacitor Products Division (GE Fort Edward) plant site have resulted in the disposal of a number of hazardous wastes, including a variety of chlorinated volatile organic compounds ("VOCs") and polychlorinated biphenyls ("PCB"), at the site, some of which were released or have migrated from the site to its surrounding environs, including the Hudson River. These disposal activities gave rise to significant threats to the public health and the environment, *viz.*,

- respecting Operable Unit 03 (the main portion of the site), significant environmental damage associated with impacts of contaminants (PCB and VOCs) on the shallow aquifer beneath the site, which was used for human water consumption in the past and is now unusable due to the presence of the PCB and VOCs above applicable standards.

- respecting Operable Unit 04 (the area of contaminated soils and sediment adjacent to the former 004 outfall on the eastern shore of the Hudson River), primarily on the significant environmental damage associated with the releases of PCB to the Hudson River from the soils and sediments contaminated with PCB along the Hudson River shoreline near the former 004 outfall. These releases of PCB from the site, among other things, materially contribute to the existing need to recommend that human consumption of fish from the Hudson River (which includes the vicinity of the site) be limited, and result in the bioaccumulation of contaminants (PCB) in flora or fauna to levels which materially contribute to significant adverse effects in fish-eating wildlife.

In order to restore the Fort Edward inactive hazardous waste disposal site to predisposal conditions to the extent feasible and authorized by law, but at a minimum to eliminate or mitigate all significant threats to the public health and the environment that the hazardous waste disposed at the site has caused, as discussed in detail in Section 7 of this document, the New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected:

- for Operable Unit 03 that contaminated groundwater be collected through an expanded recovery system and treated at the facility's treatment plant to remove the contaminants, and that an expanded DNAPL recovery system be installed and operated. Treated groundwater would be discharged to the Hudson River through an existing permitted outfall. See the discussion of Alternative 3, at pages 36 and 37. This remedy is proposed to address the significant threat to human health and the environment created by the impacts of VOCs and PCB in groundwater above groundwater standards.

- for Operable Unit 04, removal and off-site disposal of PCB contaminated material along the Hudson River shoreline near the former 004 outfall. See the discussion of Alternative 5B, at pages 38 and 39. This remedy is proposed to address the threat to human health and the environment associated with the release of PCB to the Hudson River from the PCB contaminated outfall deposits.

The above selected remedies are intended to attain the remediation goals selected for this site (other than those for the sediments and water column of the Hudson River) in conformity with applicable standards, criteria, and guidance (SCGs), *viz.*:

- Eliminate, to the extent practicable, ingestion of groundwater affected by the site that does not attain NYSDEC Class GA Ambient Water Quality Criteria.

- Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria.

- Eliminate, to the extent practicable, migration of LNAPL and DNAPL through removal and hydraulic management.

- Eliminate, to the extent practicable, exposures to PCB present in soils/sediments along the Hudson River.

- Eliminate, to the extent practicable, the migration of PCB into the Hudson River via: erosion of PCB contaminated soils, transport of suspended sediment with surface water, and transport of PCB contained in ground water or surface water.

- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.

- Eliminate, to the extent practicable, the exposure of fish and wildlife to levels of PCB above standards/guidance values.

<u>SECTION 2: SITE LOCATION AND DESCRIPTION</u>

The GE Fort Edward site is a 32-acre area located approximately 800 feet east of the Hudson River in the Town of Fort Edward between the Village of Hudson Falls, to the north, and the Village of Fort Edward, to the south. See Figure 1. The site is bounded by Broadway on the east, Park

Avenue on the south, and Lower Allen Street and D&H Railroad tracks on the west. A 200-foot wide parcel west of the main portion of the site, between Allen Street and the Hudson River, is also part of the site.

There are seven permanent buildings on the site, including the main manufacturing building, which is comprised of several joined structures constructed over a span of 25 years, and the aluminum rolling mill (Building 40, the "Foil Mill"). The remainder of the site is made up of parking areas and a concrete basin, part of the existing wastewater management system. See Figure 2.

Operable Unit No. 03, consists of the main portion of the site, including the contaminated groundwater and soil, and PCB non-aqueous phase liquids (NAPLs) beneath the facility. Operable Unit No. 04 consists of the area of contaminated soils and sediment adjacent to the former 004 outfall on the eastern shore of the Hudson River. This area consists of approximately 1350 feet of shoreline at the base of a steep bank. (An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release, or exposure pathway resulting from the site contamination.) The remaining Operable Units for this site are described in Section 3.2, below.

SECTION 3: SITE HISTORY

3.1 Operational/Disposal History

1942 - Main manufacturing building constructed as an aircraft turret plant.

1942-46 - Building leased by GE and used for manufacture of selsyn motors, used in aircraft turrets.

1946 to present - Industrial capacitors were manufactured at the site. Operations related to capacitor manufacture have included aluminum rolling, tin plating, polypropylene film manufacture, and refining and blending of capacitor dielectric fluids. A tank farm was used for storage, refining, and distribution of capacitor dielectric fluids. Prior to 1977, the capacitor dielectric fluids used were PCB, including Aroclor 1254, Aroclor 1242, and Aroclor 1016. Industrial solvents, including trichloroethene, were also used at the site. Over the course of industrial operations at the facility, releases of hazardous wastes (including industrial solvents and PCB) occurred at the site in a number of areas, including at the railroad off-loading area, in the tank farm and "treat" areas (where capacitors were filled with dielectric fluids), in the vicinity of Building 40, and from industrial sewers at the facility. Wastewaters were also discharged untreated via the 004 outfall to the Hudson River prior to 1977 which also contained PCB, resulting in contamination of the area near the 004 outfall, and the Hudson River at large.

1946-66 - The main building is expanded by construction of several additions, including one to house GE's film manufacturing operations. Also, the tank farm area was enclosed by one of the additions.

1960-73 - The Foil Mill is constructed in stages. Trenches in the concrete floor are used to convey lubricating fluids such as kerosene between the rolling mills and filter rooms.

1976 - Industrial wastewater and storm water, which were originally discharged untreated to the Hudson River, are routed to a new wastewater treatment plant.

1977 to present - Discharges of treated industrial wastewater and storm water continue through the 004 outfall.

3.2 Remedial History

1976 - The 1976 Settlement between NYSDEC and GE is signed, under which GE is obligated to implement a PCB abatement program at the Fort Edward and Hudson Falls GE plants.

1976-77 - PCB abatement program conducted, intended to eliminate PCB discharges to the environment.

1980 - The GE Fort Edward Plant Site is first listed on the Registry of Inactive Hazardous Waste Disposal Sites in New York.

1982 - Contamination is discovered in private homeowner wells in the vicinity of the site, leading to the start of the first RI/FS programs investigating the GE Fort Edward Plant as a source of the contamination.

1983 - A shallow groundwater recovery well is installed to treat VOC plume. Water is treated in an air stripper. Water lines installed for nearby homes with contaminated wells.

1985 - Issuance of the first Order on GE's consent to address completion of the RI/FS programs on-site and off-site, and to address remedy implementation based upon the findings of the RI/FS.

1988 - Off-site shallow bedrock groundwater recovery and treatment initiated.

1990 - PCB-contaminated soil is excavated and removed from the site.

1991 - Recovery wells installed for on-site shallow overburden groundwater recovery and treatment.

1992-96 - Wastewater treatment plant upgraded several times.

1992-94 - Investigations of the vicinity of the 004 outfall discharge location indicate that significant releases of PCB may be occurring from the contaminated soils and sediments in that area.

1993 - Issuance of an Order on GE's consent which requires GE to implement interim remedial measures related to the PCB releases from the 004 outfall area, and requires investigation of the 004 outfall area.

1994 - Additional residential wells sampled and homes connected to public water supply. The existing 004 outfall is rerouted beyond the contaminated soils at the base of the steep riverbank.[1]

1995 - Issuance of an Order on GE's consent which requires GE to implement a second RI/FS program to investigate potential sources of contaminant release at the plant site which were not addressed in the initial remedial program at the site.

1995-96 - PCB-contaminated soils and the former 004 outfall pipe were removed from the area east of Allen Street to the top of the cliff.

Other Operable Units for this site not addressed by this ROD include Operable Unit 01 - Off-site investigation and remediation, and Operable Unit 02 - Initial on-site investigation and remediation. These Operable Units were addressed by remedial programs in 1989 and 1990. The Operable Unit 01 remedial program is an ongoing groundwater recovery and treatment program intended to mitigate the shallow groundwater contaminant plume in the overburden soils south of the site. Since implementation of this remedial program, both the areal extent of the plume and the concentration of contaminants within the plume have been significantly reduced. (See "Five Year Review of Off-Site Remedial Program", O'Brien and Gere, July, 1995) The Operable Unit 02 remedial program is intended to reduce the sources of contamination identified during the original RI/FS at the site in the mid to late 1980's. This remedial program included the removal of contaminated soils in the former railroad offload area and in abandoned leaching pits at the site. This also included the implementation of on-site groundwater recovery and treatment programs in the overburden soils and in the shallow bedrock beneath the site. Recovery of PCB oil from beneath the site was also a portion of the Operable Unit 02 remedial program.

Operable Units 03 and 04 are the result of ongoing monitoring associated with the GE Fort Edward Site, and the Hudson River. Reviews (in 1994) of the performance of the remedial programs for Operable Units 01 and 02, along with the discovery of additional sources of contamination not identified in the original RI/FS for the site resulted in the issuance of two Orders on Consent by the Department which address the additional investigations in the vicinity of the manufacturing buildings at the site (Operable Unit 03), and additional investigations and Interim Remedial Measures (IRMs) in the vicinity of the former 004 Outfall which conveyed wastewater from the site to the Hudson River.

[1]References to "former outfall" in this document refer to the location of the 004 outfall prior to its relocation in 1994.

Also not addressed in this ROD is the investigation and remediation of the contamination in the water column and sediments of the Hudson River, other than that found in the outfall deposits proposed to be remediated in Operable Unit 04.

SECTION 4: SITE CONTAMINATION

In response to a determination that the disposal of hazardous waste at the site presents a significant threat to human health and the environment, GE completed a RI/FS. This latest RI/FS is a continuing investigation of the plant site, and supplements the RI/FS done in 1984-90. The need for a supplemental plant site investigation arose from a 1994 review of the selected remedies.

A separate remedial investigation and a focused feasibility study were conducted in 1994-97 for the area along the Hudson River shoreline.

The Commissioner may find that hazardous waste disposed at the site constitutes a significant threat to the environment if, after reviewing the available evidence and considering the factors the Commissioner deems relevant set forth in 6 NYCRR 375-1.4(b), the Commissioner determines that the hazardous waste disposed at the site or coming from the site results in, or is reasonably forseeable to result in, among other things,

(a) a bioaccumulation of contaminants in flora or fauna to a level that causes, or that materially contributes to, significant ecotoxicological effects in flora or fauna or leads, or materially contributes, to the need to recommend that human consumption be limited. (6 NYCRR 375-1.4[a][1[iii]); or

(b) significant environmental damage (6 NYCRR 375-1.4[a][2]).

In making a finding as to whether a significant threat to the environment exists, among others, the Commissioner may take into account any or all of the following matters, as may be appropriate under the circumstances of the particular situation:

- the duration, areal extent, or magnitude of severity of the environmental damage that may result from a release of hazardous waste (6 NYCRR 375-1.4[b][1]);
- type, mobility, toxicity, quantity, bioaccumulation, and persistence of hazardous waste present at the site (6 NYCRR 375-1.4[b][2]);
- manner of disposal of the hazardous waste (6 NYCRR 375-1.4[b][3]);
- nature of soils and bedrock at and near the site (6 NYCRR 375-1.4[b][4]);
- groundwater hydrogeology at and near the site (6 NYCRR 375-1.4[b][5]);

- location, nature, and size of surface waters at and near the site (6 NYCRR 375-1.4[b][6]);
- levels of contaminants in groundwater, surface water, air, and soils at and near the site and areas known to be directly affected or contaminated by waste from the site, including, but not limited to, contravention of: ambient surface water standards set forth in 6 NYCRR Part 701 or 702; ambient groundwater standards set forth in 6 NYCRR Part 703; drinking water standards set forth in 10 NYCRR Subpart 5-1 and Part 170 (6 NYCRR 375-1.4[b][7])
- proximity of the site to private residences, recreational facilities, public buildings or property, school facilities, places of work or worship, and other areas where individuals may be present;
- the extent to which hazardous waste and/or hazardous waste constituents have migrated or are reasonably anticipated to migrate from the site (6 NYCRR 375-1.4[b][9]);
- the proximity of the site to areas of critical environmental concern (as, wetlands or aquifers) (6 NYCRR 375-1.4[b][10]);
- the potential for wildlife or aquatic life exposure that could cause an increase in morbidity or mortality of same;
- the integrity of the mechanism, if any, that may be containing the hazardous waste to assess the probability of a release of the hazardous waste into the environment (6 NYCRR 375-1.4[b][12]); and
- the climatic and weather conditions at and in the vicinity of the site (6 NYCRR 375-1.4[b][13]).

(For a more detailed discussion respecting the Department's "significant threat" determinations and the rationale for its use of the above, and other, factors, in its decisionmaking, see the Draft Regulatory Impact Statement for 6 NYCRR Part 375, dated April 1991, at pages 19 to 25; and the Hearing Report, Responsiveness Summary, and Revision to the Draft Regulatory Impact Statement for 6 NYCRR Part 375, dated March 1992, at pages II-7 to II-19.)

The bases for the determination that the site poses a significant threat to human health and the environment are founded on the following:

Respecting Operable Unit 03: the hazardous wastes present in areas investigated in the most recent RI/FS program result in or are reasonably foreseeable to result in:

- contravention of ground water standards for PCB and VOCs (for concentrations of contaminants in groundwater at the site, see Table 1 below; for Water Quality Standards, see 6 NYCRR Parts 701 and 702, attached)

- contraventions of drinking water standards for PCB and VOCs (for concentrations of contaminants in groundwater at the site, see Table 1 below; for drinking water standards, see 10 NYCRR Subpart 5-1 and Part 170, attached)

The determination of significant threat associated with Operable Unit 03 is therefore based primarily on the significant environmental damage associated with impacts of contaminants (PCB and VOCs) on the shallow aquifer beneath the site, which was used for human water consumption in the past and is now unusable due to the presence of the PCB and VOCs above applicable standards.

Respecting Operable Unit 04, the hazardous wastes present in the 004 outfall area result in or are reasonably foreseeable to result in:

- contravention of surface water standards for PCB (see Table 1 below, and for Water Quality Standards, see 6 NYCRR Parts 701 and 702)

- bioaccumulation of contaminants (PCB) in fauna to levels which materially contribute to the need to recommend that human consumption be limited (for concentrations of PCB in fish in the vicinity of the site, see Spodaryk, 1998 below; for the advisory on consumption of fish from this part of the Hudson River, see "Health Advisories, Chemicals in Sportfish and Game, 1998-1999", NYSDOH, June 1998)

- bioaccumulation of contaminants (PCB) in flora or fauna to levels which materially contribute to significant adverse effects in fish-eating wildlife

The determination of significant threat associated with Operable Unit 04 is therefore based primarily on the foreseeable impacts of PCB and on the significant environmental damage associated with the releases of PCB to the Hudson River from the soils and sediments contaminated with PCB along the Hudson River shoreline near the former 004 outfall. These releases of PCB cause violation of the surface water standards which were developed to protect humans who consume fish from the effects of waterborne contaminants that may bioaccumulate in fish (such as PCB), and to protect wildlife which consume fish from the effects of waterborne contaminants that may bioaccumulate in fish (such as PCB). These releases of PCB materially contribute to the need to recommend that human consumption of fish from the Hudson River in the vicinity of the site be limited.

4.1 Summary of the Remedial Investigation

The purpose of the RI (Remedial Investigation) was to define the nature and extent of any contamination resulting from previous activities at the site. The remedial investigations for Operable Unit 03 and Operable Unit 04 are described separately.

To determine which media (soil, groundwater, etc.) contain contamination at levels of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance (SCGs).

Groundwater and drinking water SCGs identified for the GE Fort Edward site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of New York State Sanitary Code. NYSDEC soil cleanup guidelines for the protection of groundwater (TAGM 4046), and background conditions were used as SCGs for soil.

Based on the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas and media of the site in both Operable Unit 03 and Operable Unit 04 require remediation. These are summarized below. More complete information can be found in the RI reports for the site.

Soil chemical concentrations are reported in milligrams per kilogram (mg/kg). Concentrations in water are reported in parts per billion (ppb) or parts per million (ppm). For comparison purposes, SCGs are given for each medium.

OPERABLE UNIT 03

The RI was conducted in two phases. The first phase was conducted between July 1995 and March 1996 and the second phase (which was done to fill in data gaps identified in the first phase) between April 1996 and January 1997. A report entitled "Fort Edward Remedial Investigation Report" (O'Brien & Gere Engineers, Inc. - January 20, 1997) has been prepared describing the field activities and findings of the RI in detail.

The RI included the following activities:

- Conducted a soil gas survey to define areas of volatile organic contamination.
- Drilled soil borings to better interpret the soil stratigraphy at the site.
- Installed monitoring wells for collection of soil and groundwater samples.
- Sampled and analyzed soil, groundwater, and sewers.
- Evaluated deep bedrock groundwater conditions.
- Investigated DNAPL extent at site.

OPERABLE UNIT 04

The RI for this operable unit was conducted in several phases. The first phase was conducted between December 1993 and June 1994 and additional investigations were conducted in December 1994 and August 1995. Reports prepared describing the field activities and findings of the RI in detail are entitled "Final Technical Memorandum, Ft. Edward Facility, Outfall 004 Sediment Investigation and Shoreline Protection IRM" (O'Brien and Gere Engineers, November, 1995).

The RI included the following activities:

- Reviewed historical documentation and drawings related to the use and construction of the 004 outfall pipe.
- Collected soil samples at locations primarily along the Hudson River shoreline.
- Collected surface water samples above, below, and at the location where the 004 discharges to the Hudson River.
- Performed a land survey of the area being investigated.
- Excavated test pits and sampled soil within the outfall deposits and along the banks of the Hudson River downstream of the outfall location.
- Prepared and submitted reports.

4.1.1 Nature of Contamination

OPERABLE UNIT 03

The GE Fort Edward site is contaminated with several types of compounds, including PCB, a component of the dielectric fluid used in capacitor manufacture, and volatile organic compounds (VOCs), consisting of industrial solvents, and lubricants used during the aluminum rolling process and solvents used to clean parts and machinery.

As described in the RI Report, numerous soil gas, soil, and groundwater samples were collected at the site to characterize the nature and extent of contamination. Soil gas samples (the air and other vapors contained in the unsaturated soil above the water table) were collected and analyzed for chlorinated VOCs (specifically trichloroethene and 1,1-dichloroethane) and kerosene constituents. Soil gas surveys are used to locate areas of soil or groundwater contamination without collecting multiple soil or groundwater samples. Elevated levels of kerosene constituents and other VOCs were found in the soil gas at portions of the site.

The kerosene constituents were investigated because the kerosene can enhance the mobilization of the PCB and other organic contaminants at the site.

Soil samples were collected from borings and soil piles and were found to contain VOCs, kerosene, and PCB. Some of the samples were collected from borings drilled beneath the site.

Groundwater samples were collected from 108 on-site monitoring wells, 22 off-site wells, and 4 off-site springs. Groundwater samples from the overburden aquifer were found to contain kerosene constituents, the volatile organic compounds such as chlorinated solvents (e.g., trichloroethene, chlorobenzene, 1,1-dichloroethane, 1,1,1-trichloroethane), and PCB. Generally, the groundwater in the bedrock beneath the site had few contraventions of groundwater standards, as the extent of contamination in the bedrock is limited.

The area containing PCB oil in the vicinity of the parking lot (in the south-central portion of the site) was more closely defined by a soil boring program in order for alternatives to be developed in the FS to accelerate the recovery of the PCB oil from the soils.

OPERABLE UNIT 04

As described in the RI Reports, soil, sediments, and surface water samples were collected at the site to characterize the nature and extent of contamination.

Soil samples were collected from borings at selected locations on the eastern bank of the Hudson River and found to predominantly contain PCB with some additional volatile and semivolatile organic compounds (e.g., acetone, 1,3- and 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene). The PCB contaminated soils were found in areas that were previously at or below the high water level of the Hudson River when the former Fort Edward Dam was still in place. The Fort Edward Dam was removed in 1973, reducing river water levels in this area by approximately 15 feet. See Figure 2, which shows the 004 outfall area.

The downstream boundary of the 004 outfall area is the northern end of Remnant Site 3. The "Remnant Sites" are 5 other areas that became exposed in 1973, after the Fort Edward dam was removed and the river water level dropped. Remnant Site 3 (along with Remnant Sites 2, 4, and 5) was capped as an Interim Remedial Measure (IRM) by GE as ordered by USEPA in the early 1990's.

Surface water samples were taken upstream of, at and downstream of the former outfall location to determine the concentration of PCB measured in the water of the Hudson River.

4.1.2 Extent of Contamination

OPERABLE UNIT 03

Table 1 summarizes the extent of contamination for the contaminants of concern in the soil and groundwater and compares the data with the Standards, Criteria, and Guidelines (SCGs) for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Soil

Fifty-three soil samples were collected from borings drilled under and around the Foil Mill, four were collected from a former leach field, and three were collected along the western boundary of the site. Virtually all of the samples were analyzed for VOCs and PCB.

Near the Foil Mill, the contamination in the soil appears to be limited to the vicinity of the building, and directly related to the oil present in this area, a light, non-aqueous phase liquid (LNAPL) which floats on the water table. This contamination does not appear to extend off the plant property. In the former leach field, one boring exhibited elevated levels of PCB in soil (203 ppm). The borings done along the western boundary of the site exhibited PCB concentrations from non-detect to 16 ppm.

Overburden Groundwater

In the vicinity of the Foil Mill, shallow groundwater is contaminated above Class GA groundwater standards or guidance values for numerous chemicals, including 1,1-dichloroethane, 1,1,1-trichloroethane, PCB (Aroclor-1242 and Aroclor-1254), and kerosene-related VOCs. Generally, the groundwater quality standards for these chemicals is 5 ppb; PCB have a standard of 0.09 ppb. Selected concentrations of contaminants above standards are 1,1-dichloroethane at 940 ppb, 1,1,1-trichloroethane at 1,100 ppb, kerosene-VOCs from 11 to 1,250 ppb, and PCB (Aroclor-1242 at 310 ppb, and Aroclor-1254 at 5.1 ppb). See Figure 3 for a map showing the extent of contamination in the overburden groundwater near the Foil Mill.

A geological unit described as the "transition zone" is located in the southeastern portion of the site. Unlike the rest of the site, there is a gradual change from the sand aquifer (extending from the surface to approximately 30 feet deep) to the underlying silt and clay layer. This gradual change (called a "gradational contact") resulted in the presence of a series of thin alternating layers of sand and silt/clay. Trichloroethene and/or cis-1,2-dichloroethene were detected at concentrations ranging from 8 to 4,300 ppb, above the 5 ppb groundwater quality water standard for these contaminants. Aroclors 1242 and 1254 were detected at concentrations up to 28.1 ppb. See Figure 3 for a map showing the extent of contamination in the overburden groundwater associated with the transition zone.

In the southern portion of the site, groundwater in monitoring wells was contaminated above groundwater quality standards with numerous chlorinated VOCs, such as trichloroethene, cis-1,2-dichloroethene, tetrachloroethene, vinyl chloride, 1,1,1-trichloroethane, 1,1-dichloroethane, chlorobenzene, and 1,2-dichlorobenzene. Total VOC concentrations in the wells ranged from 5 to 10,000 ppb. PCB were detected at concentrations up to 77 ppb. This area is currently controlled by the existing (beginning in 1984) groundwater recovery and treatment system.

As with the on-site areas, off-site wells and springs were contaminated with chlorinated VOCs, including trichloroethene and cis-1,2-dichloroethene (concentrations up to 3,920 ppb). PCB were detected above the groundwater quality standard at concentrations up to 1.9 ppb. As stated above, both the extent of the off-site plume and concentrations of contaminants within the plume are decreasing (from a high of over 20,000 ppb VOCs) due to the implementation of the Operable Units 01 and 02 remedial programs.

Bedrock Groundwater

Shallow (generally 45 to 75 feet below grade) bedrock groundwater had several low detections of VOCs . The highest detection was of benzene at 11 ppb (standard of 0.7 ppb) in one well. PCB were detected at concentrations up to 0.92 ppb.

Intermediate (generally 75 to 100 feet below grade) bedrock wells had low levels of VOC contamination, mostly below groundwater standards, with the exception of two bedrock recovery wells, which had levels of cis-1,2-dichloroethene up to 7 ppb and vinyl chloride up to 14 ppb. The only detections of PCB above groundwater standards were for Aroclor-1242 in the two recovery wells, with concentrations up to 76 ppb.

The deep (generally greater than 100 feet below grade) bedrock wells were not contaminated above groundwater standards for VOCs or PCB.

The existing bedrock groundwater recovery and treatment system appears to be effective in controlling the contamination in the bedrock beneath the site. See "Five Year Review of Off-Site Remedial Program" (O'Brien and Gere, July, 1995)

Other

Within the groundwater at the site, there are pockets of non-aqueous phase liquids, some of which are lighter than water (LNAPLs) or denser than water (DNAPLs). These are usually pure product, such as oils or solvents, which only partially dissolve in water, and float or sink within the aquifer. DNAPLs often pool under water atop surfaces of lower permeability within the aquifer. At the site, DNAPL was observed in the south-central portion of the facility above low-permeability silt and clay deposits. A soil boring program was performed to more closely define the extent of the DNAPL "pool", and the estimate of the volume of PCB oil present in this area is 144,000 gallons. This estimate of PCB oil volume is based upon definition of the volume of soils saturated with PCB oil, and the porosity of the soils. To date, approximately 2000 gallons of PCB oil have been recovered by the existing oil recovery system.

OPERABLE UNIT 04

Table 1 summarizes the extent of contamination for the contaminants of concern in the soil and surface water and compares the data with the proposed remedial action levels (SCGs) for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Soil

One hundred ninety-six soil samples were collected from locations along the shoreline of the Hudson River from 300 feet upstream of the former 004 discharge pipe to 1150 feet downstream of the discharge pipe. The concentrations of PCB in the soils ranged from 0.2 to 44,800 mg/kg (parts per million). In general, the highest levels of PCB were found immediately adjacent to and downstream of the former discharge pipe. See Table 4 for the distribution of PCB in the 004 outfall area. The PCB concentrations tended to decrease both upstream and downstream of the former discharge pipe. Soil samples were taken at locations from above the pre-1974 high water mark to the current low water mark. The results of this sampling demonstrated the presence of PCB at the pre-1974 high water mark; the highest concentrations were found below the pre-1974 water level. See Figure 4 for a schematic cross-section of the 004 outfall area, showing the vertical extent of PCB. The presence of an oil sheen was also observed during the soil sampling.

Surface Water

Surface water measurements for PCB were taken at the following locations in the Hudson River: 200 feet upstream of the outfall, 4 feet west of where the outfall formerly flowed into the river, and 200 feet downstream of the outfall. The PCB concentrations ranged from less than 0.12 upstream to 16.7 ug/l (parts per billion) adjacent to the outfall location. The surface water standard for PCB is 0.000001 ug/l, or 1 picogram per liter. The highest values were found at the location where the outfall flowed in the river. This information prompted the 1994 rerouting of the outfall to prevent additional PCB loading caused by the discharge water passing through the contaminated material before it entered the Hudson River. Surface water was also sampled upstream and downstream of the former outfall location after the outfall was relocated, which measured concentrations of PCB of 0.172 ug/l upstream of the site, and 0.328 ug/l and 0.410 ug/l adjacent to and downstream of the former outfall location.

In both sampling events, the results indicated higher PCB concentrations downstream of the former outfall location than upstream, indicating that the area is an ongoing source of PCB to the Hudson River. Mechanisms of release to the river could include erosion of contaminated material via scour, groundwater discharging through the contaminated area, rainfall recharge passing through the contaminated area, and river water passing through the contaminated area.

Other

Fish samples collected in the Hudson River approximately 1/4 mile downstream of the 004 outfall deposit showed elevated levels of PCB, ranging from 5.59 to 20.45 ppm. (See Spodaryk, January 1998) These fish would have been exposed to PCB released from both GE plants, at Fort Edward and at Hudson Falls. However, as the water column PCB sampling showed an increase in PCB concentrations as the river passed the 004 outfall deposit, a portion of the PCB found in the fish samples is attributable to the 004 outfall deposits.

Further indications that the 004 outfall deposit is a source of PCB to the river were found in the results of PISCES sampling done by DEC in 1997. PISCES sampling is a method of water sampling which measures the mixtures of PCB present, and relative amounts of PCB present at different locations. The sampling results showed that there was a change in the PCB congener pattern (that is, a change in ratios of which PCB were found in the samplers) from upstream of the 004 outfall deposit to downstream. See Spodaryk, January 1997, and Rowell, 1997. This change in congener pattern, when evaluated along with the water column sampling described above, indicates that the 004 outfall area is an ongoing source of PCB to the Hudson River.

An investigation was performed in June 1996 to evaluate the presence of free oil at a location near the former 004 discharge pipe. Hand driven well points were installed at six locations and a test pit was excavated next to one well point to verify the distance to refusal of the well point. The well points were sampled with a bailer to determine if a separate phase oil exists. A sheen was observed in the water removed from the well points; however, there was no evidence of a separate layer of free oil in the well points. The results were consistent with the soil sampling performed previously.

4.2 Interim Remedial Measures

Interim Remedial Measures (IRMs) are discrete sets of activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation or evaluation, to prevent, mitigate, or remedy environmental damage or the consequences of same attributable to a site. The following IRMs have been completed at the site.

1985 - Two production wells were temporarily sealed to prevent migration of contaminants into the deep bedrock aquifer. These wells were permanently sealed in 1996.

1994 - A temporary diversion for the plant outfall was installed. The outfall originally flowed through contaminated sediments on the shore of the Hudson River. The permanent diversion was completed in 1996.

1994 - Shoreline protection measures were installed to reduce high flow water velocity over PCB contaminated material in the vicinity of the outfall area.

1996 - Former outfall pipeline and approximately 2000 cubic yards of pipe bedding were removed. This pipeline and pipe bedding and soil were contaminated with PCB up to 20,000 ppm. This pipeline extended from the southwestern corner of Building 40 west to the top of the cliff on the east side of the Hudson River.

4.3 Summary of Human Exposure Pathways

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks for Operable Unit 03 can be found in Section 7 of the RI Report for Operable Unit 03.

An exposure pathway is how an individual may come into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Completed pathways which exist at the site include:

- Incidental Ingestion, Inhalation, and Dermal Contact: On-site workers could be exposed to contaminants in the soil and shallow groundwater while excavating to maintain or install utility lines.
- Incidental Ingestion, Inhalation, and Dermal Contact: Off-site groundwater may be used by residents for non-potable purposes such as car washing or watering lawns. VOCs have been detected in surface springs south of the site, which may be locations where recreational exposure could occur.
- Incidental Ingestion, Inhalation, and Dermal Contact: People may be exposed to PCB contaminated material found along the eastern shoreline of the Hudson River when walking along the shoreline in the vicinity of the 004 Outfall deposits.
- Ingestion: People consuming fish and or wildlife impacted by PCB from this site also would be exposed to PCB.

4.4 Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures presented by the site. The Hudson River is exposed to contaminants due to its location hydraulically downgradient of the site. Ecological exposure pathways are considered to be complete at the site for Operable Unit 04. The primary ecological exposure pathway is through migration of PCB from the site to the Hudson River, and subsequent exposure of wildlife in the area of the Hudson River. The potential also exists for direct contact with and or ingestion of soils and water containing PCB by wildlife such as birds, mammals and fish residing on and adjacent to the site. The migration pathways that can transport PCB to the Hudson River are precipitation, erosion due to scour, ground water (which as described in Appendix B of the Focused Feasibility Study for the 004 Outfall Area, would likely result in violation of the surface water standards for PCB), and PCB flux from bank storage and discharge as described in Appendix A (attached). There are currently no known completed pathways of environmental exposure from the Operable Unit 03 portion of the site.

SECTION 5: ENFORCEMENT STATUS

The NYSDEC issued an Order on GE's consent in 1995. This Order obligates GE to implement a RI/FS for the site, and has provisions which enable GE to also do remedy implementation under this order. The 1993 Order for the 004 Outfall area addressed implementation of the IRMs done in this area, and addressed investigation of the outfall area.

The following is the chronological enforcement history of this site.

Date	Index No.	Subject of Order
1985	T032785	Implement remedial program
1994	A5-0313-93-12	Investigate plant outfall, perform IRMs
1995	A5-0316-94-06	Supplemental RI/FS

The 1985 Order was issued after the discovery of site related contamination in private homeowner wells near the site. The 1994 Order was issued after the discovery of releases of PCB to the Hudson River from the PCB contaminated material near the former 004 outfall location. The 1995 Order was issued after the discovery of additional sources of contamination at the site that were not addressed in the previous remedial programs.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established consistent with 6 NYCRR 375-1.10. The overall remedial goal is to restore the site to pre-disposal conditions, to the extent feasible and authorized by law, with the minimum remedial objective being to eliminate or mitigate, through the proper application of scientific and engineering principles, all significant threats to the public health and to the environment presented by the hazardous waste disposed at the site.

The goals selected for this site (other than those for the sediments and water column of the Hudson River), in conformity with applicable Standards, Criteria, and Guidance (SCGs), are:

- Eliminate, to the extent practicable, ingestion of groundwater affected by the site that does not attain NYSDEC Class GA Ambient Water Quality Criteria.
- Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria.
- Eliminate, to the extent practicable, migration of LNAPL and DNAPL through removal and hydraulic management.
- Eliminate, to the extent practicable, exposures to PCB present in soils/sediments along the Hudson River.

- Eliminate, to the extent practicable, the migration of PCB into the Hudson River via: erosion of PCB contaminated soils, transport of suspended sediment with surface water, and transport of PCB contained in ground water or surface water.
- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.
- Eliminate, to the extent practicable, the exposure of fish and wildlife to levels of PCB above standards/guidance values.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for Operable Unit 03 of the GE Fort Edward site were identified, screened, and evaluated in a Feasibility Study. This evaluation is presented in the report entitled "Feasibility Study, General Electric Company, Transmission Systems, Fort Edward, New York", dated January 31, 1997. Potential remedial alternatives for Operable Unit 04 of the GE Fort Edward site were identified, screened, and evaluated in a Focused Feasibility Study. This evaluation is presented in the report entitled "Fort Edward Facility, Outfall 004 Soil, Focused Feasibility Study" (O'Brien and Gere Engineers, December 1996).

A summary of the detailed analysis follows. As used in the following text, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

7.1 Description of Alternatives

Operable Unit 03

Alternative 1 - No Further Action

This alternative recognizes remediation of the site conducted under previously completed remedial actions. Only continued monitoring is necessary to evaluate the effectiveness of the existing remedial program.

This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth:	$845,485
Capital Cost:	$n/a
Annual O&M:	$55,000
Time to Implement	Complete

Alternative 2 - Hydraulic Control

Hydraulic control would be used to manage migration of contaminated groundwater and LNAPL/DNAPL in the aquifer through expansion of the existing collection system. Groundwater collected would be treated in the existing wastewater treatment facility, which would need to be upgraded to handle the increased flow.

The existing groundwater collection system would be expanded by the addition of six recovery wells in the transition zone and installation of two horizontal recovery wells to collect DNAPL at the southeast corner of the site. Groundwater recovery trenches would collect the groundwater in the western portion of the site in the vicinity of the Foil Mill.

Present Worth:	$4,669,477
Capital Cost:	$1,201,688
Annual O&M:	$153,754
Time to Implement	1 year

Note: The next three alternatives are very similar; they vary only in the methodology used to enhance the degree of groundwater control. In the first (Alt. 3), a pretreatment process is used to aid in management of increased flows of recovered groundwater. In the second (Alt. 3A), reinjection of the pretreated water would allow for enhanced recovery rates and control of groundwater. In the third (Alternative 3B), an upgradient barrier wall would be installed to achieve hydraulic control without having to increase groundwater recovery rates.

Alternative 3 - Hydraulic Control with Pretreatment

This alternative would use the same control measures as Alternative 2 (including the installation of the transition zone recovery wells and horizontal DNAPL recovery wells), but would include the addition of a water pretreatment system for management of the groundwater collected from the Foil Mill recovery trenches. Pre-treatment would allow the wastewater treatment plant to be used without an upgrade.

Present Worth:	$3,634,932
Capital Cost:	$1,104,927
Annual O&M:	$92,819
Time to Implement	1 year

Alternative 3A - Hydraulic Control with Re-Injection

If additional groundwater collection were necessary to achieve hydraulic control, Alternative 3A would implement the same controls as Alternative 3, except that the pre-treatment system would be upgraded, with 75% of the pretreated groundwater reinjected into the aquifer through a horizontal well installed beneath the Foil Mill.

This method would allow the use of the existing treatment plant without an upgrade, yet would permit the increased groundwater collection rate.

Present Worth:	$4,493,301
Capital Cost:	$1,499,517
Annual O&M:	$152,262
Time to Implement	1 year

Alternative 3B - Hydraulic Control with Upgradient Barrier

Similar to Alternative 3A, Alternative 3B would achieve hydraulic control by construction of a barrier wall upgradient of the Foil Mill, thus reducing flow to the groundwater recovery trenches. As with Alternative 3A, the wastewater treatment plant would not need to be upgraded.

Present Worth:	$4,098,899
Capital Cost:	$1,487,727
Annual O&M:	$98,099
Time to Implement	1 year

Alternative 4 - Hydraulic Control with Downgradient Barrier

This alternative would implement a system of collection trenches to handle contaminated groundwater in the vicinity of the Foil Mill, as described in Alternative 2, with the necessary upgrade of the wastewater treatment plant. However, the contaminated area (DNAPL pool) in the southwest corner of the site would be addressed through four new vertical recovery wells and a sheet piling barrier wall along the southeast property line. The sheet piling would act as a barrier to DNAPL migration through the fine sand and transition zone materials.

Present Worth:	$4,956,105
Capital Cost:	$2,113,158
Annual O&M:	$169,483
Time to Implement	1 year

Alternative 5 - Perimeter Barrier with Site Dewatering

Alternative 5 would consist of the sheet piling barrier wall, as described in Alternative 4, with the remainder of the site enclosed within a slurry wall which would extend to the top of rock or into a low permeability layer. The area inside of the barrier would be dewatered through two new groundwater recovery wells, located in the southeast part of the site. The existing wastewater treatment plant would be used to treat the collected water, and would not need to be upgraded on the basis of flow.

Present Worth:	$7,404,585
Capital Cost:	$5,112,572
Annual O&M:	$141,371
Time to Implement	1 year

Operable Unit 04

The potential remedies are intended to address the PCB contamination along the Hudson River shoreline near the former 004 outfall location. All alternatives evaluated (except Alternative 1, No Further Action) include the construction of an access road to the shoreline area north of Remnant Deposit 3.

Alternative 1 - No Further Action

This alternative recognizes remediation of the site conducted under previously completed IRMs. Only monitoring would be necessary to evaluate the effectiveness of the remediation completed under the IRM.

This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth:	$176,783
Capital Cost:	NA
Annual O&M:	$11,500
Time to Implement	Complete

Note: the next three alternatives (2A, 2B, and 2C) all involve capping the outfall deposits in place, and differ only in the method of capping. Under Alternative 2A, the entire length of the outfall deposit would be covered with a low permeability cap after installation of a retaining wall along the shoreline. Under Alternative 2B, the retaining wall would not be installed, and the cap would extent further out into the river. Under Alternative 2C, the site would be covered with rip-rap instead of a low permeability cap.

Alternative 2A - Capping

Alternative 2A consists of capping PCB-containing soils in-place with institutional actions. Institutional actions consist of access restrictions, and deed restrictions designed to prevent disturbance of the capped area; and surface water monitoring.

This alternative consists of regrading and slope stabilization of the entire outfall deposit with a retaining wall followed by construction of a low permeability cap. The cap would extend for approximately 1350 feet of shoreline to Remnant Deposit 3. Construction of a retaining wall along the down slope toe of the cap would reduce the encroachment of the capped area into the Hudson River. The cap would extend from the retaining wall to approximately elevation 153 feet average mean sea level. Removal of unstable materials on the steep slope would provide access to bedrock to allow tying the cap into the rock with a bentonite seal. PCB-containing materials extending into the Hudson River would be covered with geotextile and rip-rap (approximately 1350 lineal feet).

Upon completion of the cap installation, the temporary access road in the Hudson River would be removed. The rip-rap used for construction of the road would be placed along the edge of the capped area to provide shoreline protection. The rip rap would extend from the approximate 100-year flood elevation (estimated to be 136 feet above mean sea level ("amsl") to within the Hudson River. Deed restrictions (as described above) and sign posting would be included. Long term maintenance of the cap would be required and surface water monitoring would be conducted to monitor the effectiveness of the cap.

Present Worth:	$2,120,000
Capital Cost:	$1,480,000
Annual O&M:	$48,000
Time to Implement	1 year

Alternative 2B - Capping

Alternative 2B includes the same components as Alternative 2A, with the exception of a modified cap design. The need for the retaining wall would be eliminated by decreasing the slope to 1:3 and extending the capped area further out into the river.

Present Worth:	$2,120,000
Capital Cost:	$1,370,000
Annual O&M:	$49,000
Time to Implement	1 year

Alternative 2C - Capping

Alternative 2C would not include construction of a low permeability cap over the PCB-containing soil. This alternative would consist of regrading the soil to achieve a 1:1 slope, and placing rip-rap over the site. The rip-rap would control erosion and prevent direct contact; however, the rip-rap would not control infiltration by precipitation. The deed restrictions and sign posting would be included. Long term maintenance of the cap would be required and surface water monitoring would be conducted to monitor the effectiveness of the cap.

Present Worth:	$1,090,000
Capital Cost:	$630,000
Annual O&M:	$30,000
Time to Implement	1 year

The next five alternatives (3A, 3B, 3C, 3D, and 3E) all involve the partial relocation of the outfall deposits to the southern end of the 004 outfall area, with capping (using a retaining wall and low permeability cap as in Alternative 2A) of the entire area after the partial relocation. The differences in these next five alternatives are in the amount of the outfall deposit to be relocated prior to capping.

Under Alternative 3A, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, from 150 feet upstream of the former outfall to 260 feet downstream of the former outfall, would be excavated and relocated.

Under Alternative 3B, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, from 150 feet upstream of the former outfall to 600 feet downstream of the former outfall, would be excavated and relocated.

Under Alternative 3C, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, from 150 feet upstream of the former outfall to 800 feet downstream of the former outfall, would be excavated and relocated.
Under Alternative 3D, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, from 150 feet upstream of the former outfall to 900 feet downstream of the former outfall, would be excavated and relocated.

Under Alternative 3E, the portion of the outfall deposit from 150 feet upstream of the former outfall to 260 feet downstream of the former outfall, down to the underlying bedrock, would be excavated and relocated.

For schematic drawings which illustrate the extent of outfall deposit relocation under each of these alternatives, see Figure 5. For a summary table of the extent of material to be relocated, see Table 5 .

Alternative 3A - Consolidation/Capping

This alternative would include construction of an access road in a manner similar to the road described for Alternative 2A. Soil between 150 feet upstream of the former outfall and 260 feet downstream of the former outfall, from elevation 153 feet amsl to approximately one foot above the annual mean water level in the Hudson River (estimated to be approximately 128 feet amsl), would be relocated to the southern portion of the site between 850 feet and 1150 feet downstream of the former outfall location. It is estimated that approximately 2,600 cubic yards of soil would be excavated and relocated. The entire length of the outfall deposit would be capped consistent with Alternative 2A, including the use of a retaining wall at the base of the cap, where required. PCB-containing materials extending into the Hudson River (approximately 1350 feet of shoreline) would be covered with geotextile and rip-rap. Unstable materials above elevation 153 feet amsl would be removed and could be used to backfill excavated areas, or used as fill material during cap construction.

Present Worth:	$2,100,000
Capital Cost:	$1,400,000
Annual O&M:	$46,000
Time to Implement	1 year

Alternative 3B - Consolidation/Capping

This alternative consists of the same components as Alternative 3A, with the exception that the excavation area would be expanded to approximately 600 feet downstream of the former outfall location (approximate northern edge of junk yard). It is estimated that approximately 1100 cubic yards would be added to the quantity excavated, bringing the total to approximately 3,500 cubic yards.

Present Worth:	$2,040,000
Capital Cost:	$1,370,000
Annual O&M:	$44,000
Time to Implement	1 year

Alternative 3C - Consolidation/Capping

This alternative consists of the same components as Alternative 3A, with the exception that the excavation area would be expanded to approximately 800 feet below the former outfall location. Approximately 1,800 cubic yards would be added to the quantity to be relocated (5,300 cubic yards total).

Present Worth:	$1,990,000
Capital Cost:	$1,340,000
Annual O&M:	$42,000
Time to Implement	1 year

Alternative 3D - Consolidation/Capping

Alternative 3D would expand the excavation area to 950 feet downstream of the former outfall location, and would add an estimated additional 200 cubic yards (5,500 cubic yards total) to the quantity excavated and relocated.

Present Worth:	$1,860,000
Capital Cost:	$1,250,000
Annual O&M:	$40,000
Time to Implement	1 year

Alternative 3E - Consolidation/Capping

This Alternative is consistent with Alternative 3A, except excavation would be performed below the typical summer low water level (approximately 128 feet above mean sea level, or msl.) in the Hudson River. This alternative was developed to evaluate the feasibility of performing dewatering activities within, and adjacent to, the Hudson River. Estimated excavation volumes would increase from approximately 2,400 to 3,500 cubic yards.

A dewatering system would be installed in the Hudson River between the access road and the edge of sediment in the Hudson River. Water would be pumped from within the isolated area to a temporary water treatment facility for treatment prior to discharge back to the Hudson River.

Present Worth:	$2,220,000
Capital Cost:	$1,490,000
Annual O&M:	$47,000
Time to Implement	1 year

The next five alternatives (4A, 4B, 4C, 4D, and 4E) all involve the partial removal of the outfall deposits, with capping of the area remaining after the partial removal. The differences in these next five alternatives are in the amount of the outfall deposit to be removed prior to capping. Under each of the next five alternatives, the material removed would be disposed of off-site at a permitted facility, and the entire remaining portion of the outfall deposit would be capped as described in Alternative 2A.

Under Alternative 4A, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, between 150 feet upstream and 260 feet downstream of the former outfall location would be excavated and transported off-site.

Under Alternative 4B, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, between 150 feet upstream and 600 feet downstream of the former outfall location would be excavated and transported off-site.

Under Alternative 4C, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, between 150 feet upstream and 800 feet downstream of the former outfall location would be excavated and transported off-site.

Under Alternative 4D, that portion of the outfall deposit greater than one foot above the mean elevation of the Hudson River, between 150 feet upstream and 900 feet downstream of the former outfall location would be excavated and transported off-site.

Under Alternative 4E, that portion of the outfall deposit between 150 feet upstream and 260 feet downstream of the former outfall would be excavated down to bedrock and transported off-site.

For schematic drawings which illustrate the extent of outfall deposit removal under each of these alternatives, see Figure 6. For a summary table of the extent of material to be removed, see Table 6.

Alternative 4A - Removal/Disposal Off-Site and Capping

This alternative would include the construction of an access road similar to the road described for Alternative 2. Soil between 150 feet upstream and 260 feet downstream of the former outfall location, from elevation 153 feet amsl to approximately 1 foot above the annual mean water level in the Hudson River (approximate elevation 128 feet amsl), would be excavated and transported off-site for disposal at a permitted facility. It is estimated that 2,400 cubic yards of soil would be excavated and disposed of off-site. The entire length of the outfall deposit would be capped. The cap would extend from approximately 250 feet downstream of the former outfall location to the northern edge of Remnant Deposit 3. The cap design would be consistent with the design presented for Alternative 2A, including the use of a retaining wall at the base of the cap, where required. The PCB-containing materials extending into the Hudson River (approximately 1350 feet of shoreline) would be covered with geotextile and rip-rap.

Present Worth:	$3,990,000
Capital Cost:	$2,960,000
Annual O&M:	$67,000
Time to Implement	1 year

Alternative 4B - Removal/Disposal Off-Site and Capping

This alternative consists of the same components as Alternative 4A, with the exception that the excavation area would be expanded to 500 feet downstream of the former outfall location. It is estimated that approximately 1100 cubic yards would be added to the quantity excavated, bringing the total to approximately 3,500 cubic yards.

Present Worth:	$4,550,000
Capital Cost:	$3,430,000
Annual O&M:	$72,000
Time to Implement	1 year

Alternative 4C - Removal/Disposal Off-Site and Capping

This alternative consists of the same components as Alternative 4A, with the exception that the excavation area would be expanded to approximately 700 feet downstream of the former outfall. Approximately 1800 cubic yards would be added to the quantity to be excavated, bringing the total to 5,300 cubic yards.

Present Worth:	$4,810,000
Capital Cost:	$3,670,000
Annual O&M:	$74,000
Time to Implement	1 year

Alternative 4D - Removal/Disposal Off-Site and Capping

Alternative 4D would expand the excavation to approximately 850 feet downstream of the former outfall, and would add an estimated additional 200 cubic yards bringing the total to 5,500 cubic yards for disposal off-site.

Present Worth:	$4,770,000
Capital Cost:	$3,650,000
Annual O&M:	$73,000
Time to Implement	1 year

Alternative 4E - Removal/Disposal Off-Site and Capping

This alternative is consistent with Alternative 4A, except excavation would be performed below the annual mean water level (approximately 128 feet amsl) in the Hudson River. Estimated excavation volumes would increase from approximately 2,400 cubic yards to 3,500 cubic yards. Dewatering activities would be consistent with those described for Alternative 3E.

Present Worth:	$4,870,000
Capital Cost:	$3,680,000
Annual O&M:	$77,000
Time to Implement	1 year

The next two alternatives (5A and 5B) both involve removal of the outfall deposits along the entire length of the area, from 160 feet upstream of the former outfall location down to remnant site 3A, a length of approximately 1350 feet. The difference between the two alternatives is the depth of removal.

Under Alternative 5A, only that material located more that above one foot above the annual mean water level of the Hudson River would be removed. The entire length of the 004 outfall area would then be capped as described in Alternative 2A.

Under Alternative 5B removal would extend to below the annual mean water level elevation to the underlying bedrock.

For schematic drawings which illustrate the extent of outfall deposit relocation under both of these alternatives, see Figure 7. For a summary table of the extent of material to be removed, see Table 7.

Alternative 5A - Removal and Off-site Disposal

Alternative 5A consists of construction of an access road in a manner consistent with Alternative 2A, and excavation along the entire length of the outfall deposit. Soil would be excavated between 150 feet upstream of the outfall and the northern end of Remnant Deposit 3, from approximate elevation 153 feet amsl to approximately one foot above the annual mean water level in the Hudson River (approximate elevation 128). Soil that remained in place between 150 feet upstream of the outfall and 260 feet downstream, below approximate elevation 128 amsl would be capped, in a manner consistent with Alternative 2A. PCB-containing materials extending into the Hudson River between 150 feet above the former outfall and the northern end of Remnant Deposit 3 would be covered with geotextile and rip-rap.

The excavated materials would be transported off-site to a permitted disposal facility. The estimated volume to be excavated and disposed of is approximately 6,800 cubic yards. Unstable materials above elevation 153 feet amsl would be removed prior to excavation of the PCB-containing material below it, and could be used as backfill after the excavation was complete. The access road would be removed upon completion of the project.

Present Worth:	$5,260,000
Capital Cost:	$4,720,000
Annual O&M:	$35,000
Time to Implement	1 year

Alternative 5B - Removal and Off-site Disposal

Alternative 5B includes the same components as 5A, except excavation would be performed below the annual mean water level (assumed to be 128 feet amsl) of the Hudson River. Estimated excavation volumes would increase approximately 1,900 cubic yards to 8,700 cubic yards. Dewatering activities would be consistent with those described for Alternative 3E. Long term operation and maintenance would likely not be required for Alternative 5B.

This alternative 5B differs slightly from the alternative 5B presented in the FS, in that the access road would not be constructed over any contaminated material associated with the 004 outfall, eliminating the potential problem of not being able to remove the entire contaminated area. The cost of the alternative would not change.

Present Worth:	$5,770,000
Capital Cost:	$5,590,000
Annual O&M:	$12,000
Time to Implement	1 year

7.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste disposal sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is presented below.

Operable Unit 03

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Alternative 1
This alternative would not comply with SCGs. The area currently not in compliance with groundwater standards would not decrease. Current regulatory requirements for the generation and transport of DNAPL would be maintained.

Alternative 2
This alternative provides for the collection of LNAPL and DNAPL and would be expected to have good potential for the long-term reduction in the total VOC/PCB concentrations in groundwater. Compliance with groundwater standards for on-site areas is possible in the long-term. A reduction in the extent of off-site areas that are currently above groundwater standards is expected. Discharge of additional groundwater from the expanded treatment system would require SPDES permit modifications. Regulatory requirements for the disposal of NAPL and soils encountered during installation of the recovery systems would have to be met.

Alternatives 3, 3A, 3B
As with Alternative 2, these plans would provide a high likelihood of achieving a long-term reduction in the VOC/PCB concentrations in groundwater. Discharge of groundwater from the expanded treatment system would require SPDES permit modifications. Reinjection of pretreated water would have to meet New York State groundwater discharge limits and Federal Safe Drinking Water standards. Regulatory requirements for the disposal of NAPL and soils encountered during installation of the interceptor trench and other recovery systems would be required. Operation of

an air stripper would require compliance with New York State Air Quality Standards and Emissions Limits.

Alternative 4
While this alternative would provide for LNAPL recovery, DNAPL recovery rates would be lower than Alternatives 3, 3A, or 3B, as vertical wells would be less efficient than horizontal wells in removing DNAPL due to less screen area open to the formation. Thus, the potential for complying with SCGs for on-site and off-site groundwater is low. Discharge of groundwater from the expanded treatment system would require SPDES permit modifications. Regulatory requirements for the disposal of NAPL and soils encountered during installation of the barrier and other recovery systems would have to be met.

Alternative 5
This alternative does not include LNAPL recovery and DNAPL recovery is lower than alternatives 3, 3A, or 3B, as vertical wells would be less efficient than horizontal wells in removing DNAPL due to less screen area open to the formation. The potential for complying with groundwater SCGs is low. Discharge of groundwater from the expanded treatment system would require SPDES permit modifications. Regulatory requirements for the disposal of NAPL and soils encountered during installation of the perimeter barrier and other recovery systems would have to be met.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Alternative 1
This alternative is not protective in that continued and future migration of PCB and VOCs may impact additional downgradient groundwater users or ecological receptors.

Alternative 2
Hydraulic control and the expansion of the groundwater collection system would minimize the potential for additional off-site migration of PCB and VOCs. A reduction in contamination concentrations in off-site springs is expected over the long-term. Appropriate protective equipment and construction techniques used during installation would minimize the potential threat to workers and the surrounding community.

Alternative 3, 3A, 3B
Expansion of the groundwater collection and treatment system would minimize the potential for additional off-site migration of PCB and VOCs. A reduction in contamination concentrations in off-site springs is expected over the long-term. Appropriate protective equipment and construction techniques used during installation would minimize the potential threat to workers and the surrounding community.

Alternative 4
Expansion of the groundwater collection and treatment system would minimize the potential for additional off-site migration of PCB and VOCs, though to a lesser extent than other alternatives due

to reduced DNAPL recovery. A reduction in contamination concentrations in off-site springs is expected over the long-term. Appropriate protective equipment and construction techniques used during installation would minimize the potential threat to workers and the surrounding community.

Alternative 5
Installation of a perimeter barrier and site-dewatering system would minimize potential for off-site migration of contaminated groundwater and DNAPL, though to a lesser extent than Alternatives 2, 3, and 4. A reduction in contamination concentrations in off-site springs is expected over the long-term. Appropriate protective equipment and construction techniques used during installation would minimize the potential threat to workers and the surrounding community.

[Alternative 1, No Further Action is included as a procedural requirement of the evaluation process. However, Alternative 1 does not meet the requirements of the first two threshold criteria as described above. Since it does not meet these criteria, it will not be carried through the comparisons to the following criteria.]

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative 2
Some impacts on the community would be associated with this alternative. Limited noise and traffic impacts involved with construction and drilling equipment are expected. Appropriate personal protective equipment would be necessary to protect workers from exposures to contaminated soils and NAPLs.

Alternative 3, 3A, 3B
Impacts from this alternative are similar to Alternative 2; limited noise and traffic impacts involved with construction and drilling equipment are to be expected. Alternative 3B would involve some additional disruption due to the construction of the upgradient barrier wall. Appropriate personal protective equipment would be necessary to protect workers from exposures to contaminated soils and NAPLs.

Alternative 4
Residents living adjacent to the facility would be expected to be moderately impacted due to noise from construction activities and increased truck traffic associated with installation of the barrier system. Appropriate personal protective equipment would be necessary to protect workers from exposures to contaminated soils and NAPLs.

Alternative 5
Residents living adjacent to the facility would be expected to be moderately impacted due to noise from construction activities and increased truck traffic associated with installation of the barrier

system. The level of disruption is comparable to Alternative 4. Appropriate personal protective equipment would be necessary to protect workers from exposures to contaminated soils and NAPLs.

<u>4. Long-term Effectiveness and Permanence.</u> This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

<u>Alternative 2</u>
This alternative would provide a reduction in residual risk from groundwater contamination due to the prevention of future off-site migration of PCB/VOCs from the site and from the removal of hazardous constituents from the soils and groundwater. Contaminant concentrations in groundwater and off-site springs would attenuate over the long-term. For all the alternatives, groundwater pumping and treatment is a reliable method to prevent migration and reduce contaminant levels. Long-term operation and maintenance of the collection system, particularly the horizontal well system, would be required.

<u>Alternative 3, 3A, 3B</u>
As with Alternative 2, this alternative would also provide a reduction in residual risk from groundwater contamination due to the prevention of future off-site migration of PCB/VOCs from the site and from the removal of hazardous constituents from the soils and groundwater. Contaminant concentrations in groundwater and off-site springs would attenuate over the long-term. The overall potential effectiveness of the system is judged to be higher than the other alternatives based on the higher removal rates of DNAPL. Groundwater pumping and treatment is a reliable method to prevent migration and reduce contaminant levels. The long-term operation and maintenance of the system would be more involved than Alternative 2 due to the addition of several components such as the pretreatment system (shallow tray air stripper), the interceptor trench, and the re-injection system (Alternative 3A).

<u>Alternative 4</u>
This alternative would provide a reduction in residual risk from groundwater contamination due to the prevention of future off-site migration of PCB/VOCs from the site and from the removal of hazardous constituents from the soils and groundwater. The potential effectiveness of this alternative is lower than 2 or 3 due to the lower rate of groundwater and NAPL collection. The barrier system involves proven technology in the control of shallow groundwater migration. Long-term operation and maintenance of the collection system would be required, the barrier would require minimal maintenance.

<u>Alternative 5</u>
This alternative also would provide a reduction in residual risk from groundwater contamination due to the prevention of future off-site migration of PCB/VOCs from the site and from the removal of hazardous constituents from the soils and groundwater, though at a lower rate than other alternatives due to reduced groundwater and NAPL collection. The vertical barrier and slurry wall systems have

been used extensively at other sites for groundwater control. Long-term operation and maintenance of the collection system would be required, the barrier would require minimal maintenance.

<u>5. Reduction of Toxicity, Mobility or Volume with Treatment.</u> A site specific remedy that permanently and significantly reduces the volume, toxicity, and/or mobility of the hazardous wastes and/or consitiuents thereof is to be preferred over a remedy that does not do so. The following is the hierarchy of remedial technologies ranked from most preferable to least preferable: (1) destruction, onsite or offsite; (2) separation/treatment, onsite or offsite; (3) solidification/chemical fixation, onsite or offsite; (4) control and isolation offsite or onsite.

<u>Alternative 2</u>
PCB/VOCs would be permanently removed from groundwater collected and treated under this alternative. DNAPLS and LNAPLs (estimated 18,000 gallons/year) would be collected for off-site disposal by incineration. A significant volume of potentially contaminated soils (approximately 631 tons) would be removed for off-site disposal during the construction of the groundwater and NAPL collection systems. The toxicity of wastes remaining in the soils and groundwater would not be reduced. Mobility of groundwater and NAPL would be controlled through active pumping.

<u>Alternative 3, 3A, 3B</u>
Concentrations of PCB/VOCs in groundwater would be reduced by collection and treatment. The overall volume of NAPLs at the site would be reduced (by an estimated 18,000 gallons/year) through collection and off-site disposal by incineration. A quantity of potentially contaminated soil similar to Alternative 2 would be removed during construction. Alternative 3A would involve additional soil removal (approximately 100 tons) with the installation of the reinjection trench. Toxicity of wastes remaining in the soil and groundwater would not be reduced. Mobility of groundwater and NAPL would be controlled through pumping (Alternative 3), pumping and reinjection (Alternative 3A), or pumping and upgradient barrier wall (Alternative 3B).

<u>Alternative 4</u>
This alternative would reduce concentrations and volume of PCB/VOCs in groundwater through collection and treatment, though at a lower rate due to smaller pumping volumes. Due to the lower collection rates, the volume of NAPLs removed would be significantly less than Alternatives 2 and 3 (on the order of 18,000 total gallons of NAPL for the 30 year planning period compared to an estimated 18,000 gallons per year for 2 and 3). Volumes of soil removed are comparable to Alternatives 2 and 3. Toxicity of wastes remaining in the soil and groundwater would not be reduced. Mobility of NAPL and groundwater would be controlled by a combination of pumping and a downgradient barrier wall.

<u>Alternative 5</u>
As with Alternative 4, this plan would reduce concentrations of contaminants in groundwater to a lesser extent than for Alternatives 2 and 3. Pumping would serve to control the groundwater levels (and thus the mobility of groundwater and NAPLs) within the perimeter barrier system. Some reduction in volume of NAPLs would occur at similar recovery rates to Alternative 4. As with all the alternatives, no reduction in toxicity of wastes remaining in place would occur. The volume of

soils removed during construction is the highest for all alternatives, an estimated 4,200 tons. This reflects the length and depth of the slurry wall surrounding the site areas.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

Alternative 2

Components of the groundwater and NAPL collection system are readily implementable. Groundwater and NAPL collection are proven technologies and reliable, given appropriate operation and maintenance. The ability to implement future remedial work, if necessary, would not be impacted. Analysis of groundwater monitoring data and sampling to determine groundwater contamination concentrations would be effective to evaluate performance of system. Continued future availability of off-site DNAPL disposal facilities would be a limiting factor but is not considered problematic at this time. Upgrade of the current waste water treatment facility, with appropriate SPDES permit modifications, would be required.

Alternative 3, 3A, 3B

Components of the groundwater and NAPL collection system are readily implementable. Groundwater and NAPL collection are proven technologies and reliable given appropriate operation and maintenance. The technology required for the installation of the upgradient barrier wall (Alternative 3B) is available. The ability to implement future remedial work, if necessary, would not be impacted. Analysis of groundwater monitoring data and sampling to determine groundwater contamination concentrations would be effective to evaluate the performance of the system. Future availability of off-site DNAPL disposal facilities would be a limiting factor but is not considered problematic at this time. The current treatment plant would not need upgrading, however, discharge of groundwater from the expanded treatment system would potentially require a major SPDES permit modification. Reinjection of pretreated water (Alternative 3A) would have to meet NYS groundwater discharge limits and Federal Safe Drinking Water standards.

Alternative 4

The barrier wall (sheet piling) is readily constructable. Temporary disruption of plant parking facilities would be required. The components of the groundwater and DNAPL collection systems are proven technologies and reliable given appropriate operation and maintenance. The ability to implement future remedial work, if necessary, would not be impacted. Analysis of groundwater monitoring data and sampling to determine groundwater contamination concentrations would be effective to evaluate performance of system. Continued future availability of off-site DNAPL disposal facilities would be a limiting factor but is not considered problematic due to the lower volumes of NAPL to be produced. Modification of current waste water treatment facility, with appropriate SPDES permit modifications, would be required.

Alternative 5

The perimeter barrier (slurry wall) is readily constructable. Temporary disruption of plant vehicular traffic would be required. Off-site disposal of a significant quantity of potentially contaminated materials at a RCRA-approved facility would be expected. The ability to implement future remedial work, if necessary, would not be impacted. Analysis of groundwater monitoring data and sampling to determine groundwater contamination concentrations would be effective to evaluate performance of system. As with the other alternatives, the continued future availability of off-site DNAPL disposal facilities would be a limiting factor but is not considered problematic due to the lower volumes of NAPL produced under this scenario. While the treatment plant would not require upgrading, groundwater discharges under the expanded collection system would require the appropriate SPDES permit modifications.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary", included as Appendix C, presents the public comments received and the Department's response to the concerns raised.

No significant public comments were received concerning the remedy selection for Operable Unit 3.

Operable Unit 04

Note: As discussed in greater detail below, only Alternative 5B is fully protective of both human health and the environment while complying with New York State standards, criteria, and guidance.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Alternative 1

The sampling information indicates the PCB levels increase in this area of the Hudson River; thus, the surface water standards for PCB will continue to be exceeded if no further actions are taken.

Alternatives 2A, 2B, 2C

Compliance with State surface water standards for PCB for Alternatives 2A and 2B is unlikely because of continued releases of PCB associated with the groundwater and river water migration pathways, as the contaminated materials will not be removed, and there would be no long-term management of water associated with the capped area.

The daily infiltration/exfiltration due to bank storage and discharge brought about by the river stage fluctuations due to the operation of upstream hydroelectric facilities would continue to mobilize PCB from the contaminated material, as would large scale river stage fluctuations brought about by flood events. See Appendix A, below.

As shown in Appendix B of the Focused Feasibility Study for Operable Unit 04, groundwater discharge through the contaminated outfall deposits would contribute to, and likely cause, a violation of surface water standards in the Hudson River for PCB. In Appendix B of the Focused Feasibility Study, "Groundwater Migration Pathway Evaluation", the contribution of PCB mass loading to the Hudson River is calculated to result in a concentration of PCB in the Hudson River between 0.151 and 30.2 picograms per liter; the surface water standard for PCB, as stated above, is 1 picogram per liter. This range of PCB contribution from the 004 outfall area, as presented in Appendix B of the Focused Feasibility Study, should also be considered a minimum, for the following reasons: only 700 feet, and not the entire 1350 feet, of contaminated outfall deposit was evaluated; and the assumption was made that oil phase PCB were not present at the site and are not migrating to the Hudson River. As stated above, oil phase materials were identified in the 004 outfall deposit.

Either of the mechanisms above (bank storage and discharge, or groundwater discharge through the contaminated outfall deposits) would likely result in continued releases of PCB which would cause or contribute to violations of the surface water standard for PCB in the vicinity, materially contribute to the need to recommend that human consumption of fish in the vicinity of the site be limited, and result in the bioaccumulation of contaminants (PCB) in flora or fauna to levels which materially contribute to significant adverse effects in fish-eating wildlife.

Potential for compliance with State surface water standards is even less for Alternative 2C than 2A or 2B, as the same mechanisms of PCB migration to the Hudson River from the outfall deposits still apply, and the additional migration pathway of rainfall recharge through the outfall deposits to the river would not be addressed under Alternative 2C.

Design and construction of the access road and cap would need to comply with requirements associated with construction activities in navigable waters and flood zones for Alternatives 2A and 2B. Particulate air quality standard would be attained through dust control. OSHA requirements would be met during construction.

Alternatives 3A, 3B, 3C, 3D, 3E

Compliance with State surface water standards for PCB is unlikely. There would be continued releases of PCB associated with the groundwater and river water migration pathways, as the contaminated materials will not be removed, and there would be no long-term management of leachate associated with the capped area. Surface water monitoring would be done to evaluate the conditions after remediation. Design and construction of access road and cap would be consistent with construction in navigable waters and floodplain requirements.

The daily infiltration/exfiltration due to bank storage and discharge brought about by the river stage fluctuations due to the operation of upstream hydroelectric facilities would continue to mobilize PCB from the contaminated material, as would large scale river stage fluctuations brought about by flood events. (See Appendix A, below)

As shown in Appendix B of the Focused Feasibility Study for Operable Unit 04, groundwater discharge through the contaminated outfall deposits would contribute to, and likely cause, a violation of surface water standards in the Hudson River for PCB. In Appendix B of the Focused Feasibility Study, "Groundwater Migration Pathway Evaluation", the contribution of PCB mass loading to the Hudson River is calculated to result in a concentration of PCB in the Hudson River between 0.151 and 30.2 picograms per liter; the surface water standard for PCB, as stated above, is 1 picogram per liter. This range of PCB contribution from the 004 outfall area, as presented in Appendix B of the Focused Feasibility Study, should also be considered a minimum, for the following reasons: only 700 feet, and not the entire 1350 feet, of contaminated outfall deposit was evaluated; and the assumption was made that oil phase PCB were not present at the site and are not migrating to the Hudson River. As stated above, oil phase materials were identified in the 004 outfall deposit.

Either of the mechanisms above (bank storage and discharge, or groundwater discharge through the contaminated outfall deposits) would likely result in continued releases of PCB which would cause or contribute to violations of the surface water standard for PCB in the vicinity, materially contribute to the need to recommend that human consumption of fish in the vicinity of the site be limited, and result in the bioaccumulation of contaminants (PCB) in flora or fauna to levels which materially contribute to significant adverse effects in fish-eating wildlife.

Cap design and construction would have to be consistent with State and Federal hazardous and PCB waste landfill capping performance requirements. EPA/TSCA approval may be required for relocation of soil having PCB concentrations greater than 50 mg/kg. Particulate air quality standard would be attained thought dust control. OSHA requirements would be met during construction.

<u>Alternatives 4A, 4B, 4C, 4D, 4E</u>

Compliance with State surface water standards for PCB is unlikely. There would be continued releases of PCB associated with the groundwater and river water migration pathways, as the contaminated materials will not be completely removed, and there would be no long-term management of leachate associated with the capped area.

The daily infiltration/exfiltration due to bank storage and discharge brought about by the river stage fluctuations due to the operation of upstream hydroelectric facilities would continue to mobilize PCB from the contaminated material, as would large scale river stage fluctuations brought about by flood events. See Appendix A, below.

As shown in Appendix B of the Focused Feasibility Study for Operable Unit 04, groundwater discharge through the contaminated outfall deposits would contribute to, and likely cause, a violation of surface water standards in the Hudson River for PCB. In Appendix B of the Focused Feasibility Study, "Groundwater Migration Pathway Evaluation", the contribution of PCB mass loading to the Hudson River is calculated to result in a concentration of PCB in the Hudson River between 0.151 and 30.2 picograms per liter; the surface water standard for PCB, as stated above, is 1 picogram per liter. This range of PCB contribution from the 004 outfall area, as presented in Appendix B of the Focused Feasibility Study, should also be considered a minimum, for the following reasons: only 700 feet, and not the entire 1350 feet, of contaminated outfall deposit was evaluated; and the assumption was made that oil phase PCB were not present at the site and are not migrating to the Hudson River. As stated above, oil phase materials were identified in the 004 outfall deposit.

Either of the mechanisms above (bank storage and discharge, or groundwater discharge through the contaminated outfall deposits) would likely result in continued releases of PCB which would cause or contribute to violations of the surface water standard for PCB in the vicinity, materially contribute to the need to recommend that human consumption of fish in the vicinity of the site be limited, and result in the bioaccumulation of contaminants (PCB) in flora or fauna to levels which materially contribute to significant adverse effects in fish-eating wildlife.

Surface water monitoring would be done to evaluate the conditions after remediation. Design and construction of access road and cap would be consistent with construction in navigable waters and floodplain requirements. Excavated soil would be disposed of at a TSCA-approved RCRA permitted landfill. RCRA and federal and/or state Department of Transportation (DOT) requirements would be attained during transportation. Marking and decontamination, if any, would meet TSCA requirements. RCRA and TSCA generator requirements would be followed. Cap design and construction consistent with State hazardous waste and TSCA landfill capping performance requirements. Particulate air quality standard would be attained though dust control. OSHA requirements would be met during construction.

Alternatives 5A - 5B

Compliance with State surface water standards for PCB is unlikely for alternative 5A. There would be continued releases of PCB (described above) associated with the groundwater and bank storage and discharge migration pathways, as the contaminated materials will not be completely removed, and there would be no long-term management of leachate associated with the remaining capped area. Alternative 5A would result in the removal of a large portion of the contaminated soils and sediments in the 004 outfall deposit, but the portion that would remain would still contain high levels of PCB, and would still be subject to the groundwater and bank storage and discharge pathways, as the remaining soils would all be below, or less than one foot in elevation above, the typical elevation of the Hudson River.

The daily infiltration/exfiltration due to bank storage and discharge brought about by the river stage fluctuations due to the operation of upstream hydroelectric facilities would continue to mobilize PCB from the contaminated material, as would large scale river stage fluctuations brought about by flood events. (See Appendix A, below)

As shown in Appendix B of the Focused Feasibility Study for Operable Unit 04, groundwater discharge through the contaminated outfall deposits would contribute to, and likely cause, a violation of surface water standards in the Hudson River for PCB. In Appendix B of the Focused Feasibility Study, "Groundwater Migration Pathway Evaluation", the contribution of PCB mass loading to the Hudson River is calculated to result in a concentration of PCB in the Hudson River between 0.151 and 30.2 picograms per liter; the surface water standard for PCB, as stated above, is 1 picogram per liter. This range of PCB contribution from the 004 outfall area, as presented in Appendix B of the Focused Feasibility Study, should also be considered a minimum, for the following reasons: only 700 feet, and not the entire 1350 feet, of contaminated outfall deposit was evaluated; and the assumption was made that oil phase PCB were not present at the site and are not migrating to the Hudson River. As stated above, oil phase materials were identified in the 004 outfall deposit.

Either of the mechanisms above (bank storage and discharge, or groundwater discharge through the contaminated outfall deposits) would likely result in continued releases of PCB which would cause or contribute to violations of the surface water standard for PCB in the vicinity, materially contribute to the need to recommend that human consumption of fish in the vicinity of the site be limited, and result in the bioaccumulation of contaminants (PCB) in flora or fauna to levels which materially contribute to significant adverse effects in fish-eating wildlife.

Surface water monitoring would be done to evaluate the conditions after remediation.

Alternative 5B is much more likely to prevent this area from causing non-compliance with surface water standards, as the source of contamination within the outfall deposits would be completely removed.

Design and construction of access road and cap (in the case of alternative 5A) would be consistent with construction in navigable waters and floodplain requirements. Excavated soil would be disposed of at TSCA-approved/RCRA permitted landfill. RCRA and DOT requirements would be complied with during transportation. Marking and decontamination, if any, would meet TSCA requirements. RCRA and TSCA generator requirements would be followed. Particulate air quality standard would be attained through dust control. OSHA requirements would be met during construction.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Alternative 1

This alternative is not protective of human health or the environment: access restrictions (sign posting and deed restrictions) would reduce, but not eliminate, the potential for direct contact human health exposure; and ecological exposure is not addressed at all.

Alternatives 2A, 2B, 2C

Capping would minimize direct contact with PCB. Use of a low permeability cap (Alternatives 2A and 2B) would reduce off-site migration of PCB due to infiltration. Access restrictions would restrict access that may result in breaching of the integrity of the cover and contact with soil. The use of appropriate protective equipment during remedial activities would minimize potential threat to remedial workers. A cap would reduce direct contact with PCB by ecological receptors. Control of erosion and precipitation would reduce contact with PCB by species indigenous to the Hudson River. However, groundwater discharge and river infiltration through the capped area are not controlled by alternatives 2A, 2B, or 2C, and PCB will continue to be released to the Hudson River, through groundwater movement and the river stage fluctuations as described above.

Alternatives 3A, 3B, 3C, 3D, and 3E

Excavating relocating and capping soil would minimize direct contact with PCB. Access restrictions would restrict access that may result in breaching of the integrity of the cap and contact with soil. The use of appropriate protective equipment during remedial activities would minimize potential threats to remedial workers. Excavating, relocating, and capping soil would reduce direct contact with PCB by ecological receptors. Control of erosion and precipitation would reduce contact with PCB by species indigenous to the Hudson River. However, groundwater discharge and river infiltration through the capped area are not controlled by alternatives 3A, 3B, 3C, 3D, and 3E, and PCB will continue to be released to the Hudson River, through groundwater movement and the river stage fluctuations as described above.

Alternatives 4A, 4B, 4C, 4D, and 4E

Excavating and transporting excavated soil to a TSCA-permitted commercial landfill would minimize direct contact with PCB. Capping would minimize direct contact with the soil. Access restrictions would restrict access that may result in breaching of the integrity of the cover and contact with the soil. The use of appropriate protective equipment during remedial activities and monitoring would minimize potential threat to remedial workers. Excavating soil with off-site disposal and capping soil left in place would reduce contact with PCB by species existing in the Hudson River. However, groundwater discharge and river infiltration through the capped area are not controlled by alternatives 4A, 4B, 4C, 4D, and 4E, and PCB will continue to be released to the Hudson River, through groundwater movement and the river stage fluctuations as described above.

Alternatives 5A - 5B

Excavating and transporting excavated soil to a TSCA-permitted commercial landfill would minimize direct contact with PCB. The use of appropriate protective equipment during remedial activities and monitoring would minimize potential threat to remedial workers. Excavating soil with off-site disposal would minimize contact with PCB by ecological receptors. For alternative 5A, control of erosion and precipitation would minimize contact with PCB by species existing in the Hudson River. However, groundwater discharge and river infiltration through the capped area would not be controlled by alternatives 5A, and PCB will continue to be released to the Hudson River, through groundwater movement and the river stage fluctuations as described above.

Under alternative 5B, there would no longer be releases of PCB to the Hudson River from the outfall deposits, as the PCB containing material would be completely removed.

The next five criteria are used to compare the positive and negative aspects of each of the remedial alternatives.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative 1

Community will be restricted from access to site. Monitoring will not affect the community. Remedial action objectives would not be achieved.

Alternatives 2A, 2B, 2C

Dust control will minimize PCB air migration during construction and transport. The community will be restricted from access to the site. Monitoring will not affect the community. Trucks passing through community will cause noise and additional traffic. Appropriate protective equipment would be utilized during remedial activities. Contaminant transport during construction would be minimized through appropriate methods such as off-site drainage and dust control. The time until the remedial action is completed is estimated to be one construction season.

Alternatives 3A, 3B, 3C, 3D, 3E

Dust control will minimize PCB air migration during construction and transport. The community will be restricted from access to the site. Monitoring will not affect the community. Trucks passing through the community will cause noise and additional traffic. Appropriate protective equipment would be utilized during monitoring and remedial activities. Contaminant transport during construction would be minimized through appropriate methods such as off-site drainage and dust control. Careful management of construction water during excavation below the elevation of the Hudson River (Alternative 3E) would be required to control releases of PCB from excavation area to the Hudson River. High flow events may result in releases of PCB to the Hudson River during excavation. The time until the remedial action is completed is estimated to be one construction season.

Alternatives 4A, 4B, 4C, 4D, 4E

Dust control will minimize PCB air migration during construction and transport. The community will be restricted from access to the site. Monitoring will not affect the community. Trucks passing through the community will cause noise and additional traffic. Appropriate protective equipment would be utilized during monitoring and remedial activities. Contaminant transport during construction would be minimized through appropriate methods such as off-site drainage and dust control. Careful management of construction water during excavation below the water level of the Hudson River (Alternative 4E) would be required to control releases of PCB from excavation area to the Hudson River. High flow events may result in releases of PCB to Hudson River during excavation. The time until the remedial action is completed is estimated to be one construction season.

Alternatives 5A, 5B

Dust control will minimize PCB air migration during construction and transport. The community will be restricted from access to the site. Monitoring will not affect the community. Trucks passing through the community will cause noise and additional traffic. Appropriate protective equipment would be utilized during monitoring and remedial activities. Contaminant transport during construction would be minimized through appropriate methods such as off-site drainage and dust control. Careful management of construction water during excavation in the Hudson River (Alternative 5B) would be required to control releases of PCB from excavation area to the Hudson River. High flow events may result in releases of PCB to Hudson River during excavation. The time until the remedial action is completed is estimated to be one construction season.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 1

Migration pathways and ecological exposure pathways would not be controlled. Access restrictions have been implemented and their reliability in restricting activities resulting in contact with soil is unknown. Current environmental conditions would continue to result in release of PCB to Hudson River. The remaining risks would be the same as those currently present; no additional controls would be established to limit the risks.

Alternatives 2A, 2B, 2C

Direct contact exposures, and erosion migration pathways, would be controlled under all three of these alternatives. Precipitation migration pathway would not be controlled for Alternative 2C, but would be under alternatives 2A and 2B. A low permeability cap (Alternatives 2A and 2B) would require an appropriate design to maintain. A rip rap cover (Alternative 2C) is adequate and reliable for protection from erosion. Access restrictions are adequate and reliable for preventing activities which could threaten cap integrity. Groundwater discharge and river infiltration through the capped area are not controlled by alternatives 2A, 2B,or 2C as discussed above.

The remaining risks would be associated with exposures caused by continued releases to the Hudson River; the only controls on these risks would be existing advisories on fish consumption; these controls are somewhat reliable. See "Hudson River Angler Survey", Hudson River Sloop Clearwater, March 1993, attached.

Alternatives 3A, 3B, 3C, 3D, 3E

Direct contact exposure, and erosion and precipitation migration pathways, would be controlled under all of these alternatives. Access restrictions are adequate and reliable for preventing activities which could threaten cap integrity. Groundwater discharge and river infiltration through the capped area are not controlled by alternatives 3A, 3B, 3C, 3D, or 3E as discussed above.

The remaining risks would be associated with exposures caused by continued releases to the Hudson River; the only controls on these risks would be existing advisories on fish consumption. These controls are somewhat reliable. See "Hudson River Angler Survey", Hudson River Sloop Clearwater, March 1993, attached.

Alternatives 4A, 4B, 4C, 4D, 4E

Direct contact exposure, and erosion and precipitation migration pathways would be controlled under these alternatives. These alternatives would provide only partial control of the groundwater discharge and river infiltration pathways as discussed above, as some of the area would not have PCB containing material left behind. The degree of partial control of these pathways is dependant on the degree of removal. Excavation and off-site disposal is an adequate and reliable remediation method. Access restrictions are adequate and reliable for preventing activities which could threaten cap integrity. Groundwater discharge and river infiltration through the capped area are not controlled by alternatives 4A, 4B, 4C, 4D, or 4E as discussed above.

The remaining risks would be associated with exposures caused by continued releases to the Hudson River; the only controls on these risks would be existing advisories on fish consumption; these controls are somewhat reliable. See "Hudson River Angler Survey", Hudson River Sloop Clearwater, March 1993, attached.

Alternatives 5A, 5B

Direct contact exposure, and erosion and precipitation migration pathways, would be controlled. Under alternative 5A, there would be only partial control of groundwater discharge and river infiltration pathways, as the contaminated material below an elevation of 1 foot above river level would be left in place. For alternative 5B, all migration pathways would be eliminated. Alternative 5B has the highest long-term effectiveness and permanence. Groundwater discharge and river infiltration through the capped area are not controlled by alternative 5A, as discussed above.

For 5A, the remaining risks would be associated with exposures caused by continued releases to the Hudson River; the only controls on these risks would be existing advisories on fish consumption; these controls are somewhat reliable. For 5B, there would be no remaining risks associated with the contaminated materials, as they would be completely removed. See "Hudson River Angler Survey", Hudson River Sloop Clearwater, March 1993, attached.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The alternatives evaluated in the feasibility study will not permanently and significantly reduce the toxicity and volume of PCB-contaminated material. However, the alternatives evaluated will reduce the mobility of the PCB-contaminated material.

Alternative 1

The mobility of the PCB-contaminated material will still be influenced by migration pathways of precipitation, erosion, surface water and ground water.

Alternative 2A, 2B, 2C

The capping will reduce the mobility of PCB-contaminated material because the migration pathways of precipitation and erosion would be reduced for Alternatives 2A and 2B. The capping Alternative 2C would reduce the mobility of the contaminants for erosion. These alternatives would still allow the PCB-contaminated material to be mobile due to the migration pathways of groundwater discharge and river infiltration through the capped area (2A, 2B and 2C) as discussed above; and precipitation (2C).

Alternatives 3A, 3B, 3C, 3D, 3E

These alternatives would reduce the mobility of the PCB-contaminated material by removing and consolidating varying amounts of contaminated material to a location out of the influences of changes in the Hudson River elevation. The degree to which the mobility of PCB-contaminated material is reduced is directly related to the amount of contaminated material which is consolidated. Alternative 3A would have the least reduction of mobility and Alternative 3E would have the greatest reduction in mobility for Alternatives 3A through 3E. The PCB-contaminated material remaining in place would still be influenced by groundwater discharge and river infiltration through the capped area as discussed above.

Alternatives 4A, 4B, 4C, 4D, 4E

These alternatives would have a greater degree of reduction of mobility than those evaluated in Alternatives 3A through 3E because the PCB-contaminated material would be disposed of off-site at a permitted facility. The PCB-contaminated material remaining would still be influenced by groundwater discharge and river infiltration through the capped area as discussed above.

Alternative 5A and 5B

Alternative 5A would remove and dispose 6,800 cubic yards of PCB-contaminated material to an off-site facility. The PCB-contaminated material remaining under alternative 5A would still be influenced by groundwater discharge and river infiltration through the capped area as discussed above. Alternative 5B would provide the greatest reduction in mobility of the PCB-contaminated material for the alternatives evaluated, as the removal of contaminated materials is not limited by relative river elevation, and there would no longer be any potential for groundwater discharge or river infiltration (as discussed above) through the PCB contaminated materials to move contaminants to the river.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc..

Alternative 1

Legal coordination with property owners would be required to implement deed restrictions. Maintenance of signs and monitoring could be readily implemented. Coordination with property owners would be necessary to implement deed restrictions. Inspection and maintenance personnel, sampling equipment, sampling personnel, and analytical laboratory are readily available.

Alternatives 2A, 2B, 2C

The cap (low permeability or rip-rap) could be readily constructed above water level, construction could be somewhat more difficult below water level. Legal coordination with property owners would be required to implement deed restrictions. Maintenance and monitoring could be readily implemented. Additional remedial actions would not be readily done after capping, due to the burial of PCB-containing materials by the cap. Operation and maintenance activities including routine inspections, maintenance of access restriction measures and surface water monitoring would be adequate indicator of performance. Coordination with property owners would be necessary to implement deed restrictions. Excavating/construction equipment, and capping materials are readily available. Applicable technologies are readily available.

Alternative 3A, 3B, 3C, 3D, 3E

Excavation, relocation, and capping would be readily implemented. Legal coordination with property owners would be required to implement deed restrictions. Maintenance and monitoring would be readily implemented. Excavation below water level of Hudson River would be somewhat more difficult due to the degree of water management required to control releases of PCB from the excavation area to the Hudson River (Alternative 3E). TSCA approval from EPA may be required for consolidation and capping on-site. Additional remedial actions would not be readily done after capping due to the burial of PCB-containing materials by the cap. Operation and maintenance activities including routine inspections, maintenance of access restriction measures and surface water monitoring would be adequate indicators of performance. Coordination with property owners would be necessary to implement deed restrictions. TSCA approval from EPA may be required for consolidation and capping on-site. Excavation, dewatering, and treatment equipment, as well as capping materials are readily available. The use of effective methods and equipment for construction water management for excavation in Hudson River (Alternative 3E) would likely require specialized contractors. Monitoring equipment, personnel, and facilities are readily available. Applicable technologies are readily available.

Alternatives 4A - 4E

Excavation above the water level of the Hudson River, off-site disposal of soil, and capping are readily implemented. Legal coordination with property owners would be required to implement deed restrictions. Maintenance and monitoring would be readily implemented. Excavation below water level of the Hudson River would be somewhat more difficult due to degree of water management required to control releases of PCB from the excavation area to the Hudson River (Alternative 4E). Additional remedial actions would not be readily done after capping due to the burial of PCB-containing materials by the cap. Operation and maintenance activities including routing inspections, maintenance of access restriction measures and surface water monitoring would be adequate indicators of performance. Coordination with property owner would be necessary to implement deed restrictions. Landfill facility and capacity would be expected to be readily available. Excavation, construction, and capping materials readily available. The use of effective methods and equipment for construction water management for excavation below the elevation of the Hudson River (Alternative 3E) would likely require specialized contractors. Monitoring equipment, personnel, and facilities are readily available. Applicable technologies are readily available.

Alternatives 5A - 5B

Excavation above water level of the Hudson River, off-site disposal of soil, and capping are readily implemented. Legal coordination with property owners would be required to implement deed restrictions for Alternative 5A; Alternative 5B would likely not require deed restrictions. Excavation below the water level of the Hudson River would be more difficult due to the need for more water management to control releases of PCB from the excavation are at the Hudson River (Alternative 5B). Access restrictions and monitoring reliable. Operation and maintenance activities including routine inspections, maintenance of access restriction measures and surface water monitoring would be adequate indicators of performance. Operation and maintenance activities would likely not be required for Alternative 5B. Landfill facility and capacity are expected to be readily available. Excavation/construction, dewatering and water treatment equipment materials are readily available (Alternatives 5A and 5B). Monitoring equipment, personnel, and facilities are readily available. The use of effective methods and equipment for construction water management for excavation below the elevation of the Hudson River (Alternative 5B) would likely require specialized contractors. Applicable technologies are readily available.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 3.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary", included as Appendix C presents the public comments received and the Department's response to the concerns raised.

Substantial written commentary was received concerning the remedy selection for Operable Unit 4 from the responsible party for the site, GE. In general, GE's commentary focused upon the Department's significant threat determination, upon the Department's application of the remedy selection criteria, and upon other issues. The Department has determined that the none of the issues raised by GE in the written commentary warrant revisions to the selected remedy for Operable Unit 4. For a detailed discussion of the issues raised in GE's commentary, see the Responsiveness Summary in Appendix C below.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

OPERABLE UNIT 03

Based on the results of the RI/FS for the plant portion of the site, and the evaluation presented in Section 7, the NYSDEC is selecting Alternative 3 as the remedy for Operable Unit 03 at this site.

The selected remedy for Operable Unit 03 will eliminate or mitigate, through the proper application of scientific and engineering principles, all significant threats to public health and the environment presented by the hazardous wastes disposed in Operable Unit 03 of this site. The selected alternative will include the implementation of the most comprehensive groundwater management system of the alternatives evaluated, and will allow for the highest volume of DNAPL recovery, which will mitigate this site as a source of contamination to the groundwaters of the State.

This selection is based on the advantages Alternative 3 has over the other evaluated plans in meeting the remedial action objectives. The advantages of Alternative 3 include:

- Alternative 3 provides for a comprehensive collection system for groundwater and NAPL recovery. NAPL volumes removed under this alternative are the highest among the alternatives evaluated. Alternatives 4 and 5 provide comparatively little NAPL and groundwater treatment.

- Pretreatment of groundwater may preclude the need to upgrade the existing wastewater treatment plant at the site. Pretreatment provides an advantage over Alternative 2 in that higher pumping rates (with corresponding increased effectiveness in the reduction in contaminant levels) may be sustained in the Foil Mill area. Alternative 3 provides flexibility over the other alternatives in the optimization of existing treatment facilities at the site.

- Alternative 3 is more protective in that it provides for hydraulic control of groundwater movement combined with higher removal rates of groundwater and NAPL. Alternative 4 and 5 rely on minimal pumping rates and barriers to achieve hydraulic control, while removing comparatively little waste mass from the site.

- Alternatives 2 and 3 would be protective, and have comparable short and long-term effectiveness, implementability, and reliability; however, Alternative 3 is more cost effective than 2 due to savings associated with the upgrade of the treatment facility.

The estimated present worth cost to implement the remedy is $3,634,932. The capital cost to construct the remedy is estimated to be $1,104,927 and the estimated average annual operation and maintenance cost for 30 years is $92,819.

The elements of the selected remedy are as follows:

- Continued operation of the ongoing remedial programs for Operable Units 1 and 2, and completion of any other ongoing remedial actions.

- A remedial design program will be performed to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. The design will include a detailed evaluation of the capacity of the existing wastewater treatment plant to handle the expected flows and meet discharge limitations.

- The existing groundwater collection system will be expanded by the addition of six recovery wells in the transition zone in the southeastern portion of the site.

- Two horizontal recovery wells will be installed to collect DNAPL in the southern portion of the site.

- Groundwater recovery trenches will collect the groundwater and LNAPL in the western portion of the site, on the western and southern sides of the Foil Mill.

- Contaminated soils excavated during construction activities will be removed and disposed off-site.

- Pretreatment of collected groundwater will be done with an air stripper, before treatment in the existing wastewater treatment plant and eventual discharge to surface water. NAPLs recovered would be taken off-site for disposal.

- Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program would be instituted. This program would allow the effectiveness of the selected remedy to be monitored and would be a component of the operation and maintenance for the site.

- Restrictions on future use of the site are found in Appendix B.

- Since the remedy results in untreated hazardous waste remaining at the site, reviews of the status of the remedial program shall be performed every five years to determine if the remedy is still protective of human health and the environment, and to determine what additional remedial actions are required to achieve protection of human health and the environment.

OPERABLE UNIT 04

Based on the results of the RI/FS for Operable Unit 04, and the evaluation presented in Section 7, the NYSDEC is selecting Alternative 5B as the remedy for Operable Unit 04 at this site.

The selected remedy for Operable Unit 04 will eliminate or mitigate, through the proper application of scientific and engineering principles, all significant threats to public health and the environment presented by the hazardous wastes disposed in Operable Unit 04 of this site. The selected alternative will eliminate the 004 outfall deposits as a source of PCB to the Hudson River which materially contributes to the need to recommend that the consumption of fish from the Hudson River in the vicinity of the site be limited, and as a source of PCB to the Hudson River which causes or contributes to the violation of the surface water standard for PCB in the Hudson River.

This selection is based on the advantages Alternative 5B has over the other alternatives evaluated in meeting the remedial action objectives. The advantages of Alternative 5B include:

- Removing all of the PCB contaminated material in this area will eliminate this site specific source of PCB to the Hudson River

- The removal alternative will provide a greater degree of overall protection of human health and the environment than that provided by capping or partial removal since the migration pathways would be reduced to the greatest extent practicable (eliminated).

- Removing the highly contaminated PCB material will eliminate the need for long-term monitoring and maintenance of a capping alternative.

- All of the alternatives involving capping have the disadvantage of the lack of control on contaminant migration of PCB to the river by groundwater discharging through the contaminated material, or by river water infiltrating through the contaminated material as described above.

- Monitoring for contaminant releases from the outfall deposits will be limited because the highly contaminated PCB material identified would be removed, and only confirmation monitoring would be needed to document the total removal of contaminants.

The other remedial alternatives evaluated would result in a continuing release of PCB to the Hudson River, contributing to exceedances of the surface water standards of the State that result in contributions to the ongoing fish and wildlife PCB contamination in the vicinity of the site.

The elements of the selected remedy are as follows:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. The design will include a detailed evaluation of dewatering methods, water treatment and discharge limitations;

- Construction of an access road to the northern end of Remnant Deposit 3/3A;

- Clearing vegetated areas;

- Installation and operation of a dewatering system to facilitate excavation of the outfall deposits;

- Excavation of soil and dewatered sediment from areas approximately 160 feet upstream of the former 004 outfall downstream to the northern end of Remnant Site 3A; (Note: The removal would be performed to the top of bedrock, as the top of bedrock is near the land surface, and the available sampling information indicates that the contamination extends to the bedrock).

- Off-site disposal of all excavated material from this area;

- Confirmatory sampling to ensure that the contaminated materials have been completely removed, including testing of the underlying bedrock;

- Removal of the access road/dewatering system once excavation and sampling is complete.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

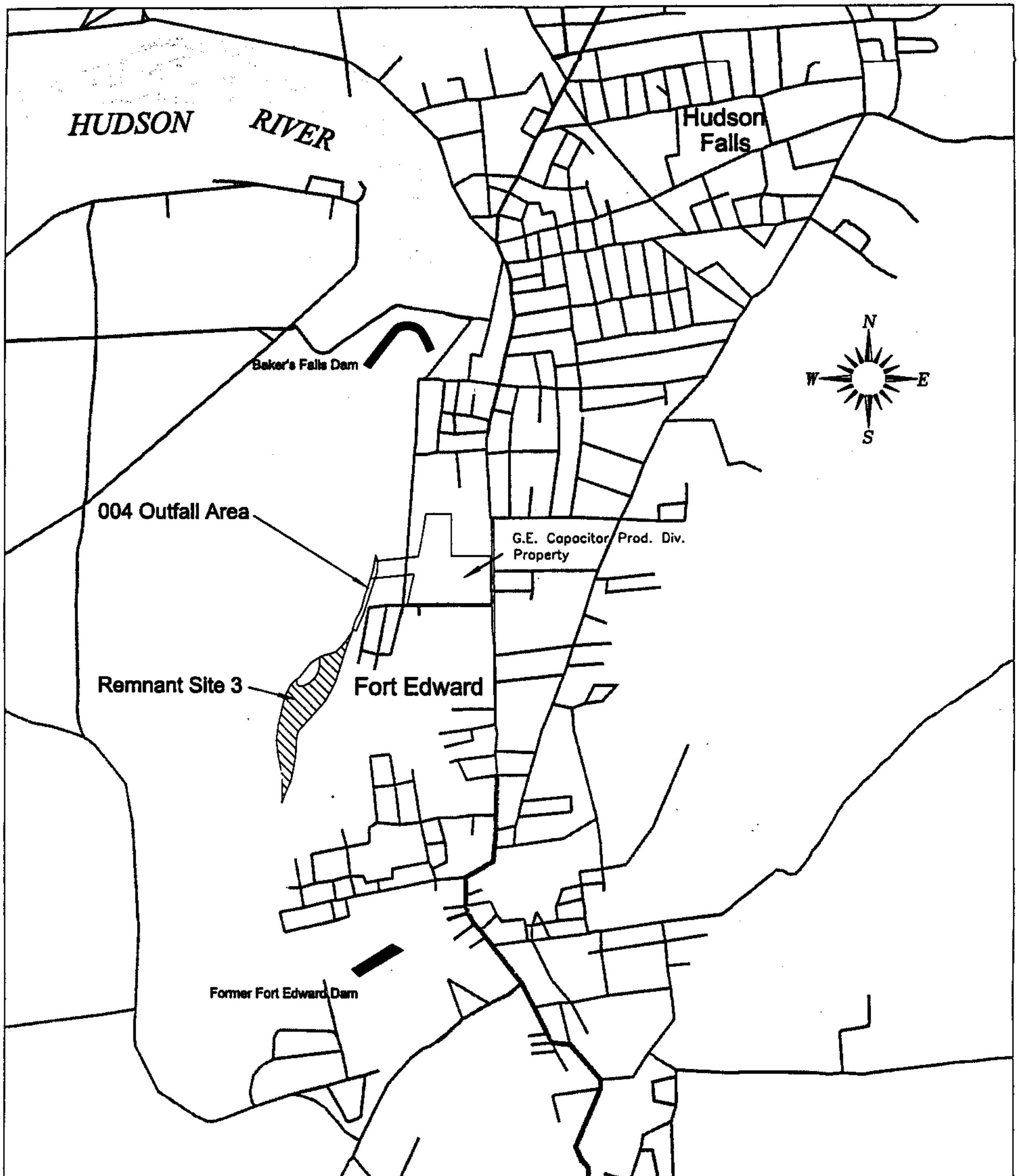
- Two repositories for documents pertaining to the site was established, at the Washington County Clerk's Office in Fort Edward, and at the Adriance Memorial Library in Poughkeepsie, NY

- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.

- An availability session was held on March 10, 1999 from 3 pm to 5 pm at the Washington County Office Building to allow for informal question and answers on the proposed remedial action plan.

- A public meeting was held on March 10, 1999 from 7 pm to 9 pm at the Washington County Office Building, at which the Department presented the proposed remedial action plan, and received public comments on the plan.

- In January 2000, a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the PRAP.



0 1/2 1 Mile

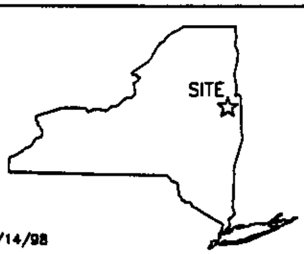


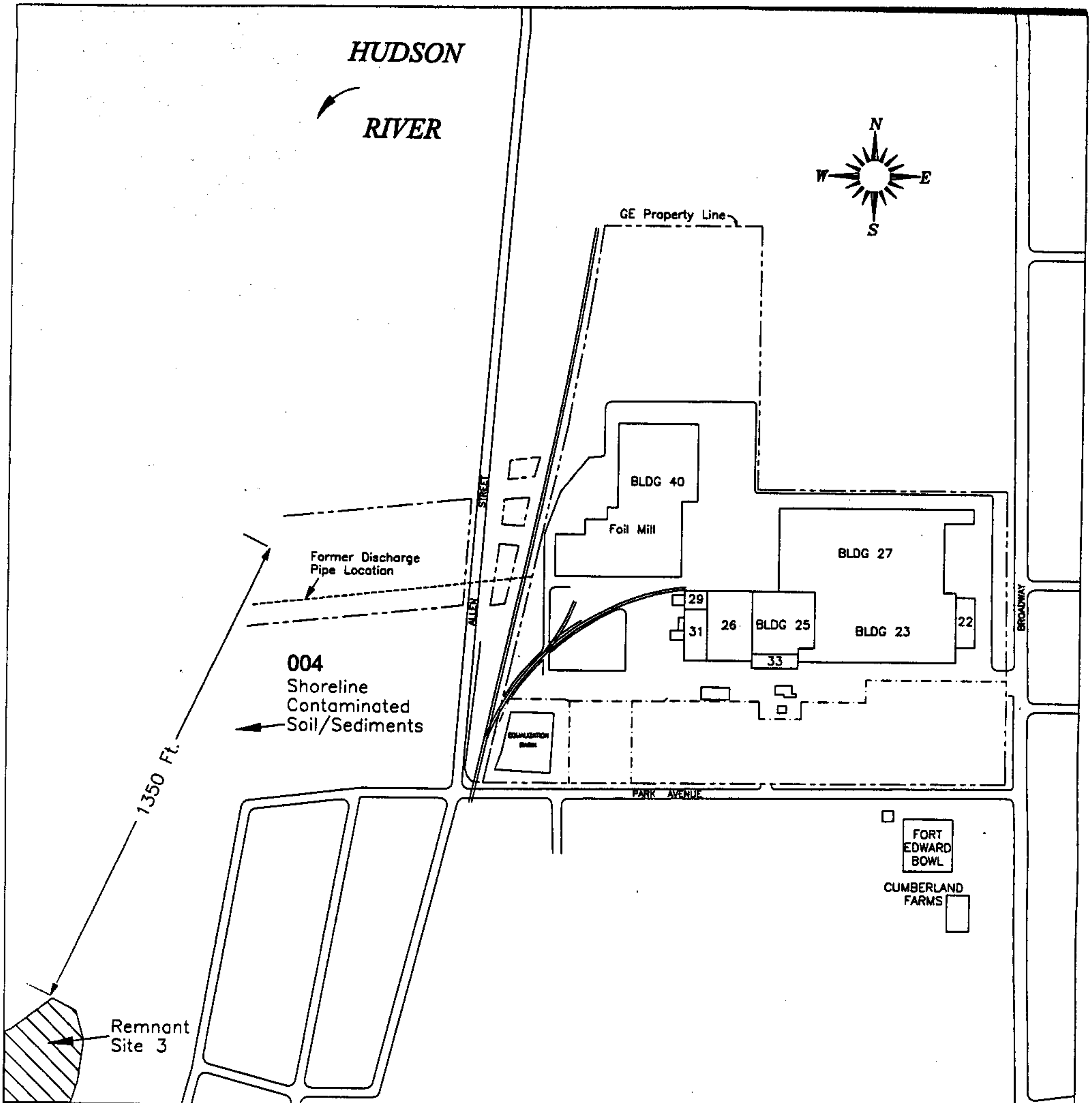
Figure 1

Site Location Map for Fort Edward

Department of Environmental Conservation

Division of Environmental Remediation

ports2.dwg, WBW, 8/14/98



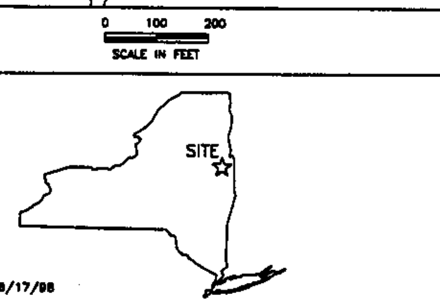
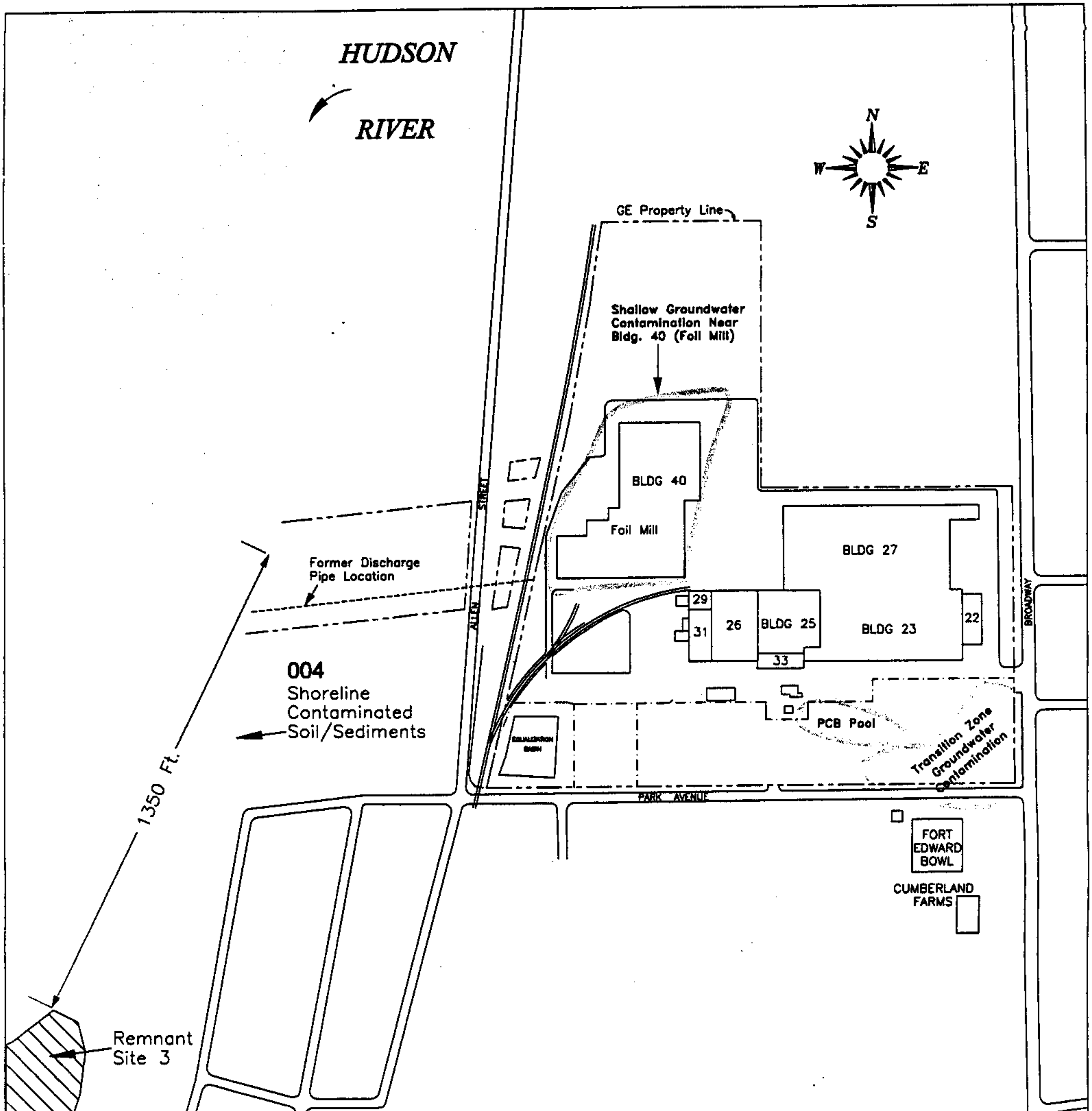


Figure 2

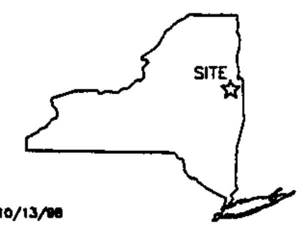
Site Layout Map

G.E. Capacitor Prod. Div. (Fort Edward) Site ID No. 558004

Department of Environmental Conservation
Division of Environmental Remediation



0 100 200
SCALE IN FEET



ports4.dwg, WBW, 10/13/98

Figure 3

Contaminated Groundwater For Operable Unit 03

G.E. Capacitor Prod. Div. (Fort Edward) Site ID No. 558004

Department of Environmental Conservation

Division of Environmental Remediation

Figure 4

Schematic Cross-Section (Typical) of the 004 Outfall Area

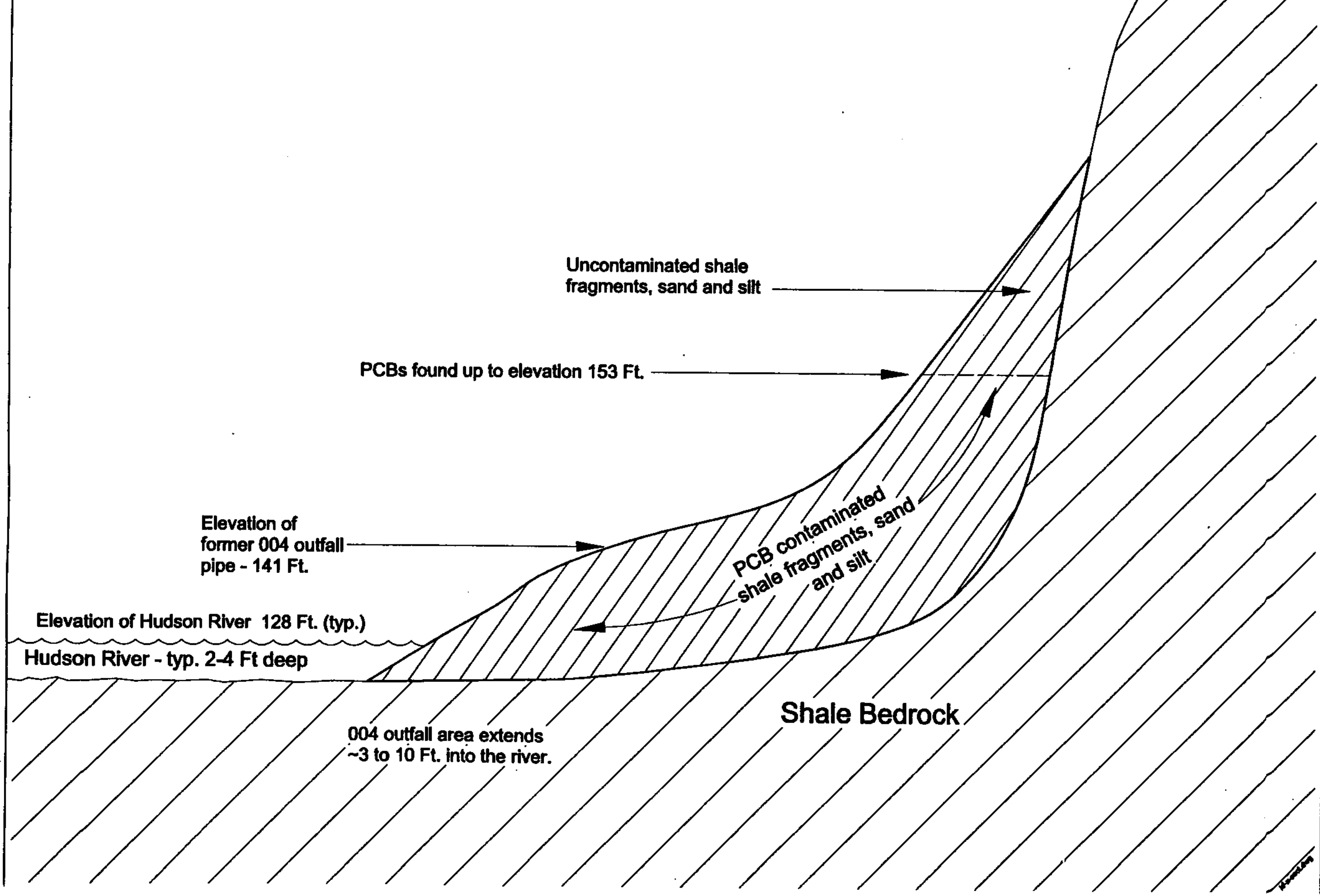


Figure 5, Schematics showing the relocation of outfall deposits under alternatives 3A through 3E

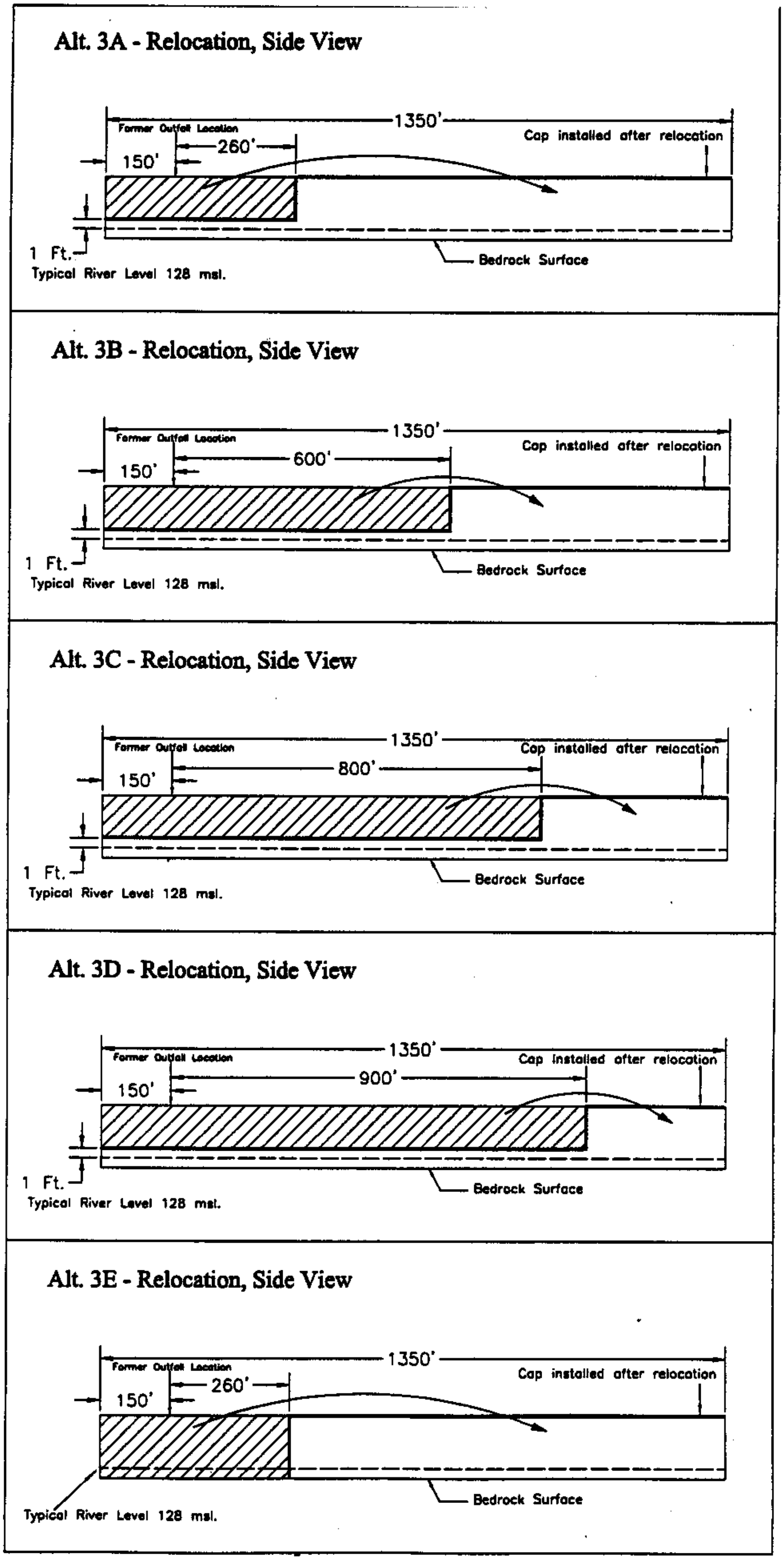


Figure 6, Schematics showing the partial removal of outfall deposits under alternatives 4A through 4E

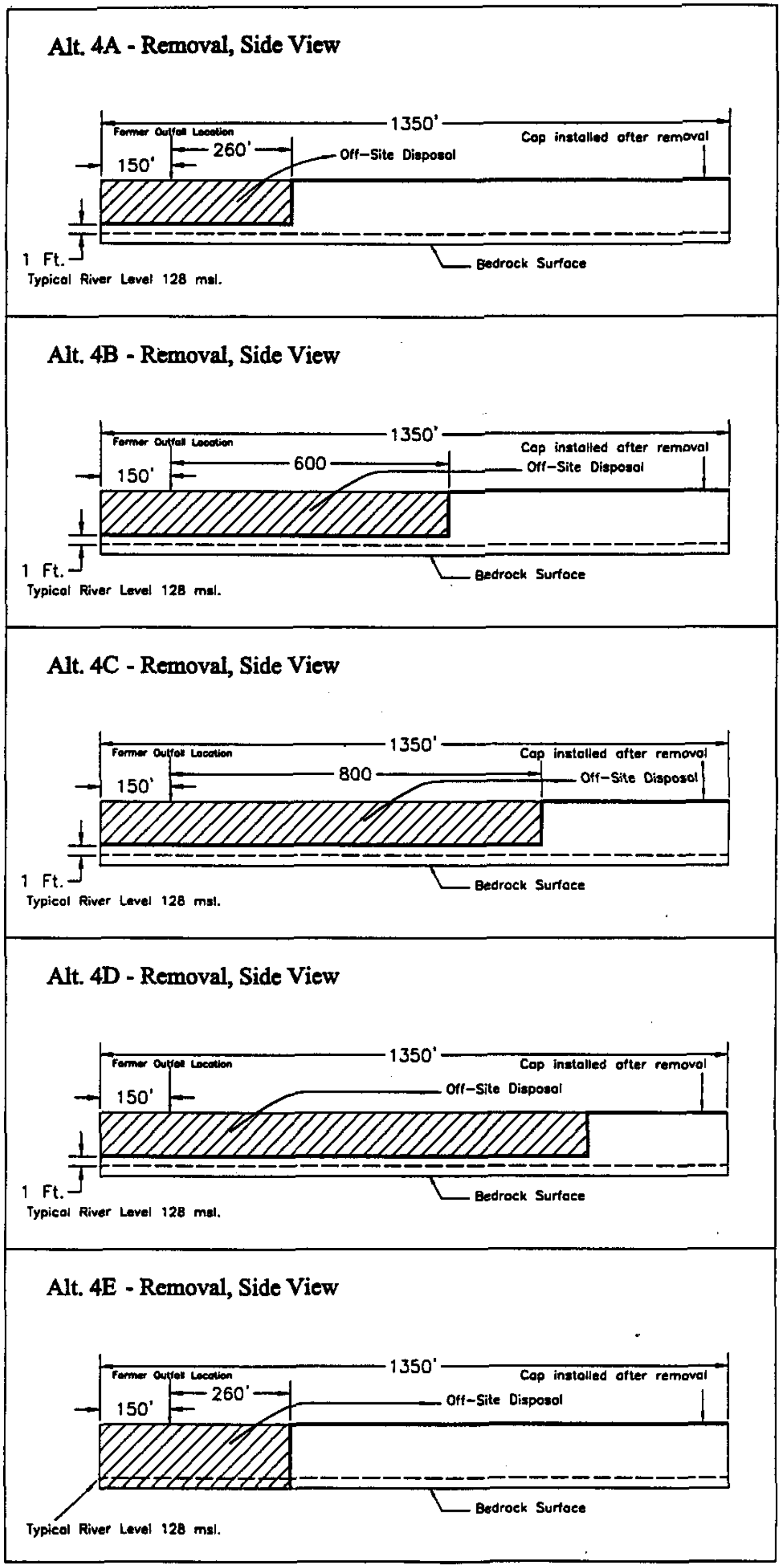


Figure 7, Schematics showing the partial removal of outfall deposits under alternative 5A, and complete removal under alternative 5B

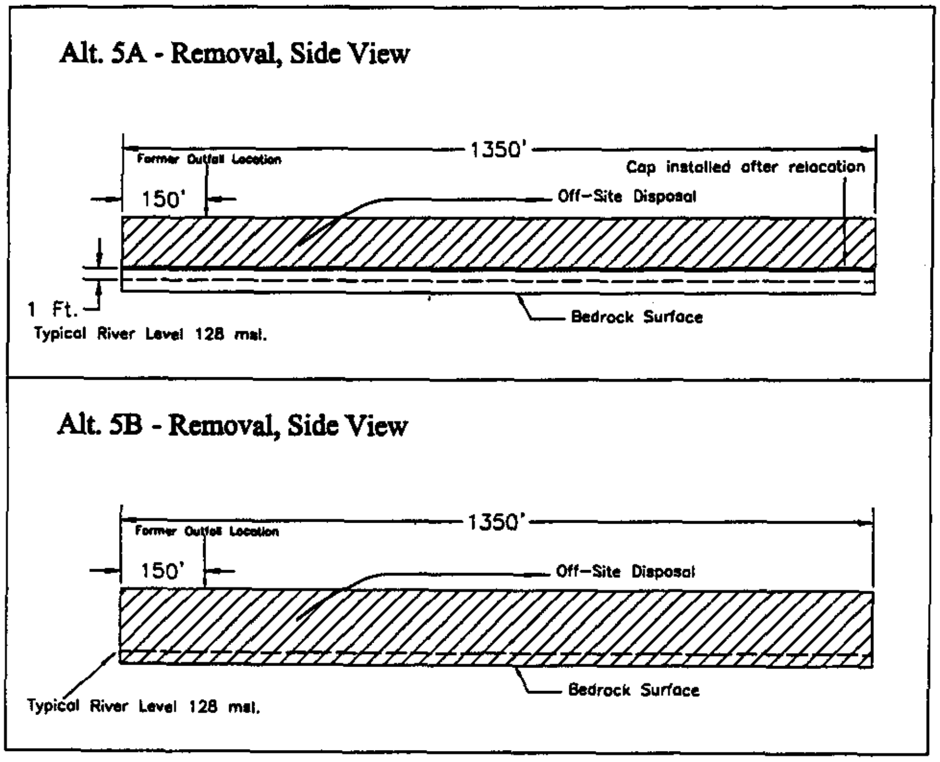


Table 1

Nature and Extent of Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb for water, ppm for soil)	SCG (ppb for water, ppm for soils)
Soils	Organic Chemicals	PCB (Aroclor 1242)	ND to 63	1 (surface); 10 (subsurface)
		PCB (Aroclor 1254)	ND to 140	1 (surface); 10 (subsurface)
		1,2,3-trichlorobenzene	ND to 15	3.4
		1,2,4-trichlorobenzene	ND to 47	3.4
		1,2,4-trimethylbenzene	ND to 40	NA
		1,3,5-trimethylbenzene	ND to 5.3	NA
		Acetone	ND to 48	0.2
		Isopropyl benzene	ND to 2.4	NA
		Kerosene	ND to 61,000	NA
		Napthalene	ND to 67	13
		Toluene	ND to 350	1.5
		1,1,1-trichloroethane	ND to 2,000	0.8
		Trichloroethene	ND to 25	NA
		Ethylbenzene	ND to 3,100	5.5
		Total xylenes	ND to 4,300	1.2
		n-butylbenzene	ND to 15,000	NA
		n-propylbenzene	ND to 5,200	NA
		p-cymene	ND to 8,300	NA
		Sec-butylbenzene	ND to 6,500	NA

Table 1 (continued)

Nature and Extent of Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb for water, ppm for soil)	SCG (ppb for water, ppm for soils)
Ground Water	Organic Chemicals	PCB (Aroclor 1242)	ND to 77	0.09
		PCB (Aroclor 1254)	ND to 4.5	0.09
		1,2,3-trichlorobenzene	ND to 7	5
		Benzene	ND to 11	1
		Chlorobenzene	ND to 200	5
		cis-1,2-dichloroethene	ND to 650	5
		Isopropyl benzene	ND to 2400	5
		Kerosene	ND to 61,000	NA
		Napthalene	ND to 1000	10
		Toluene	ND to 39	5
		1,1,1-trichloroethane	ND to 1100	5
		Trichloroethene	ND to 10,000	5
		Ethylbenzene	ND to 4	5
		Total xylenes	ND to 66	5
		n-butylbenzene	ND to 250	5
		n-propylbenzene	ND to 25	5
		p-cymene	ND to 38	NA
		Sec-butylbenzene	ND to 9	5

Table 1 (continued)

Nature and Extent of Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb for water, ppm for soil)	SCG (ppb for water, ppm for soils)
Surface Water	Organic Chemicals	PCB (total)	ND to 16.7	1×10^{-6}
Riverbank Soils / Sediments	Organic Chemicals	PCB (total)	520 to 44,800,000	1,000

Table 2
Remedial Alternative Costs
Operable Unit 03

Alternative	Capital Cost	NAPL Disposal Present Worth	Annual O&M	30 Year O&M Present Worth	Total Present Worth
1) No Further Action	n/a	n/a	$55,000	$845,485	$845,485
2) Hydraulic Control	$1,201,688	$1,104,217	$153,754	$2,363,572	$4,669,477
3) Hydraulic Control w/Pretreatment	$1,104,927	$1,103,156	$92,819	$1,462,849	$3,634,932
3A)	$1,499,517	$1,103,156	$152,262	$2,340,628	$4,943,301
3B)	$1,487,727	$1,103,156	$98,099	$1,508,016	$4,098,899
4) Hydraulic Control w/Barrier Downgradient	$2,113,158	$118,788	$169,483	$2,724,159	$4,956,105
5) Perimeter Barrier w/Site Dewatering	$5,112,572	$118,788	$141,371	$2,173,226	$7,404,585

Table 3
Remedial Alternative Costs
Operable Unit 04

Alternative	Capital Cost	Annual O&M	30 Year O&M Present Worth	Total Present Worth
1) No Further Action	n/a	$15,000	$176,783	$176,783
2A) Capping/Retaining Wall	$1,480,000	$48,000	$640,000	$2,120,000
2B) Capping/1:3 Slope	$1,370,000	$49,000	$750,000	$2,120,000
2C) Regrading/Cover/Rip-Rap	$630,000	$30,000	$460,000	$1,090,000
3A) Consolidation and Capping	$1,400,000	$46,000	$700,000	$2,100,000
3B) Consolidation and Capping	$1,370,000	$44,000	$670,000	$2,040,000
3C) Consolidation and Capping	$1,340,000	$42,000	$650,000	$1,990,000
3D) Consolidation and Capping	$1,250,000	$40,000	$610,000	$1,860,000
3E) Consolidation and Capping	$1,490,000	$47,000	$730,000	$2,220,000
4A) Partial Removal and Capping	$2,960,000	$67,000	$1,030,000	$3,990,000
4B) Partial Removal and Capping	$3,430,000	$72,000	$1,120,000	$4,550,000
4C) Partial Removal and Capping	$3,670,000	$74,000	$1,140,000	$4,810,000
4D) Partial Removal and Capping	$3,650,000	$73,000	$1,120,000	$4,770,000
4E) Partial Removal and Capping	$3,680,000	$77,000	$1,580,000	$5,260,000
5A) Removal (above river elev.)	$4,720,000	$35,000	$540,000	$5,260,000
5B) Removal (below river elev.)	$5,590,000	$12,000	$180,000	$5,770,000

Table 4: Distribution of PCBs along the length of the 004 Outfall Area

Riverbank sample locations relative to former 004 outfall pipe location	Range of PCB concentrations measured in samples by location, in parts per million
250 feet upstream of former outfall location	Non-detect to 0.6 (14 samples)
150 feet upstream of former outfall location	Non-detect to 3.1 (20 samples)
50 feet upstream of former outfall location	1.7 to 516 (17 samples)
Former 004 outfall pipe location	11.6 to 44,800 (14 samples)
50 feet downstream of former outfall location	5.3 to 31,800 (14 samples)
150 feet downstream of former outfall location	0.9 to 5860 (13 samples)
260 feet downstream of former outfall location	Non-detect to 1753 (16 samples)
305 feet downstream of former outfall location	35.9 to 5860 (4 samples)
350 feet downstream of former outfall location	1.2 to 713 (11 samples)
408 feet downstream of former outfall location	3 to 81.8 (8 samples)
550 feet downstream of former outfall location	Non-detect to 3630 (13 samples)
650 feet downstream of former outfall location	Non-detect to 180 (10 samples)
750 feet downstream of former outfall location	Non-detect to 99.1 (7 samples)
850 feet downstream of former outfall location	Non-detect to 49.1 (4 samples)
950 feet downstream of former outfall location	Non-detect to 26 (4 samples)
1050 feet downstream of former outfall location	Non-detect to 25 (4 samples)
1150 feet downstream of former outfall location	Non-detect to 37 (4 samples)

Table 5

Summary of the extent of material that would be relocated to the southern end of the 004 outfall area under Alternatives 3A, 3B, 3C, 3D and 3E for Operable Unit 4. The entire 004 outfall area would then be capped under these alternatives.

Alternative	Linear extent of material to be relocated	Depth of excavation in area to be relocated	Volume to be relocated
3A	From 150 ft. upstream of former outfall location to 260 ft. downstream of former outfall location	Excavate only those materials located higher than one ft. above the typical Hudson River elevation (~128 above mean sea level, or "amsl")	2600 cubic yards
3B	From 150 ft. upstream of former outfall location to 600 ft. downstream of former outfall location	Excavate only those materials located higher than one ft. above the typical Hudson River elevation (~128 above mean sea level, or "amsl")	3500 cubic yards
3C	From 150 ft. upstream of former outfall location to 800 ft. downstream of former outfall location	Excavate only those materials located higher than one ft. above the typical Hudson River elevation (~128 above mean sea level, or "amsl")	5300 cubic yards
3D	From 150 ft. upstream of former outfall location to 900 ft. downstream of former outfall location	Excavate only those materials located higher than one ft. above the typical Hudson River elevation (~128 above mean sea level, or "amsl")	5500 cubic yards
3E	From 150 ft. upstream of former outfall location to 260 ft. downstream of former outfall location	Excavate down to the underlying bedrock	3500 cubic yards

For a schematic drawing of the above alternatives, see Figure 5.

Table 6

Summary of the extent of material that would be removed under Alternatives 4A, 4B, 4C, 4D and 4E for Operable Unit 4. The entire 004 outfall area would then be capped under these alternatives.

Alternative	**Linear extent of material to be removed**	**Depth of excavation in area to be removed**	**Volume to be removed**
4A	From 150 ft. upstream of former outfall location to 260 ft. downstream of former outfall location	Excavate only those materials located greater than one ft. above elevation 128 msl. (typical Hudson River elevation)	2600 cubic yards
4B	From 150 ft. upstream of former outfall location to 600 ft. downstream of former outfall location	Excavate only those materials located greater than one ft. above elevation 128 msl. (typical Hudson River elevation)	3500 cubic yards
4C	From 150 ft. upstream of former outfall location to 800 ft. downstream of former outfall location	Excavate only those materials located greater than one ft. above elevation 128 msl. (typical Hudson River elevation)	5300 cubic yards
4D	From 150 ft. upstream of former outfall location to 900 ft. downstream of former outfall location	Excavate only those materials located greater than one ft. above elevation 128 msl. (typical Hudson River elevation)	5500 cubic yards
4E	From 150 ft. upstream of former outfall location to 260 ft. downstream of former outfall location	Excavation down to the underlying bedrock	3500 cubic yards

For a schematic drawing of the above alternatives, see Figure 6.

Table 7

Summary of the extent of material that would be removed under Alternatives 5A and 5B for Operable Unit 4. The entire 004 outfall area would then be capped under Alternative 5A.

Alternative	Linear extent of material to be removed	Depth of excavation in area to be removed	Volume to be removed
5A	From 150 ft. upstream of former outfall location downstream to Remnant Site 3A (approximately 1350 ft.)	Excavate only those materials located greater than one ft. above elevation 128 msl. (typical Hudson River elevation)	6800 cubic yards
5B	From 150 ft. upstream of former outfall location downstream to Remnant Site 3A (approximately 1350 ft.)	Excavate down tot he underlying bedrock	8700 cubic yards

For a schematic drawing of the above alternatives, see Figure 7.

Appendix A

An estimation of the impacts of bank storage and recharge on PCB mobilization from the 004 outfall area

Appendix A

An estimation of the impacts of bank storage and discharge on PCB mobilization from the 004 Outfall area at the GE Fort Edward Plant Site, #558004.

Section 1: Introduction:

In the Feasibility Study Report submitted for the 004 Outfall area, entitled "Report, Fort Edward Facility, Outfall 004 Soil, Focused Feasibility Study, General Electric Company Corporate Environmental Programs, Albany, New York" (O'Brien and Gere Engineers, December 1996), there is an Exhibit A, "Estimation of PCB discharges from bank sediments in the vicinity of the General Electric Fort Edward facility outfall 004". (HydroQual, Inc.) In the NYSDEC review of this Exhibit, it has been determined that the estimation presented in Exhibit "A" represents a significant underestimation of the impacts on PCB mobilization from the 004 outfall deposits to the water column of the Hudson River of bank storage and discharge of river water due to changes in river stage.

Section 2: Site Conditions:

The 004 outfall area is approximately 1350 feet long. The concentrations of PCB in the outfall deposits are highest in the vicinity of the former outfall location, and generally decrease with distance downstream. Concentrations of PCB range from over 40,000 ppm to less than 1 ppm. Oil phase (also referred to as "non aqueous phase liquids, or NAPLs) PCB contamination was also observed at the site.

The volume of the outfall deposits is presented in the FS report in Exhibit A. Calculations of the volume of the outfall deposits which is saturated under varying river stages are presented in Figure 2 of Exhibit A. However, this volume presented in Exhibit "A" only takes into account 200 feet of riverbank, not the entire site.

There are two distinct scenarios under which the outfall deposits will be affected by bank storage and release of river water. First, the diurnal fluctuations in river stage due to upstream operation of hydroelectric facilities result in daily bank storage and release of river water, which will cause mobilization of PCB into the Hudson River. Second, there are seasonal and storm-related high flow events which will cause large scale fluctuations in river stage. These seasonal and storm related events, while infrequent, will cause larger volumes of water to be stored and released back into the Hudson River than caused by the diurnal fluctuations. The figure below illustrates the process of bank storage and discharge as it pertains to this site.

Bank storage and discharge occurrs when there are fluctuations in river stage; that is, when the height of the water column in the river goes up and down. When the river stage increases, the elevation of the water column in the river becomes higher that the elevation of the water within the banks of the river. This situation (water elevation in the river higher than in the banks) induces water flow out of the river and into the banks of the river. When the river stage decreases, the water level in the banks of the river are higher than the elevation of the water column of the river, and the flow of water is out of the banks and back into the river.

Upon reviewing the hydrographs (records of the elevation of the water column of the river) recorded at the United States Geologic Survey (USGS) guaging station at Fort Edward approximately one mile downstream of the 004 outfall area, NYSDEC has determined that there are diurnal (daily) increases and decreases in river stage. These fluctuations are due primarily to the operation of hydroelectric facilities upstream of the Fort Edward area. Typically, the magnitude of the river stage fluctuation is approximately one foot. This fluctuation in river stage occurrs approximately 200-240 days per year, primarily during low flow periods.

Other larger fluctuations in river stage have also been recorded by USGS at the Fort Edward guaging station,

Section 3: Impacts of diurnal river stage fluctuation on PCB mobilization

A review of the calculations presented in Exhibit "A" of the Focused Feasibility Study has led NYSDEC to conclude that the diurnal fluctuations in river stage were not accounted for in the evaluations presented in Exhibit "A".

Based upon Figure 2 presented in Exhibit "A", the one foot fluctuation in river stage could result in up to 11,000 gallons of water being stored within the contaminated outfall deposits and then released, on a daily basis, 200-240 times per year during low flow periods.

As the calculations presented in Exhibit "A" assume up to 200 parts per billion PCB in the water released by bank storage and discharge, NYSDEC concludes that the 004 outfall area represents a source of PCB contamination to the water column of the Hudson River, contributing to the violation of the surface water standard for PCB in the Hudson River.

Section 4: Impacts of flood driven fluctuations in river stage on mobilization of PCB

A review of the calculations presented in Exhibit "A" of the Focused Feasibility Study has led NYSDEC to conclude that the flood event fluctuations in river stage were not fully accounted for in the evaluations presented in Exhibit "A". Again, only 200 feet of riverbank was evaluated in Exhibit "A", not the entire contaminated length of the 004 outfall deposit. However, as the calculations presented in Exhibit "A" show, the flood driven fluctuations in river stage would still contribute to violations of the surface water standard for PCB in the Hudson River.

Section 5: Summary

The 004 outfall area represents a source of PCB to the Hudson River due to bank storage and discharge during fluctuations in river stage. Fluctuations in river stage occur most days in the year; approximately 200-240 times due to diurnal fluctuations, and also due to storm events and seasonal flooding. Estimates are presented in Exhibit "A" of the Focused Feasibility Study which show that the 004 outfall area is a source of PCB to the water column of the Hudson River. These estimates, as shown above, underrepresent the amount of PCB mobilized to the river by bank storage and discharge due to taking into account only 200 feet of the entire 1350 foot length of the contaminated 004 outfall deposit, and by not taking into account the daily fluctuation in river stage.

The estimates presented in Exhibit "A" also underrepresent the amount of PCB mobilized to the river by bank storage for the following reasons:

1) The PCB load estimates presented above do not reflect the movement of PCB in the form of non-aqueous phase liquid (NAPL). It is difficult to observe and measure the movement of small amounts of NAPLs in the vicinity of the 004 outfall area. Since the above estimates do not account for the PCB load associated with NAPL migration, which could be enhanced by bank storage and discharge, the mass load estimates presented above are likely to be biased low.

2) The number of days which exhibit a diurnal fluctuation in river stage of approximately 1 foot has been used in the above estimates. The number of days which exhibit a lesser diurnal fluctuation in river stage were not included in the estimates. This is an additional potential source of bias in the estimates which, if taken into account, would increase the estimated PCB mass load out of the 004 outfall deposits due to bank storage and discharge.

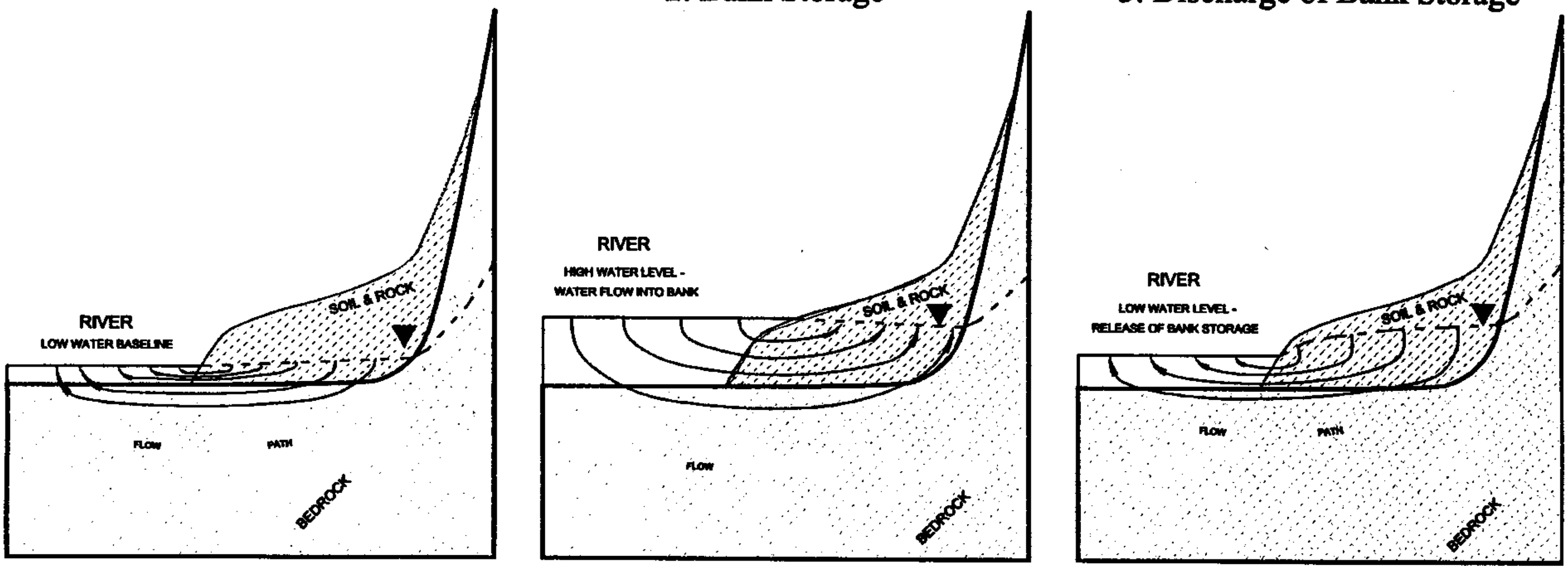
3) The number of seasonal or storm driven flooding events resulting in a multiple-foot fluctuation in river stage has not been rigorously evaluated, as only flooding events associated with a seven foot fluctuation in river stage were evaluated. However, it is likely that the PCB mass load due to bank storage and discharge related to flooding events is biased low in the above estimates, as there are typically several events per year which result in a multiple-foot fluctuation in river stage. As the frequency of such events is highly variable, however, the impact of such events was not presented in the above estimates.

River stage fluctuations result in mobilization of PCB from the 004 outfall area

1. Baseline Conditions

2. Bank Storage

3. Discharge of Bank Storage



New York State Department of Environmental Conservation
Division of Environmental Remediation

Appendix B

Restrictions on future use of the GE Fort Edward Site, #558004

Appendix B: Restrictions for Future Use of the GE Fort Edward Site, #558004

1. **On-site Excavation or Disposal of Soils is Prohibited.** There shall be no excavation of soils at the facility or removal of soil from the facility until such time that the NYSDEC has approved a **Soil Management Plan.**

   a. **Soil Management Plan.** At any time, the proponent of such onsite excavation or disposal of soils ("proponent") may submit to the NYSDEC for review and approval, a plan that describes procedures for soil excavation and removal of soils from the facility. The plan shall be designed to protect human health and the environment. Until this plan is approved, no excavation or soil removal is allowed. Should the proponent decide to submit a Soil Management Plan, at minimum the plan shall include:

      i. **Soil sampling.** Include protocols and procedures for sampling soils to determine the concentration of contaminants. The plan shall include the appropriate practices and protocols.

      ii. **Health and Safety Plan.** The plan shall describe the health and safety requirements and general procedures to be followed during the excavation of soils. The plan shall be designed to minimize the possibility that personnel at the facility and the surrounding community will be injured or exposed to site contaminants during excavation of such soils.

      iii. **Off-Site Disposal.** Should soil be disposed off-site, the plan shall include a hazardous waste determination to verify whether deposition into a secure hazardous waste landfill or a solid waste landfill is necessary.

      iv. **Implementation.** The proponent may implement the Soil Management Plan at any time after NYSDEC approval.

4. **Deed Notification.** No later than **ninety (90) days** after the effective date of Record of Decision for this site, GE, or the owner of the site at that time, as the case may be, shall submit to the NYSDEC for review and approval language amending the current property deed, that will in perpetuity notify any potential purchasers of the property of the contamination present at the property. At a minimum, the amended language shall include a declaration of covenants and restrictions which:

   a. Indicates that soils with elevated levels of PCB and other contaminants is being left in place on-site and that this contamination may pose an unacceptable health risk should the soil be improperly handled, managed or disposed.

b. Limits the land parcel to industrial use only.

c. Prohibits the use of water from beneath the surface of the premise.

d. Notifies future land owners, that under the authority of the New York State Department of Environmental Conservation, an existing hazardous waste remedial program is ongoing to address the on-site and off-site contamination in soils, surface water and groundwater.

The deed shall be recorded and filed with the appropriate authorities, and proof of recording and filing shall be submitted to the NYSDEC within **sixty (60) days** of language approval.

Appendix C

Responsiveness Summary

RESPONSIVENESS SUMMARY FOR THE PROPOSED REMEDIAL ACTION PLAN

GE Capacitor Products Division (Ft. Edward)
Operable Units 03 & 04

Town of Fort Edward, Washington County, New York
Site No. 558004
December 1999

The written comments received on the Proposed Remedial Action Plan ("PRAP") can be placed in three broad categories:

- those that relate to the "significant threat" determination;
- those that relate to how the Department used the remedy selection criteria outlined in 6 NYCRR Part 375; and
- miscellaneous comments.

Those categories serve as this Responsiveness Summary's outline.

To enable the reader to easily distinguish between a comment received and the Department's response to it, a paragraph coming fully to the left margin summarizes a comment received and an indented paragraph or paragraphs respond to that comment.

I. Comments Relating to the "Significant Threat" Determination

The key commenter on the "significant threat" determination is General Electric Company ("GE").

GE asserts that the Department's "significant threat" finding relating to the PCBs disposed at the 004 outfall arises from a mere concentration in the water column near the 004 outfall area that exceeds State water quality standards; and then critiques the PRAP with its assertion used as a "strawman." *See, e.g.*, pp. 3 and 11 of GE's comments.

> GE mischaracterizes the basis for the Department's determination. The "significant threat" is not as GE asserts--a "mere exceedance of water quality standards." The "significant threat" arises out of the *adverse consequences* upon the public health and the environment that hazardous wastes released into the environment from the site have caused that give rise to the "significant threat" determination in this matter, *viz.*, as noted on page one of the PRAP:
>
> a. respecting Operable Unit 03 (the main portion of the site), significant

environmental damage associated with impacts of contaminants (PCBs and VOCs) on the shallow aquifer beneath the site, which was used for human water consumption in the past and is now unusable due to the presence of the PCBs and VOCs above applicable standards.

b. respecting Operable Unit 04 (the area of contaminated soils and sediment adjacent to the former 004 outfall on the eastern shore of the Hudson River), primarily on the significant environmental damage associated with the releases of PCBs to the Hudson River from the soils and sediments contaminated with PCBs along the Hudson River shoreline near the former 004 outfall. These continual and prolonged releases of PCBs from the site--in quantities that produced PCB surface water concentrations exceeding ***400,000 times the standard (0.000001** micrograms per liter) the Department determined through rulemaking is the <u>maximum</u> concentration of PCBs allowable in surface water without compromising adequate protection of the health of humans from the toxic effects of PCBs which bioaccumulate in fish*--materially contribute to the existing need to recommend that human consumption of fish from the Hudson River (which includes the vicinity of the site) be limited.

GE also asserts, on page 14 of its comment letter, that the Department's finding that the site poses a significant threat is deficient.

We disagree.

The Department's regulations provide alternative approaches for the Commissioner to rely on in making a finding that hazardous waste disposed at the site constitutes a significant threat to the environment, and the PRAP articulated sufficient grounds justifying such a finding. For example, the Department's investigation supports the finding that the hazardous waste disposed at Operable Unit 04 "results in or is reasonably foreseeable to result in ... a bioaccumulation of contaminants."

In the vicinity of the site, the surface water sampling showed that the concentrations of PCB in the waters of the Hudson River adjacent to the site are significantly higher than upstream (0.410 micrograms per liter and 0.328 micrograms per liter adjacent to the 004 outfall area, as compared to 0.172 micrograms per liter upstream of the site); the PISCES sampling (which measures relative concentrations of PCB in surface water) showed a greater than twenty fold increase in PCB downstream of the 004 outfall area as compared to upstream. The fish sampled a short distance downstream of the 004 outfall area contained concentrations of PCB in fish flesh in excess of the tolerance limit set by the United States Food and Drug Administration (2 parts per million). When the surface water sampling results, the PISCES sampling results, and the fish sampling results are all taken into account, it is clear that the 004 outfall area materially contributes to the need to recommend that human consumption of fish in the vicinity of the site be limited.

Thus, the threshold established in 6 NYCRR 375-1.4(a)(1)(iii) has been met.

At p. 15 of GE's comment letter, GE states that the Department cannot rely on violations of the water quality standard for PCBs as the basis for a finding of a significant threat. GE asserts that "The water quality standard for PCBs is fundamentally flawed", because the toxicological underpinnings of the standard are flawed, the fish consumption rate used to develop the standard does not reflect fish consumption rates in the Hudson River, the reduction of PCBs in fish prior to consumption due to trimming and cooking is not taken into account, and the bioaccumulation factors used do not apply to the upper Hudson.

We again disagree with GE's assertion:

a. The Department's finding that these PCBs pose a significant threat to the environment is not based merely upon a water quality standard violation. That exceedance (by a factor of *over 400,000 times over the standard*--a standard set to protect people from bioaccumulative contaminants), placed in the context of documented wildlife exposure, the toxicity of PCBs, and the bioaccumulative nature of the chemical and its material contribution to the existing need to recommend that human consumption of fish from the Hudson River (which includes the vicinity of the site) be limited, and other considerations, support a "significant threat" finding.

b. The standard GE challenges is found in a regulation which was duly promulgated after an opportunity for public comment; and this is not the forum to challenge the sufficiency of the basis for that standard. (Incidentally, a water quality standard is based upon an assessment of the inherent toxicity of a substance, a bioaccumulation factor, and an exposure [ingestion rate] of 33 grams of fish per day. For PCBs, the toxicity component is based on a one-in-a-million lifetime cancer risk level [the level set in regulation] and a 1996 re-assessment of carcinogenic potency by USEPA. The scientific basis for the PCB H[FC] standard (the standard GE objects to) is presented in the rulemaking documents.[1]) Also, even if GE's assertion that the bioaccumulation factor should be reduced by a factor of five (*see* the footnote on p. 37 of Appendix B of GE's comments; an increase from 0.4 mg/l to 2 mg/l in particulate organic carbon or POC, one of the bases for determining the bioaccumulation factor) were to be taken into account--an assertion the Department does not agree with--the samples of Hudson River water taken in the vicinity of the site by GE would still show exceedance of the standard by *a factor of over 80,000.*

Another GE comment related to the Department's "significant threat" determination is

---

[1]*See* New York State Department of Environmental Conservation, *Combined Regulatory Impact and Draft Environmental Impact Statement, Title 6, Chapter X; Parts 700-706* (1997); New York State Department of Environmental Conservation, *Final Combined Regulatory Impact and Draft Environmental Impact Statement, Title 6, Chapter X; Parts 700-706* (1998).

found on p. 18 of GE's comment letter, which raises the issue of the significance of the contribution of PCBs from the outfall deposit to the Hudson River. GE states that:

- there are "background" concentrations of PCBs, between 0.5 and 2 ng/l upstream of the two GE plants (at Fort Edward and Hudson Falls);
- the GE Hudson Falls plant site is a source of PCB to the Hudson River on the order of 0.2 lbs/day;
- the PCBs that might derive from the outfall deposit remain in an extremely small and spatially discrete area in the river near the deposit itself.

"Accordingly," GE summarizes, "it cannot be rationally said that the contribution of PCBs from the outfall deposit to the river creates a 'significant threat' to the environment", defining the "environment" in question as encompassing the entire Hudson River and not, as the Department states, the 004 outfall area and its environs.

> The Department once again disagrees: the relative contribution of the outfall deposit to the entire PCB problem in the Hudson River is not the determining factor whether the PCBs emanating from the 004 outfall area constitute a "significant threat." While the 004 outfall PCB releases certainly contribute to the adverse environmental and public health impacts of the Hudson River as a whole, the releases of PCBs from the 004 outfall in the vicinity of the site are significant in themselves.
>
> In the vicinity of the site, the data clearly show that the hazardous waste disposed at the 004 outfall area does pose a "significant threat." The surface water sampling, performed as part of the investigation of the 004 outfall area, showed significant increases in PCB concentrations from upstream of the outfall area to downstream. The sources of PCBs on the eastern shore of the Hudson River between the villages of Hudson Falls and Fort Edward (the GE Hudson Falls plant site, the GE Fort Edward plant site, including the 004 outfall area, and potentially Remnant Sites 3/3A and 5) all may contribute PCBs to the Hudson River in varying amounts. In the vicinity of the 004 outfall area, the surface water sampling indicates that the most significant source of PCBs in that vicinity is the 004 outfall area. The impact of the 004 outfall area is differentiable from other PCB sources within the river reach from the outfall area to approximately 1.5 miles downstream.

GE asserts on p. 19 of its comment letter that "The PISCES data do not support NYSDEC's claim that the outfall deposit causes a significant threat."

> We disagree. The Department used the PISCES sampling solely to determine the relative concentrations of PCBs in the water column upstream and downstream of the 004 outfall deposit. A greater than 20-fold increase in PCB recovery was observed between PISCES samples taken above and below the north end of the outfall deposit. This is evidence that the 004 area is contributing PCBs to the water column and--contrary to GE's assertions--is not used as evidence of an exceedance of the PCB water quality standard in the vicinity of the 004 outfall. Turbulence conditions just above and

immediately below the 004 outfall are similar; there is no reason to suppose a change in turbulence produced the sudden jump in PISCES recovery. Random differences in turbulence between PISCES locations cannot explain the increase because all the 19 samples taken downstream of the 004 outfall show an increase in recovery relative to the five samples immediately upstream and the eight samples from the western shoreline.

Equally important, the samples taken below the outfall show a major shift in PCB congener pattern. Differences in turbulence would not be expected to change the PCB congener patterns.

Thus, the Department's PISCES results show that the outfall deposit is contributing PCBs to the Hudson River. Furthermore, the sudden shift in PCB congener pattern cannot be explained if upstream contamination remains the overriding factor along the shoreline.

GE asserts on p. 20 of its comment letter that "NYSDEC's fish sampling data similarly do not show that PCBs released from the deposit materially contribute to the need for fish consumption advisories in the river. [*Note: see also* GE's comments to similar effect on pages 18, 22, and 27.] As an initial matter, fish advisories in the Hudson River already extend 195 miles from Hudson Falls to the Battery; indeed, possession and consumption of fish is banned in the upper river above the Federal Dam in Troy."

As stated above, the relative contribution of the outfall deposit to the entire PCB problem in the Hudson river is not relevant to the selection of remedy for this site. The releases of PCBs from the site are significant, as demonstrated by the surface water sampling in the vicinity of the site. Additionally, the results of fish sampling in the site's vicinity, particularly the concentrations of the fish collected from the east side of the river (the 004 outfall area side of the river) to the west side fish, described in the PRAP, indicate the impact the releases from the 004 outfall area are having on biota in the river in the vicinity of the site. Indeed, GE itself admits (on p. 22 of its comment document) that "the data demonstrate that the source(s) of PCB to fish on the eastern shore have...a localized effect..."

On p. 22 of its comment letter, GE states that "The mass of PCBs entering the river through groundwater flux and bank storage and release is insignificant", and proposes three reasons which supposedly support the statement:

1. the hydraulic gradient used in the calculation of groundwater flow in the Focused Feasibility Study (FFS) should no longer be used, and instead a new gradient should be used.
2. "the calculation implicitly accounts for the use of the presence of the oil in the deposit..."
3. "The contribution of PCBs from the deposit to the river through the flooding and ebbing of river water ('bank storage') is also insignificant, even accounting for the 'diurnal' changes in river height."

Regarding the first reason, summarized, the change in hydraulic gradients used in

GE's calculations is not justified, the calculations in the FFS are not conservative, and the contributions of PCBs to the Hudson River due to bank storage and recharge are not insignificant:

On the change in gradient used in FFS calculations is not justified,

a. A "data set" is a record of the water levels measured in monitoring wells over a four year period; and is used in the FFS to calculate the hydraulic gradient between the water in the bedrock and the surface water in the river. The Department's review of the document GE cites as the basis for revising the data set used in calculating the hydraulic gradient (*viz.,* O'Brien and Gere, "Annual Ground Water Monitoring Report and Remedial System Operation Report," prepared for General Electric Co., Fort Edward, New York, March 1999) fails to demonstrate any objectively valid rationale to reconsider the validity of that data set or its utility in calculating the hydraulic gradient.

b. GE, in Appendix "C" of its comments, states that "At that time, water levels from another well located closer to the river (OBG 45BD), which were below the elevation of the Hudson River, were not considered to be representative of bedrock groundwater elevations in that area. Since that time, however, the water levels in OBG 45BD have regained equilibrium, i.e., the levels are above river elevation and fluctuate normally, and are considered reliable."

The Department has reviewed the water level information available for the wells OBG 44 BD and OBG 45 BD for the years 1995 through 1998, which is contained in a series of reports submitted by GE to the Department.[1]

However, the document cited by GE to support revising the calculations presented in the FFS does not support the comment; nor do the other reports submitted to the Department over the past several years.

No information is available to the Department yet for 1999, as the

---

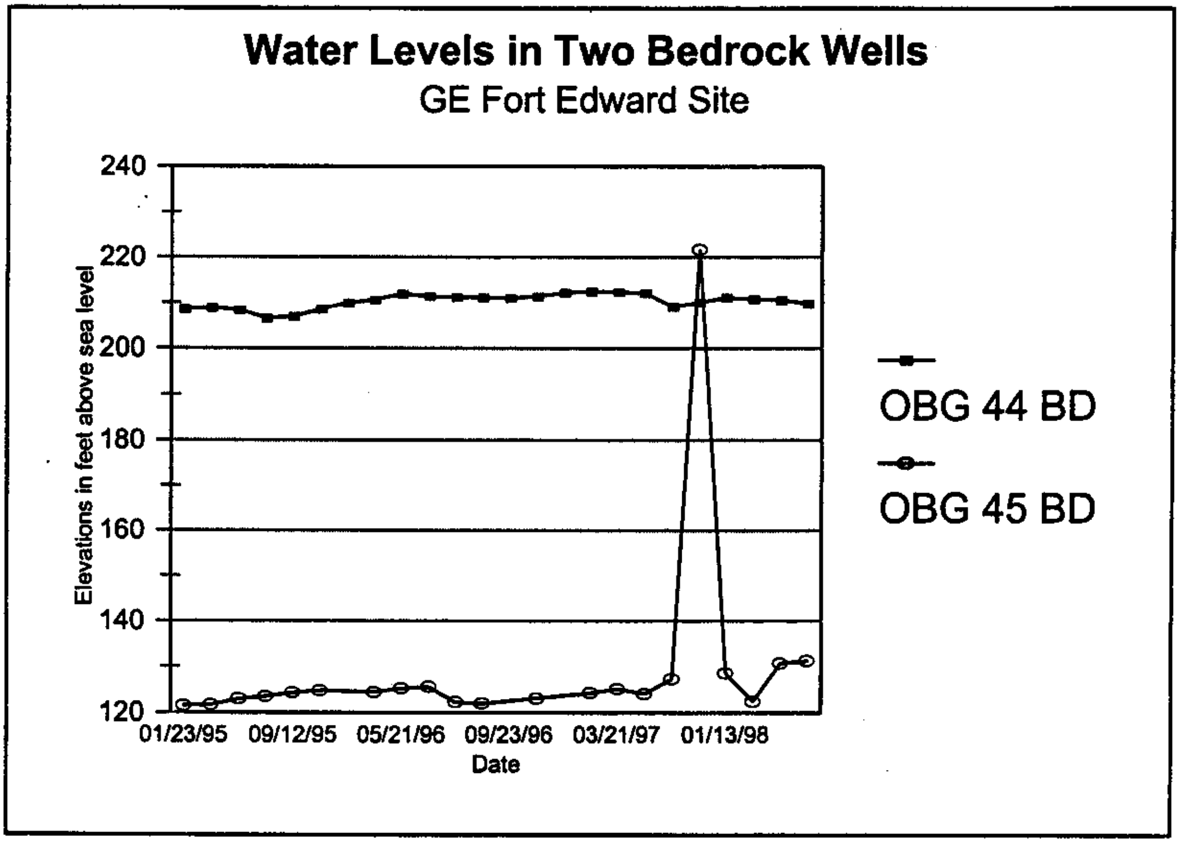
[1]O'Brien and Gere, "1997 Annual Ground Water Monitoring and Remedial System Operation Report," General Electric Company, Transmission Systems, Fort Edward Facility, Fort Edward, New York, April 3, 1998;

O'Brien and Gere, "1996 Annual Ground Water Monitoring and Remedial System Operation Report," General Electric Company, Transmission Systems, Fort Edward Facility, Fort Edward, New York, April , 1997;

O'Brien and Gere, "1995 Annual Ground Water Monitoring and Remedial System Operation Report," General Electric Company, Transmission Systems, Fort Edward Facility, Fort Edward, New York, June, 1996;

annual monitoring report for 1999 is not due to be submitted until early 2000.

Below is a graph of the water levels for the two wells. As can be clearly seen in the graph, **there is no significant change in trend in the water levels measured in OBG 45 BD**, except for one anomalous measurement in late 1997, which is likely a measurement or reporting error. No basis exists in the data set for altering the engineer's (O'Brien and Gere's) initial determination, as expressed in the FFS, that the data from OBG 45BD is unacceptable.



On the issue that the calculations in the FFS are not conservative,
GE states that "NYSDEC's claim that the calculation provided in the FFS does not account for PCB oils in the deposit and the full length of the deposit is incorrect." GE's assertion is incorrect: the calculations are not conservative, *i.e.*, the actual amount of PCBs released to the river from the 004 outfall deposit may be *higher* than indicated by the calculations in the FFS.

a. PCB levels in sediments sampled in the 004 outfall deposit exceeded 3600 parts per million, or about 1/3 of one percent, as far as 600 feet downstream of the former outfall location. In the vicinity of the former outfall pipe location, concentrations of PCB were measured in excess of 40,000 parts per million, or 4%. The presence of such high concentrations indicates the presence of PCBs as a separate phase material or oil.

b. A small amount of PCB oil moving along with the groundwater would result in concentrations greatly exceeding the 200 parts per billion concentration used in the calculation. The assumption of 200 parts per billion is therefore not conservative, as the concentration of PCB within the waters leaving the 004 outfall deposits could be much higher. An example of the impact of the high concentrations of PCBs in the 004 outfall deposit on the concentration of PCBs in the water which passes through the 004 outfall deposit can be found in the results of water samples taken in the Hudson River adjacent to the former 004 outfall location before the 004 outfall pipe was relocated. A water sample taken in the Hudson River adjacent to the location where the water from the 004 outfall entered the river (after passing over approximately 30 feet of the outfall deposit) exhibited a concentration of 16.7 micrograms per liter. Clearly, if water which passes *over* the 004 outfall deposit can result in high levels *in the river itself*, the water which passes *through* the 004 outfall deposit can contain very high levels of PCBs.

On the issue that the contributions of PCBs to the Hudson River due to bank storage and recharge are not insignificant,
GE's assertion again relies on the argument that because there is a large source of PCBs upstream of the GE Fort Edward site (GE's own Hudson Falls plant site), the PCB releases from the 004 outfall deposit are insignificant. However, as previously discussed, the water quality sampling and PISCES results conclusively show that the 004 outfall deposit is a significant source of PCB to the water column of the Hudson River in the vicinity of the site.

Also, the calculation of the contribution of PCBs to the Hudson River from bank storage and recharge estimated is not extremely conservative, as GE asserts on p. 6 of Appendix C of its comments. To restate, use of the 200 parts per billion PCB concentration in the waters moving out of the 004 outfall deposits is not conservative, as even a small amount of PCB oil moving along with the water would result in concentrations greatly exceeding 200 parts per billion.

The Department agrees with GE that at downstream sampling locations near Roger's Island, the pattern (signature) of the PCBs detected is similar to the PCBs GE admits (*see* pp. 25 and 26 of GE's comments) are coming out of GE's Hudson Falls facility.

GE concludes, in Appendix C of its comments, that "In 1997, the combined contribution of the these mechanisms is conservatively estimate[d] to be less than 4% of the PCB load passing Roger's Island. Eliminating these sources, therefore, will have no measurable effect on PCB levels in the Hudson River." This conclusion misses the point: the movement of PCBs from the 004 outfall deposit through groundwater flux and bank storage and recharge *does* have a measurable effect on the water column of the Hudson River in the vicinity of the site and some distance downstream, as shown by the data presented in the PRAP and supporting documents. This effect is further exhibited by the results of fish sampling a short distance downstream of the 004 outfall deposit, which show that the fish in the vicinity of the site are highly contaminated with PCBs.

GE, on p. 25 of its comments, asserts that the PCB mixture or "signal" observed at Roger's Island (approximately 1.5 miles downstream of the 004 outfall deposit) is comparable to that associated with the GE Hudson Falls plant site, not the GE Fort Edward plant site.

This assertion is not relevant to the issue at hand, which is whether the releases of PCBs associated with the 004 outfall deposit give rise to significant threats in the vicinity of the 004 outfall area; and as to this, on p. 26 of its comments, GE admits that, in the PISCES survey, "Sites adjacent to the eastern shore in the vicinity of the outfall deposit reflect the signal seen in the outfall itself", indicating that, in the vicinity of the site, the 004 outfall deposit *is* the significant PCB source. In any event, GE admits that a small part of the signal at Roger's Island nonetheless comes from Fort Edward plant site's PCB releases.

GE, in summarizing this portion of it's comments, also asserts that "In short, GE's water column sampling and NYSDEC's PISCES data demonstrate that the outfall deposit's influence is limited to a very small area along the eastern shore near the deposit itself." GE also asserts (on p. 22 of its comment document) that "there is no evidence that the outfall deposit has a significant influence on PCB concentrations in fish in the upper Hudson River." *See also* GE's comments to similar effect on pages 18, 22, and 27.

GE is incorrect. As stated above, the PISCES data, as well as the water column sampling and fish sampling results (as discussed in the PRAP), show that the 004 outfall area is a source of PCBs to the Hudson River which gives rise to significant threats to human health and the environment. Indeed, as previously noted, GE itself admits that "the data demonstrate that the source(s) of PCB to fish on the eastern shore have...a localized effect..." and, on p. 26 of its comments, in the PISCES survey, "Sites adjacent to the eastern shore in the vicinity of the outfall deposit reflect the signal seen in the outfall itself."

II. Comments That Relate to How the Department Used the Remedy Selection Criteria Outlined in 6 NYCRR Part 375

GE made several comments relating to the Department's application of the remedy selection criteria in the PRAP.

The first, found on p. 29 of GE's comments, is that since water upstream of the 004 Outfall already exceeds the water quality standard (WQS) of one part per quadrillion (ppq) of PCBs, no outfall remedy will meet the goal of attaining river water below that concentration. Therefore, the Department should have selected the "no action" remedy.

> The Department's regulations do not require that a remedy eliminate the "significant threat" that has been identified. A remedy that "mitigates" such threats is consistent with the statute and the regulations, and the remedy selected here achieves that objective. In addition, the water quality standards violations are not in themselves the significant threat that the Department proposes to address. While removing the 004 outfall deposit may not eliminate the water quality problem in the entire river, it will reduce the adverse impacts this area has on the Hudson River, and its contribution to the need to limit fish consumption.
>
> Furthermore, to acquiesce in what GE proposes here as the final remedy--leaving things as they are because taking remedial action will not improve water quality due to an upstream source that already contaminates to an extent that exceeds the applicable water quality standard--logically would have the Department do nothing at any site releasing contaminants into environmental media already contaminated by other sources. The Department does not interpret its mandate from the Legislature to be limited to protecting sectors of the State's environment that would be pristine but for a single contamination source. Rather, the Department works on the premise that remediation that eliminates a contaminant source improves an environmental medium contaminated by other sources since that remediation is one of several steps directed at cleaning that medium.

On p.10 of its comments, GE states that "By proposing to fully excavate the outfall deposit, NYSDEC is seeking to restore the site to predisposal conditions, an authority NYSDEC lacks under the IHWDSL. This statute only allows NYSDEC to develop remedial programs that 'contain, alleviate, or end the threat to life or health or to the environment' posed by the disposal of hazardous waste at a site."

> The basis for proposing the remedy for the 004 outfall deposit is clearly stated in the PRAP. While returning a site to predisposal conditions certainly is the remedial objective of the State's inactive hazardous waste disposal site remedial program, 6 NYCRR 375-1.10(b), the PRAP clearly sets forth the considerations the Department accounted for in proposing the remedy [*see* pages 26 through 35 of the PRAP and the summary on pages 36-37] and restoring the site to predisposal conditions was not one of the considerations. Furthermore, this remedy satisfies the preference set by the regulations for permanent remedies. *See* 6 NYCRR 375-1.10(c)(5). Lastly, the Department has the requisite authority to have as a remedial objective for an inactive hazardous waste disposal site, restoring it to predisposal conditions.

At p. 31 of GE's comments, GE states that "A remedy used successfully at the remnants would be effective for the outfall deposit. However, the PRAP ignores the experience gained from the remnant deposit capping." GE then describes the remnant capping project and compares the remnant site cap to remedial alternatives which would cap the 004 outfall deposits. It summarizes by stating that "Given the success of the remnant deposit capping remedy, NYSDEC cannot simply dismiss the partial removal and capping alternative. The fundamental question NYSDEC must answer is whether some additional or more intrusive remedy, such as that proposed in the PRAP, would provide additional protection than is necessary to eliminate or mitigate a significant threat to the environment. The PRAP, however, does not consider this question. When the full removal remedy is compared to the capping and partial removal remedy, it is clear that (1) both remedies are effective in reducing or eliminating the release of PCBs from the deposit to the river; (2) partial removal and capping remedy is more feasible; (3) full removal includes substantial short-term risks, including the potential for the release of significant quantities of PCBs to the river during implementation; and (4) partial removal and capping is more cost effective."

The Department addresses each of the issues GE raises as follows:

Ignoring the experience gained from the remnant site capping: The "remnant sites" are five areas of river bottom downstream of the GE Fort Edward plant site which were exposed after the removal of the Fort Edward Dam in 1973. These areas were contaminated with PCBs as a result of historical discharges from the GE Fort Edward and GE Hudson Falls plant site. USEPA ordered GE in 1989 to cap four of the remnant sites to address the direct contact and volatilization threats posed by the PCB contamination within the remnant sites. The Department has not ignored the experience gained from the remnant site capping. It is inappropriate, however, to assume that because the capping of the remnant sites was done, it naturally follows that the 004 outfall deposit should also be capped. The differences are significant between the two projects:

1) The remnant site capping project was done as an Interim Remedial Measure (IRM) (see the United States' characterization of the capping on page 3 its consent decree issued to GE dated September 27, 1989, as an interim remedy), and was not intended to be the final remedy for the remnant sites;

2) The remnant sites contain soils/sediments containing much lower concentrations of PCBs than does the 004 outfall deposit;

3) No evaluation has been done of the actual effectiveness of the remnant site capping project at abating the flux of PCBs from the contaminated soils/sediments within the remnant sites due to groundwater flow, and bank storage and recharge. As the capping project was not designed to impact these sources of PCB flux to the river by these mechanisms, it is very unlikely that the remnant site capping project abated the PCB flux to the river attributable to these mechanisms.

Whether some additional or more intrusive remedy, such as that proposed in the

PRAP, would provide additional protection than is necessary to eliminate or mitigate a significant threat to the environment: The Department has described in the PRAP why the proposed remedy was identified as the preferred alternative. The only alternative which would abate the significant threat posed by the 004 outfall deposit is the preferred alternative.

Both remedies are effective in reducing or eliminating the release of PCBs from the deposit to the river: As stated in the PRAP, the only alternative which eliminates the release of PCBs to the Hudson River from the 004 outfall deposit is the preferred alternative. All of the other alternatives would result in the continuing releases of PCB to the river, giving rise to significant threats as discussed above and in the PRAP.

Partial removal and capping remedy is more feasible: It may be slightly easier to implement a lesser remedy for the 004 outfall area, as slightly less work would need to be done. However, the preferred alternative is feasible; the differences (additional water management would need to be done to excavate below the elevation of the Hudson River, additional volume of material would be removed, and the cap would not need to be installed) compare closely to other alternatives, including partial removal and capping. Other than the additional water management and additional volume of material to be removed, the feasibility of the preferred alternative is the same as or better than the partial removal and capping alternative (*see* PRAP, pages 33 to 34), *viz.:*

-the access would be the same;
-the off-site disposal of soil would be the same;
-legal coordination with property owners would be the same;
-operation and maintenance would be more feasible with the preferred alternative;
-excavation/construction, dewatering and water treatment equipment materials availability would be the same;
-applicable technology availability would be the same;
-deed restrictions under the preferred alternative would likely not be required
-the cap would not need to be installed.

Full removal includes substantial short-term risks, including the potential for the release of significant quantities of PCBs to the river during implementation: The short-term risks associated with the preferred alternative are very similar to the risks posed by partial removal and capping. The differences are directly related to a larger amount of material to be transported. The potential for a high flow event to cause releases of PCB from the remediation area to the river is similar for all alternatives, as the estimated duration for all alternatives is one construction season.

Partial removal and capping is more cost effective: Cost effectiveness is defined in the National Contingency Plan (NCP) as being determined by evaluating "overall effectiveness" (a combination of long-term effectiveness and permanence, reduction of toxicity, mobility and volume through treatment, and short-term effectiveness), and comparing to cost. A remedy shall be cost effective under the NCP if its costs are proportional to its overall effectiveness. The preferred alternative has the highest cost effectiveness, as the long-term effectiveness and permanence of the preferred alternative is the highest, which only a small incremental increase in estimated cost. Partial removal and capping has a lower long-term effectiveness, and only a small incremental decrease in estimated cost. The reduction of toxicity, mobility and volume through treatment for all alternatives is the same, and the short-term effectiveness of the proposed alternative is similar to the capping alternatives.

Note that GE confused "cost" with "cost effectiveness": just because a remedial alternative has a higher estimated cost does not mean it can not be cost effective, and just because a remedial alternative has a lower estimated cost does not mean that it is cost effective.

Furthermore, the preferred alternative satisfies the preference set by the regulations for permanent remedies. *See* 6 NYCRR 375-1.10(c)(5).

GE, at p. 34 of its comments, states that "The PRAP Misapplies the Applicable Remedy Selection Criteria", and describes what GE believes the remedy selection criteria are and how they are categorized.

The Department disagrees. As an initial matter, 6 NYCRR 375-1.10(c) provides that the program the Department selects for a site must not be inconsistent with the National Contingency Plan. By using the phrase "not inconsistent with the NCP" in this regulation, the Department intended to ensure that its remedial actions would qualify for cost recovery in an action brought pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601 *et seq.* Thus, the regulation simply requires the Department's remedial actions to meet the standards set by courts in cost recovery actions. It does not incorporate every item of the NCP into the State's remedy selection.

Furthermore, this consideration is only one of several factors that the Department's regulations establish to guide remedy selection. The statute and regulations allow the Department to weigh remedy selection criteria in a manner that may be different from what is provided by the NCP. The Department has complied with its own regulations in reaching this decision.

At p. 35 of its comments, GE tries to make the point that the Department has misapplied two of the remedy selection criteria: mitigation or elimination of the significant threat; and compliance with standards, criteria, and guidance. GE states that no remedy will eliminate the significant threat, and that partial removal and capping is as protective of human health and the environment as the proposed remedial alternative in the PRAP. The Department will address these two points in turn.

As to the assertion that no remedy will eliminate the significant threat, the significant threats posed by disposal of hazardous wastes at the 004 outfall deposit are as described above in this Responsiveness Summary. The proposed remedial alternative would eliminate the releases of PCBs to the Hudson River from the 004 outfall deposit. All of the other alternatives evaluated would result in ongoing releases of PCBs to the Hudson River, continuing to give rise to significant threats.

As to the assertion that partial removal and capping is as protective of human health and the environment as full removal, as shown above and in the PRAP, partial removal and capping would not abate the significant threats. Some protection of human health and the environment would be accomplished if a partial removal and capping alternative would be implemented, as some possible pathways for migration of, and exposure to, the PCBs within the 004 outfall deposit would be controlled (direct contact, river scour, and rainfall recharge). However, the proposed remedy is much more protective, as the remaining pathways (groundwater flux, and bank storage and recharge, as discussed in the PRAP and above) for migration of, and exposure to, the PCBs within the 004 outfall deposit would all be eliminated.

At p. 36 of its comments, GE states here that both remedies (partial removal and capping, and full removal) are equally effective in the long term, and raises several issues in their commentary.

The Department disagrees with GE's assertions.

Regarding GE's assertion that there may be residual amounts of PCB-containing material that would likely remain in the excavation area, proper implementation of the remedial alternative would eliminate this. Conventional construction methods, including pressure washing (which was done after the sediment removal projects at the GE Hudson Falls plant site, for example) would easily address this issue.

Regarding GE's assertion that an impermeable barrier would prevent or minimize river water infiltrating the bank soils, the installation of an impermeable barrier would not prevent the infiltration of river water into the 004 outfall deposit. River water would flow into the deposit from the upstream end of the 004 outfall deposit, and through the bedrock into the 004 outfall deposit. Also, no alternative was developed or evaluated in the FFS or the PRAP which included use of this technology in this manner.

Regarding GE's assertion that partial removal would remove the areas of highest PCB concentrations in the 004 outfall deposit and so, PCB mass flux from bank storage and release would be greatly reduced, if not eliminated, the Department believes that the partial removal alternative would remove some of the highly contaminated materials, but only those more than 2 feet above the 100 year flood elevation of the river. The portion of the 004 outfall deposit below that elevation would remain; this portion of the 004 outfall deposit is the portion which is subject to diurnal bank storage and discharge, and groundwater flux driven migration of PCB. Thus, the partial removal and capping alternative would not address the movement of PCB into the river from the 004 outfall deposit from groundwater flux, and bank storage and recharge, at all.

Regarding GE's assertion that extending the low-permeability geosynthetic clay liner (GCL) filter fabric to the base of the outfall sediments below the river surface would minimize or eliminate the PCB groundwater flux to the river, the Department believes that extension of a GCL to the base of the 004 outfall deposit would not impact the amount of groundwater passing through the 004 outfall deposits to the river. The groundwater flowing into the 004 outfall deposits is controlled by the difference in head between the bedrock above and behind the 004 outfall deposits, and within the 004 outfall deposits. The groundwater which entered the 004 outfall deposits would simply flow beneath the GCL and into the river. Also, no alternative was developed or evaluated in the FFS or the PRAP which included use of this technology in this manner.

GE also raised the issue that the GCL may also reduce the concentration of PCBs in the groundwater because PCBs, which are strongly hydrophobic, may partition from the water phase onto the GCL. As stated above, though, the Department believes that the groundwater would flow beneath the GCL into the river. Some small amount of PCBs may contaminate the surface of the GCL, but the groundwater and GCL would, in that case, come to equilibrium in a short period of time, and no further sorbing of PCBs would occur. Also, the use of the GCL as a sorbent material to prevent the migration of PCBs to the river was not part of any alternative which was developed or evaluated in the FFS or PRAP.

As stated in the PRAP, long term effectiveness is determined by evaluating (1) the magnitude of the remaining risks after remedy implementation; (2) the adequacy of the controls intended to limit the risk; and (3) the reliability of the controls.

The differences in long-term effectiveness of the remedial alternatives are stated on pages 31-32 of the PRAP. Alternative 5B has the highest long-term effectiveness.

At p. 37 of its comments, GE claims that "Partial Removal and Capping is More Effective and Significantly Less Risky Than Full Removal."

The Department disagrees:

a. While GE asserts that the longer the work area remains open, the greater the possibility of eroding PCB-containing materials into the river, the reality is that the possibility of eroding PCB-containing materials is the same under any of the capping, partial removal and capping, or full removal alternatives. As stated in the PRAP, the proposed remedial alternative is estimated to be completed in one construction season. The work would not be scheduled to occur in the time of year (spring) when high flows are likely to occur. As stated in the PRAP, during construction of the proposed remedial alternative, a temporary access road would be constructed between the river and the area to be excavated, providing a barrier between the two. GE concludes that the temporary access road would prevent the scour of PCBs from the deposit into the river during the construction of the partial removal and capping alterative. The access road is a portion of all capping alternatives, partial removal and capping alternatives, and the proposed remedial alternative.

b. GE states that, as USEPA recognized in its 1984 ROD, full removal would also disturb the local community and created the potential for off-site spills of PCB-containing materials offsite. Because a smaller volume of material would need to be trucked off site for disposal under the partial removal and capping alternative, these risks would be minimized. The number of truckloads transporting the material removed from the 004 outfall deposit would be smaller under partial removal and capping than under the preferred alternative. However, the material removed under the partial removal and capping alternative is some of the heavily contaminated material within the 004 outfall deposit. There are risks associated with transporting the material under any alternative which involves removal; the risks are low under any of these alternatives, and the more material that is removed, the slightly higher the risks.

At p. 38 of its commentary, GE claims that "Partial Removal and Capping is More Feasible than Full Removal", and states several reasons for that claim: (a) excavation of submerged sediments would make the full removal alternative more difficult due to the longer time period required, raising the possibility of a high flow event which would cause delays; (b) full removal would require managing 8700 cubic yards of material, as compared to 2500 yards of material under the partial removal and capping alternative; (c) full removal would require management of larger volumes of construction water; and (d) the partial removal and capping alternative is indisputably less costly than the full removal alternative.

The Department has two responses to the claim that partial removal and capping is more feasible that full removal.

a. The first three statements above all deal with scale. The implementability of the proposed remedial alternative differs from the partial removal and capping alternative fundamentally on the issue of scale. More removal work would be done under the proposed alternative than the other alternatives, which takes more time and effort to implement. However, the differences are small. On the issue of schedule, all alternatives are estimated to take one construction season. On the issue of volume of material to be removed, the only difference is how much; the access would be the same among the alternatives which involve removal, as would the technologies used. On the issue of managing construction water, the only differences again are of scale; excavating a few feet deeper, to a level approximately two feet below the typical level of the river, would take additional effort. However, as with the volume of materials to be removed, the same technologies would be used. The partial removal and capping alternative would involve all of the effort related to capping the entire site, which would be avoided under the proposed alternative. The overall difference in implementability is small between partial removal and capping, and the proposed alternative.

b. The second statement is a reiteration of an argument GE has stated previously, that alternatives are more cost-effective solely based upon relative cost. As stated above, a remedy shall be cost effective if its costs are proportional to its overall effectiveness. GE again confused "cost" with "cost effectiveness": just because a remedial alternative has a higher estimated cost does not mean it can not be cost effective, and just because a remedial alternative has a lower estimated cost does not mean that it is cost effective.

III. Miscellaneous Comments

GE made a number of other comments, to the more salient of them the Department responds here.

At p. 43 of its comments, GE states that there are serious legal impediments to attempting to require it to implement or pay for the full removal alternative: (a) the "1976 Agreement"; and (b) the PCBs in the 004 outfall deposit derived from "federally permitted releases". (pp. 43-44).

While the Department disagrees with both assertions, they are irrelevant to the Department's identification of a significant threat and evaluation of alternative remedial approaches.

At p. 12 of its comments, GE asserts that tardiness in the Department's response to a FOIL request prejudiced its ability to provide comments on the PRAP.

The regulations in 6 NYCRR Subpart 375-1 governing the preparation of a Record of Decision and the public participation process do not incorporate the disclosure requirements of the Public Officers Law, and the Department has fully complied with those regulations. In addition, there has been no prejudice to GE because all of the technical information on which the PRAP was based was either generated by GE or provided to GE well before the close of the comment period.

A third comment related to other issues can be found on pages 3, 13-14, and 27-31 of GE's comments. At various points in its comments (*see, e.g.*, p. 3 of its comments), GE questions the source of the Department's authority to collect data for purposes of the PRAP and to conduct the review of remedial alternatives outlined in that document.

GE incorrectly summarizes New York state law relating to the Department's hazardous waste investigative authority by characterizing ECL 27-1313.3.b as the exclusive authority enabling the Department to undertake site investigations, to evaluate information derived from such investigations, and then to consider remedial "fixes." The Department is confident of its authority to investigate inactive hazardous waste disposal sites and to weigh alternative remedies, and indeed has a statutory duty to do so in carrying out its obligations to protect public health and the environment.

GE, at pp. 9 and 10 of its comments, took umbrage over the Department's alleged failure to tell GE in advance that the Department undertook PISCES sampling and that the Department never followed up the PISCES sampling with quantitative methods.

> As an initial matter, the Department is under no obligation to inform GE of the Department's intentions respecting sampling. Secondly, there was no need to follow up the PISCES sampling with quantitative methods since the Department already had quantitative data generated from sampling GE undertook at Department direction that dealt with the taking of surface water samples upgradient and downgradient of the 004 outfall area. Those data show violations of water quality standards caused by releases of PCBs from the 004 outfall deposits.

GE Fort Edward Plant Site Public Meeting

An availability session, and public meeting, were held for the public on March 10, 1999 at the Washington County Office Building in Fort Edward. The availability session and public meeting were held to present the Proposed Remedial Action Plan, to receive comments on the PRAP, and answer questions asked by the public on the PRAP and about the site.

The public meeting was attended by approximately 15 members of the public. The questions and comments, along with the answers, are listed below.

Questions/comments related to the proposed remedial action to address Operable Unit 3

No issues or questions raised for this part of the Public Meeting presentation.

Questions/comments related to the proposed remedial action to address Operable Unit 4

Q: What is the cost of the proposed remedial action for Operable Unit 4?

A: ~ $5.7 million

Q: Has the capping of the remnant sites been effective?

A: The capping has prevented the rainfall and snowmelt from discharging contamination into the river, and prevented further scour of the remnant sites into the river

There are similarities and differences between the remnant sites and the bank near 004. The bank near 004 is significantly more contaminated than the larger remnant sites. Also, the capping of the remnant sites was not intended to eliminate PCB flux to the river, but to prevent rainfall and snowmelt recharge from entering the remnant sites, and prevent further scour of the material due to river flows.

Q: A member of the public at the meeting rose to state that she preferred the capping alternative to the removal alternative, and that it made more sense to leave the material there along the riverbank and cap it.

A: For the reasons stated in the PRAP, the Department has identified the removal alternative as the preferred alternative.

Q: There was a citizen who had a concern about the shipping of excavated material through the village.

A: The shipping of the removed material would be done according to all of the rules and regulations which relate to shipping of hazardous materials/wastes.

Q: Where would the material go?

A: A permitted modern day hazardous waste landfill; one example of the type of facility might be the Model City facility near Buffalo.

Q: What's the worst case scenario if the contaminated material is capped in place?

A: The contaminated materials would continue to act as a source of PCB to the river, via the mechanisms of groundwater flux, and bank storage and recharge.

Q: Is there any chance there's a possibility of taking another look at capping the material again?

A: Yes. The State could take another look at this option if needed.

Q: Would there be a long-term maintenance program required if the bank sediments are capped?

A: Yes. The cap would need to be monitored and repaired as necessary.

Q: Give a comparison between the remnant sites and the 004 outfall area.

A: The remnant sites are much larger in size with lower concentrations of PCB contamination. The 004 outfall area is smaller with higher PCB concentrations.

Q: What information exists to prove the effectiveness of capping the remnant sites?

(At this point a GE representative, John Haggard, rose to state that weekly monitoring is performed at Roger's Island. The most recent samples analyzed resulted in a Non-Detect at 11 ppt (parts per trillion). The remnants are not contributing to the river contamination. He also stated that the calculations of the cap impacts were overestimated and are 100 times less than the calculations presented. The studies (March 1991, for example) are based on our (GE's) assumptions.

A: The Department relies on the weekly monitoring done by GE under Order with USEPA to evaluate the impacts of the remnant sites on the river.
(The responses to the assertions by GE above can be found in the portion of the responsiveness summary above which addresses the written comments submitted by GE.)

Q: What have been the total costs GE has spent on both the Hudson Falls and Fort Edward sites?

A: The Department does not know the amount of money spent by GE on the remediation of the plant sites to date.

(At this point a GE representative, John Haggard, rose to state that GE has spent $40 million over the past ten years between the two sites. The capping of the remnant sites was an additional $30 million.)

Q: (to GE representative) So the proposed plan would be roughly 10 percent of the costs already spent?

A: (none given by GE)

Q: How will the effectiveness of the removal be measured?

A: The effectiveness will be monitored by water column and biota monitoring in the vicinity of the site.

Q: Isn't the river already contaminated by PCB from sources upstream of the Fort Edward site? Won't the river still contain PCB above the water quality standards even if the removal is done?

A: There are background levels of PCB at the GE Fort Edward plant site due to the presence of the GE Hudson Falls plant site, which contributes significant amounts of PCB to the river. However, the implementation of the removal alternative will eliminate the impacts of the Fort Edward site on the river.

Walt Demick of DEC stated that the Public Comment Period for the PRAP has been extended to April 26, 1999.

Q: When will the ROD come?

A: This summer (1999), depending on the amount of comments and issues that need to be addressed by the NYSDEC.

Q: When will the construction start, this fall?

A: The construction will most likely wait until next spring (2000) because it would be too late to begin this year (1999).

Q: Does the on-site construction have to wait for the off-site construction?

A: No.

Q: GE: Currently there are difficulties with measuring down to the water quality standard for PCBs.

A: (No answer was needed to this statement)

Q: What are the ways to measure the effectiveness of the remedy and the safety during the construction.

A: Real time monitors can be used during the construction to protect the workers handling the material. In addition, monitors along the site property line will be present to measure the air quality leaving the site. Upwind and downwind measurements are made to monitor air quality. Dust is often measured because contaminants can travel with the dust. Administrative controls are used to establish boundaries of construction and maintain the safety of the public.

Q: Who creates the Health and Safety Plans?

A: GE and it consultants and contractors will make up the HASP, and will be reviewed by NYSDOH and NYSDEC.

Appendix D

Administrative Record

GENERAL ELECTRIC/FORT EDWARD
Administrative Record Document List

- Evaluation of the six month pump test conducted at the GE Co., Ft. Edward, New York Plant - May, 1985 Geraghty & Miller (G&M)
- Remedial Investigation Report, GE Capacitor Plant, Ft. Edward, New York August, 1985 - LMS Engineers (LMS)
- Work Plan for F.S, GE Capacitor Plant, Ft. Edward, New York August 5, 1985 - LMS
- Revised RI Report, GE Capacitor Plant, Ft. Edward, New York December, 1985 LMS
- General Electric Company, Ft. Edward, New York, Interim Remedial Program, Annual Report July, 1986 G&M
- Groundwater Conditions in the Upper Zone of the Bedrock Aquifer, GE Co., Ft. Edward, New York May, 1987 G&M
- Feasibility Study, Off-Site shallow Aquifer, GE Capacitor Plant, Ft. Edward, New York July, 1987 LMS
- Feasibility Study, Off-Site shallow Aquifer, GE Capacitor Plant, Ft. Edward, New York January, 1988 LMS (Revised)
- Additional Bedrock Aquifer Investigations at the GE Co. Plant, Ft. Edward, New York February, 1988 G&M
- Supplemental Remedial Investigations On-Site, GE Capacitor Plant, Ft. Edward, New York February, 1988 LMS
- On-site Feasibility Study, GE Capacitor Plant, Ft. Edward, New York October, 1988 LMS
- Vadose Zone Volatilazation Assessment, GE Co. Ft. Edward, New York December 6, 1988 LMS (Letter Report)
- Remedial Plan for GE Ft. Edward off-site area March 1989 LMS

- Revised On-Site Feasibility Study, GE Capacitor Plant, Ft. Edward, New York May, 1989 LMS
- NYSDEC Public Meeting Transcript, GE Ft. Edward 12/21/89 New York State Department of Environmental Conservation (NYSDEC)
- Fort Edward Dam PCB Remnant Containment, Environmental Monitoring Program, Baseline Studies, Report of 1989 Results, August - December 1989, Harza Engineering Company with Harding Lawson Associates/Yates & Auberle, February, 1990
- Hydrogeologic Evaluation of Recovery Well RW 1/2A , General Electric Co., Ft. Edward, New York Plant March, 1990 Dunn Geoscience Corp. (Dunn)
- Work Plan Supplemental Hydrogeological Investigation of the GE Co., Ft. Edward Facility, Ft. Edward, New York May, 1990 Dunn
- Supplemental Hydrogeological Investigation Report of the GE Co. Ft. Edward Facility Ft. Edward, New York September, 1990 Dunn
- Final Report on the General Electric Co., Ft. Edward Facility, PCB Contaminated Material Removal, GE Co., Ft. Edward, New York Nov. 15, 1990 Dunn
- Technical Memorandum: Soil Boring and Analysis, Remnant Deposit Characterization, Canonie Environmental, 1991
- Draft Regulatory Impact Statement for 6 NYCRR Part 375, April 1991 (NYSDEC)
- Letter with attachments from Dave West (GE) to Jim Ludlam (NYSDEC) dated August 12, 1991 regarding request for on and off-site groundwater quality data
- Fort Edward Dam PCB Remnant Containment, Environmental Monitoring Program, Preconstruction and Construction Monitoring Studies, Report of 1990 Results, March - December 1990, Harza Engineering Company with Harding Lawson Associates/Yates & Auberle, January 1992
- Hearing Report, Responsiveness Summary, and Revision to the Draft Regulatory Impact Statement for 6 NYCRR Part 375, March 1992 (NYSDEC)
- Fort Edward Dam PCB Remnant Containment, Environmental Monitoring Program, Report of 1991 Results, January - November 1991, Harza Engineering Company with Harding Lawson Associates/Yates & Auberle, March 1992
- Certification Report, GE Co., Capacitor and Power Protection Operation, G.E. Co. Ft. Edward, New York March 3, 1992

- Project Manager's Field Notebook (William Ports, PE, NYSDEC) "Hudson River Field Book", beginning April 1992

- Remedial Technology Review for Hudson River Remnant Sites, for General Electric Company, GE Corporate Environmental Programs, Albany New York, December 1992 Applied Environmental Management, Inc.

- Hudson River Angler Survey, Hudson River Sloop Clearwater, Inc, March 1993

- Report, Fort Edward Dam PCB Remnant Containment, 1992 Post-Construction Remnant Deposit Monitoring Program, General Electric Company, Corporate Environmental Programs, Albany, New York, August 1993 O'Brien and Gere Engineers (OB&G Eng.)

- Fax to Ron Sloan (NYSDEC) from Bob Montione (NYSDOH) dated September 23, 1993 regarding sampling results

- Letter from Robert Wagner (Northeast Analytical, NEA) to Dave West (GE) dated December 1, 1993 containing results of Congener Specific PCB Analysis for samples listed on chain of custody dated November 19, 1993

- Letter from Scott Fein (Whiteman, Osterman & Hanna, WOH) to Dean Sommer (NYSDOL) and Frank Bifera (NYSDEC) dated December 3, 1993 containing responses to information requests

- Letter from Ed LaPoint (GE) to Steve Hammond (NYSDEC) dated December 3, 1993 regarding Draft Analytical Results GE/DEC Split Samples Adjacent to Outfall 004

- Fax from Bill Ports (NYSDEC) to Ed LaPoint (GE) dated December 7, 1993 regarding Sediment Results in Hudson River

- Investigative Work Plan and Interim Abatement Measure, GE, Ft. Edward, New York December 10, 1993 Dames & Moore (D&M)

- Revised Investigative Work Plan & Interim Abatement Measure, G.E., Ft. Edward, New York December 28, 1993 GE

- Fax to Kevin Farrar (NYSDEC) from Alan Belenz (New York State Department of Law, NYSDOL) dated January 19, 1994 with a GE Environmental Control Memo dated April 7, 1975

- Memo from Steve Hammond (NYSDEC) to Charlie Goddard (NYSDEC) dated January 31, 1994 regarding Hudson Riverbank samples collected by Bill Ports (NYSDEC)

- Investigative Work Plan and Interim Abatement Measure (Revised) G.E., Ft. Edward, New York February 3, 1994 GE

- Letter from Ed LaPoint (GE) to Bill Daigle (NYSDEC) dated March 17, 1994 regarding Draft Analytical Results GE/DEC Split Samples WWTP Grabs & Water Below Outfall 004

- Letter from Mark Herwig (GE) to Thomas Hall (NYSDEC) dated March 21, 1994 regarding sample results of newly identified AOC

- Notice of Violation, from NYSDEC and NYSDOL to GE dated April, 1994, in the matter of unpermitted releases of polychlorinated biphenyl into the Hudson River from the General Electric Company Facility in Fort Edward, NY

- Report, Fort Edward Dam PCB Remnant Containment, 1993 Post-Construction Remnant Deposit Monitoring Program, General Electric Company, Corporate Environmental Programs, Albany, New York, May 1994 OB&G Engs.

- 1993 Annual Report for the Ground Water Collection and Treatment System and Monitoring Activities, G.E. Co., Transmission Systems, Ft. Edward Facility, Ft. Edward, New York May 2, 1994 OB&G Eng.

- Letter from Bill Ports (NYSDEC) to Ed LaPoint (GE) dated June 28, 1994 regarding GE-Fort Edward

- AOC Assessment Report, General Electric Co.

- Letter from Ed LaPoint (GE) to Bill Ports (NYSDEC) dated September 27, 1994 regarding Preliminary Analytical Results and Proposed Continuation of Test Pit Investigation Former Outfall 004

- DNAPL Recovery Well Evaluation, G.E. Co., Transmission Systems, Ft. Edward, New York, October, 1994 OB&G Eng.

- Notice of Violation, from NYSDEC and NYSDOL to GE dated October 13, 1994, in the matter of releases of polychlorinated biphenyl to the Hudson River in quantities injurious to fish life and/or to protected wildlife or waterfowl from the General Electric Company Facility in Fort Edward, NY

- Notice of Violation, from NYSDEC and NYSDOL to GE dated October 13, 1994, in the matter of releases of polychlorinated biphenyl to the groundwater from the General Electric Company Facility in Fort Edward, NY

- Outfall 004 Investigation Report, GE Co., Ft. Edward, New York, October 28, 1994 D&M

- Shallow Unconsolidated Unit, Recovery Well Evaluation, G.E. Company, Transmission Systems, Ft. Edward, New York Nov. 1994 OB&G Eng.

- Letter from Ed LaPoint (GE) to Bill Ports (NYSDEC) dated November 2, 1994 regarding Verbal Analytical Results Ft. Edward/HR Seep Samples

- Outfall 004 Investigation Report, Appendices, GE Co., Ft. Edward, New York November 4, 1994 D & M

- Letter from John Haggard (GE) to Walt Demick (NYSDEC) dated December 14, 1994 regarding Ft. Edward Proposed Additional Remedial Activities

- Deep Bedrock Ground Water Evaluation Work Plan, G.E. Co., Electrical Distribution & Control, Ft. Edward Facility, Ft. Edward, New York March 1995 OB&G Eng.

- Transmittal from Bill Ports (NYSDEC) to Eric Hausman (OB&G Engs.) dated April 26, 1995 containing GE Fort Edward Soil Boring Split results

- Ft. Edward Facility, Outfall 004 Sediment Investigation, Shoreline Protection, GE Company - Corporate Environmental Programs, Albany, NY July, 1995 OB&G Eng.

- Five Yr. Review of Off-Site Remedial Program, Vol. II, GE Company, Electrical Distribution & Control, Ft. Edward, New York July, 1995 OB&G Eng.

- Five-Year Review of off-Site Remedial Program, Vol. 1, GE Co., Electrical Distribution 7 Control, Ft. Edward, New York (Final Report) July, 1995 OB&G Eng.

- Subsurface Investigation, Former Outfall 004 Pipeline, Summary Report, GE Company, Electrical Distribution & Control, Transmission Systems, Ft. Edward, New York, (Final Report) August, 1995 OB&G Eng.

- Quality Assurance Project Plan for the Remedial Investigation/Feasibility Study, GE Co., Transmission Systems, Ft. Edward, New York, July, 1995 OB&G Eng. (Final Report)

- Remedial Investigation Field Sampling Plan, GE Co., Transmission Systems, Ft. Edward, New York, July 1995, OB&G Eng. (Final Report)

- Work Plan - Former Outfall 004 Pipeline, Interim Remedial Measure, GE Co., Electrical Dist. & Control, Ft. Edward, New York August, 1995 OB&G Eng.

- Work Plan, Remedial Investigation Field Sampling Plan, GE Co., Transmission Systems, Ft. Edward, New York July 5, 1995 *(Revised August 9, 1995)* OB&G Eng.

- Work Plan Addendum - Fort Edward Facility, Outfall 004 Sediment Investigation and Focused Feasibility Study, General Electric Company, Corporate Environ. Programs, Albany, New York   August, 1995   OB&G Eng.

- Letter from Bill Ports (NYSDEC) to John Haggard (GE) dated August 22, 1995 regarding Ft. Edward Facility Outfall 004

- Letter from Bill Ports (NYSDEC) to Mark Herwig and John Haggard (GE) dated August 28, 1995 regarding GE Hudson Falls and Fort Edward

- Letter from John Haggard (GE) to Bill Ports (NYSDEC) dated September 5, 1995 regarding Ft. Edward Facility outfall 004 Sediments/Soils Investigation and Focused Feasibility Study

- 004 Outfall Modifications, G.E. Co., Ft. Edward, New York   Oct. 1995   OB&G

- Transmittal to Bill Ports (NYSDEC) from Mark LaRue (OB&G Engs.) dated October 10, 1995 regarding Ft. Edward 004 Outfall Sediment Investigation

- Technical Memorandum Append. B - Vol. 4 of 10 Fort Edward Facility, Outfall 004 Sediment Investigation and Shoreline Protection, GE Co., Corporate Environmental Programs, Albany, New York   November, 1995   OB&G

- Technical Memorandum Append B. - Vol 10 of 10 Ft. Edward Facility, Outfall 004 Sediment Investigation and Shoreline Protection, GE Co., Corp. Environ. Programs, Albany, NY   November, 1995   OB&G Engs.

- Final Technical Memorandum   Ft. Edward Facility, Outfall 004 Sediment Investigation and Shoreline Protection IRM, GE Co., Corporate Environmental Programs, Albany, NY November, 1995   OB&G Engs.

- Work Plan   Risk Assessment   - G.E. Co., Electrical Distribution & Control, Ft. Edward, New York   November, 1995   OB&G Engs.

- Work Plan   Feasibility Study   - G.E. Co., Transmission Systems, Ft. Edward, NY November, 1995   OB&G Engs.

- Report, Fort Edward Dam PCB Remnant Containment, 1994 Post-Construction Remnant Deposit Monitoring Program, General Electric Company, Corporate Environmental Programs, Albany, New York, November 1995   OB&G Engs.

- Letter from Bill Ports (NYSDEC) to John Haggard (GE) dated December 26, 1995 regarding General Electric - Fort Edward Plant Site

- Data Summary Report, Hudson River Project, River Monitoring Text, General Electric Company, Corporate Envorinmental Programs, Albany, New York
  January 1996 OB&G Engs.

- Letter from John Haggard (GE) to Walt Demick (NYSDEC) dated January 31, 1996 regarding Ft. Edward Outfall Sediments

- Letter from Bill Ports (NYSDEC) to John Haggard (GE) dated March 25, 1996 regarding General Electric Fort Edward Plant site

- Note from John Haggard (GE) dated April 15, 1996 attaching charts used by OBG during discussion on 004.

- Final Report 1995 Annual Ground Water Monitoring and Remedial Systems Operation Report - GE Co., Transmission Systems, Ft. Edward Facility, Fort Edward, NY
  June, 1996 OB&G Engs.

- Summary Report, Fort Edward Dam PCB Remnant Containment, 1995 Post-Construction Remnant Deposit Monitoring Program, General Electric Company, Corporate Environmental Programs, Albany, New York, July 1996 OB&G Engs.

- Report - Former Outfall 004 Pipeline, Interim Remedial Measure, GE Co., Electrical Distribution and Control, Transmission Systems, Ft. Edward, NY July, 1996 OB&G Engs.

- Letter from Bill Ports (NYSDEC) to John Haggard and Mark Herwig (GE) dated August 8, 1996 regarding Fort Edward Plant Site , with attached laboratory reports

- Report - Fort Edward Facility, Outfall 004 Soil, Focused Feasibility Study, GE Co., Corporate Environmental Programs, Albany, NY
  December, 1996 OB&G Engs.

- Combined Regulatory Impact and Draft Environmental Impact Statement, Title 6, Chapter X, Parts 700-706, Volume 1 of 3, Main Body and Appendix I, 1997 (NYSDEC)

- Combined Regulatory Impact and Draft Environmental Impact Statement, Title 6, Chapter X, Parts 700-706, Volume 3 of 3, Main Body and Appendix I, 1997 (NYSDEC)

- Final Report - Volume V - Ft. Edward Remedial Investigation Report
  GE Co., Transmission Systems, Fort Edward, NY
  January 20, 1997 OB&G Engs.

- Final Report - Volume IV - Ft. Edward Remedial Investigation Report
  GE Co., Transmission Systems, Ft. Edward, NY
  January 20, 1997 OB&G Engs.

- Final Report - Volume III - Ft. Edward Remedial Investigation Report
  GE Co., Transmission Systems, Ft. Edward, NY
  January 20, 1997 OB&G Engs.

- Final Report - Volume II, Ft. Edward Remedial Investigation Report
  GE Co., Transmission Systems, Ft. Edward, NY
  January 20, 1997 OB&G Engs.

- Final Report - Volume I, Ft. Edward Remedial Investigation Report
  GE Co., Transmission Systems, Ft. Edward, NY
  January 20, 1997 OB&G Engs.

- Report, Feasibility Study, General Electric Company, Transmission Systems, Fort Edward, NY January 1997 OB&G Engs.

- Final Report - 1996 Annual Ground Water Monitoring and Remedial Systems Operation Report - G.E., Co., Transmissions Systems, Ft. Edward Facility, Ft. Edward, NY
  April, 1997 OB&G Engs.

- Final Plan - Sampling & Analysis Plan, Ft. Edward Facility, Ft. Edward, NY
  G.E., Co., Transmissions Systems, Ft. Edward, NY
  April 29, 1997 OB&G Engs.

- FINAL Combined Regulatory Impact and Environmental Impact Statement, Title 6, Chapter X, Parts 700-706, 1998 (NYSDEC)

- Upper Hudson River PISCES sampling/source trackdown results - Remnant deposits and GE #004 outfall area (Baker's Falls to Remnant deposit #5) (Memorandum) December 19, 1997, Chandler Rowell, NYSDEC

- 1997 upper Hudson River PISCES and fish sampling results - Remnant deposits and GE #004 outfall area (Memorandum), January 7, 1998, Joe Spodaryk, NYSDEC

- Summary Report, Fort Edward Dam PCB Remnant Containment, 1996 Post-Construction Remnant Deposit Monitoring Program, General Electric Company, Corporate Environmental Programs, Albany, New York, March 1998 OB&G Engs.

- Final Report - 1997 Annual Ground Water Monitoring and Remedial Systems Operation Report - G.E., Co., Transmissions Systems, Ft. Edward Facility, Ft. Edward, NY
  April 3, 1998 OB&G Engs.

- Letter from Jeff Myers (New York State Department of Health,NYSDOH) to Art Richards (NYSDOH) dated March 18, 1998 regarding results from samples.

- Health Advisories, Chemicals in Sportfish and Game, 1998-1999, New York State Department of Health, June 1998

- Transmittal to Kevin Farrar (NYSDEC) from Brian Worobey (United States Geologic Survey, USGS) dated August 4, 1998 hydrographs and daily mean discharge data

- Memo and attachment from Brian Worobey (USGS) to Kevin Farrar (NYSDEC) dated September 23, 1998 with data regarding station number (01327750) Hudson River at Fort Edward, NY gage height data, October 1, 995 to September 30, 1996

- Summary Report, Fort Edward Dam PCB Remnant Containment, 1997 Post-Construction Remnant Deposit Monitoring Program, General Electric Company, Corporate Environmental Programs, Albany, New York, November 1998 OB&G Engs.

- Proposed Remedial Action Plan, GE Capacitor Products Division (Ft. Edward), Operable Units 03 & 04,Town of Fort Edward, Washington County, New York, Site No. 558004, February 1999 (NYSDEC)

- Sign in sheet for public meeting March 10, 1999 (NYSDEC)

- Final Report - 1998 Annual Ground Water Monitoring Report and Remedial Systems Operation Report, General Electric Company, Fort Edward, New York March 29, 1999 OB&G Engs.

- Comments of the General Electric Company on New York State Department of Environmental Conservation's Proposed Remedial Action Plan for the General Electric Fort Edward Plant Operable Units 03 and 04 April 26, 1999 GE

- Hudson River Database Update (fish/biota data set) October 5, 1999 (NYSDEC)

- Responsiveness Summary for the Proposed Remedial Action Plan, GE Capacitor Products Division (Ft. Edward), Operable Units 03 & 04, Town of Fort Edward, Washington County, New York, Site No. 558004 December 1999 (NYSDEC)