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Preassessment Screen Determination

for

The Hudson River, New York

Issued by:

The State of New York, the National Oceanic and Atmospheric Administration, and the United States Department of the Interior
in their capacity as Trustees of Natural Resources

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1.0 INTRODUCTION

Pursuant to the authority of section 107(f) of the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. §9607(f), and other applicable Federal and state laws, designated Federal and state authorities may act on behalf of the public as natural resource trustees to pursue claims for natural resource damages for injury to, destruction of, or loss of natural resources resulting from the release of hazardous substances to the environment. Claims may be pursued against parties that have been identified as responsible for releasing hazardous substances to the environment. Under CERCLA, sums recovered by trustees as damages shall be used only to restore, replace, or acquire the equivalent of such natural resources.

The first step in developing a natural resource damages claim is the preparation of a preassessment screen. The purpose of a preassessment screen is to provide a review of readily available information on hazardous substance releases and the potential impacts of those releases on natural resources under the trusteeship of Federal and state authorities. The review should ensure that there is a reasonable probability of making a successful claim against parties responsible for releasing hazardous substances to the environment. A preassessment screen also documents the trustees' determination that further investigation and assessment efforts are warranted.

This preassessment screen addresses potential claims for natural resource damages for injury to, destruction of, or loss of natural resources resulting from the release of hazardous substances to the Hudson River. It was prepared in accordance with the preassessment screen provisions of the Federal regulations for Natural Resource Damage Assessments under CERCLA, 43 CFR Part 11, Subpart B, sections 11.23 through 11.25. The natural resource trustees for the Hudson River who have participated in the preparation of this preassessment screen include the Commissioner of the New York State Department of Environmental Conservation (NYSDEC), the Secretary of the United States Department of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA), and the Secretary of the United States Department of the Interior (DOI) (collectively the "Trustees").

A review of readily available information documenting releases of polychlorinated biphenyls (PCBs) to approximately 200 miles of the Hudson River from identified sources between Hudson Falls and the Thompson Island Dam, and the effects of these releases on natural resources for which Federal and state agencies may assert trusteeship under section 107(f) of CERCLA, ensures that there is a reasonable probability of making a successful claim against an identified potentially responsible party for natural resource damages with respect to these documented PCB releases. Specifically, the Trustees have determined that:

(1) A release of a hazardous substance has occurred;

(2) Natural resources for which the trustees may assert trusteeship under CERCLA have been or are likely to have been adversely affected by the release;

(3) The quantity and concentration of the released hazardous substance is sufficient to potentially cause injury to natural resources;

(4) Data sufficient to pursue an assessment are readily available or likely to be obtained at a reasonable cost; and

(5) Response actions, if any, carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.

The Trustees acknowledge that there are other sources of contamination to the River, including inactive hazardous waste disposal sites, paper mills, combined sewer overflows, sewage effluent, and tributaries entering the river (USEPA 1997).[1] These other sources of contamination may be addressed in future investigations conducted by the Trustees.

1.1 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The Hudson River originates at Lake Tear-of-the-Clouds, a two-acre pond located on Mount Marcy in the Adirondack Mountains in northern New York State. From its Adirondack headwaters, the Hudson flows in a southerly direction for approximately 315 river miles to the Battery at the southern tip of Manhattan, NY (see Exhibit 1) (USEPA 1991). Descriptions of the Hudson River generally divide the river into two main reaches. The Upper Hudson is the reach flowing from Mount Marcy in the Adirondacks to the Federal Dam at Green Island, Troy, NY, draining an area of approximately 4,640 square miles (see Exhibit 2). The Lower Hudson is the 153 mile stretch of the river downstream of the Federal Dam to Battery Park, New York City (see Exhibit 3). The drainage area of this portion is approximately 5,285 square miles (USEPA 1991).

[1] See footnote 3 below.

2.0 INFORMATION ON THE SITE AND ON THE RELEASES OF HAZARDOUS SUBSTANCES

As described below, the Trustees have obtained and reviewed readily available information concerning releases of PCBs to the Hudson River.

2.1 Time, Quantity, Duration and Frequency of Releases

A variety of studies over the last three decades have documented elevated levels of PCBs in the Hudson River environment. As a result, a 200 mile stretch of the river, from Hudson Falls to the Battery in New York City, has been designated a Superfund site by the United States Environmental Protection Agency (EPA) (USEPA 1984; USEPA 1991). In examining the site, EPA has determined that primary contributors of PCBs to the Hudson River are two electrical capacitor manufacturing plants located at Hudson Falls and Fort Edward, NY (see Exhibits 4 and 5).

The Hudson Falls and Fort Edward plants have been the source of a significant quantity of PCBs released to the Hudson River. Wastewaters containing PCBs were discharged to the Upper Hudson beginning in 1947 from the Fort Edward plant and beginning in 1952 from the Hudson Falls plant. Estimates of the quantity of PCBs released from these plants to the sediments and waters of the Hudson River from the 1940s to 1977 range from 209,000 to 1,330,000 pounds (USEPA 1997). Direct wastewater discharges containing PCBs were redirected to an on-site wastewater treatment plant in 1976 (O'Brien & Gere 1997). In addition to the direct wastewater discharges, the plants may have indirectly contributed PCBs to the Hudson River watershed and ultimately to the river by disposing manufacturing wastes in nearby landfills and possibly wastewater collection systems (e.g., sewers, municipal wastewater treatment plants) (USEPA 1997).

An unknown quantity of PCBs continue to enter the river through fractured bedrock under the Hudson Falls plant site (General Electric Company 1997). In addition, PCBs that have come to be located in the sediments throughout the river continue to be a source of PCBs to the entire river environment (USEPA 1997).

2.2 Hazardous Substance Released

PCBs are listed as hazardous substances in Table 302.4, List of Hazardous Substances and Reportable Quantities under CERCLA (40 CFR §302.4(a)), and as toxic pollutants pursuant to 40 CFR §401.15, as amended. PCB-containing fluids have had a wide variety of industrial applications, including use in electrical, heat transfer, and hydraulic systems. PCBs comprise a class of 209 chlorinated aromatic hydrocarbon compounds. They are lipophilic and are characterized by extreme stability, low solubility in water, and long-term persistence in the environment, due to high resistance to chemical and biological breakdown, particularly in the more highly-chlorinated congeners (Eisler 1986).

Due to their chemical composition and attributes, PCBs tend to accumulate in soils and sediments and then become available to biological organisms, typically moving through the food chain from invertebrates to fish, birds, mammals and other wildlife. The results of field and laboratory studies indicate that PCBs can be associated with a range of adverse effects in exposed organisms, including impaired reproductive ability in fish, mammals and birds (Eisler 1986, Beyer et al. 1996). Environmental concerns led to a ban on the manufacture of PCBs in 1977; however, they continue to be present in many industrial applications (Connell and Miller 1984).

PCBs were marketed under various trade names including Aroclor, the type that was used at the Hudson Falls and Fort Edwards manufacturing plants. Reported uses at the manufacturing plants consisted mainly of three types of Aroclors: Aroclor 1254, Aroclor 1242, and Aroclor 1016 (USEPA 1997).

2.3 History, Current/Past Use and Relevant Operations at the Sites Identified as Sources of Releases

PCBs were used at the Hudson Falls and Fort Edward manufacturing plants from 1947 to 1977 as a dielectric fluid for electrical capacitors. During that period, PCBs in raw material form were brought to these plants by bulk rail transport and then pumped into a raw product storage area. The PCBs were then refined, boiled and vacuumed to remove moisture or any other constituents that could conduct electricity. Next, the PCBs were filtered and moved to a refined product storage area. From there they were pumped to treatment areas where flood-filling of capacitors occurred. The capacitors were rinsed with water and detergents to remove excess PCBs. Following rinsing, the capacitors were oven-baked, cured and sent off-site. Sampling performed at the plants indicates that there was spillage of PCBs throughout each of these steps (Farrar 1997).[2]

2.4 Additional Hazardous Substances Potentially Discharged or Released From the Sites

Volatile organic compounds such as trichlorethene and dichloroethene have been detected in soil and groundwater samples on and near the Hudson Falls and Fort Edward plants (USEPA 1997; O'Brien & Gere 1997; Dames & Moore 1996). In several locations at both the Fort Edward and Hudson Falls plants, the concentrations of these VOCs exceeded NYSDEC groundwater standards (O'Brien & Gere 1997; Dames & Moore 1996).

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[2] For more detailed information on the industrial activities at the Fort Edward and Hudson Falls plants, see EPA's "Data Evaluation and Interpretation Report" (1997), O'Brien & Gere (1997), and Dames & Moore (1996).

2.5 Potentially Responsible Parties

The Hudson Falls and Fort Edward manufacturing plants are owned and operated by the General Electric Company (GE). GE also owned and operated the manufacturing plants during the time that PCBs were used at the plants and released into the river (USEPA 1984). Therefore, the Trustees believe they can demonstrate that GE is a potentially responsible party under CERCLA. The Trustees acknowledge that there are other sources of hazardous substance releases to the Hudson River, including inactive hazardous waste disposal sites, paper mills, combined sewer overflows, sewage effluent, and tributaries entering the river (USEPA 1997).[3] These other sources of hazardous substance releases may be addressed in future investigations conducted by the Trustees, and other potentially responsible parties may be identified.

2.6 Damages Excluded from Liability under CERCLA or CWA

The regulations at 43 CFR Part 11.24 provide that the Trustees must determine whether the damages being considered are barred by specific defenses or exclusions from liability under CERCLA or the Clean Water Act (CWA). The Trustees have made such determinations and believe that such defenses or exclusions from liability are not dispositive, and are without merit. These required determinations are as follows:

- The Trustees must determine whether the damages: (i) Resulting from the discharge or release were specifically identified as an irreversible and irretrievable commitment of natural resources in an environmental impact statement or other comparable environmental analysis, that the decision to grant the permit or license authorizes such commitment of natural resources, and that the facility or project was otherwise operating within the terms of its permit or license, so long as, in the case of damages to an Indian tribe occurring pursuant to a Federal permit or license, the issuance of that permit or license was not inconsistent with the fiduciary duty of the United States with respect to such Indian tribe; or (ii) And the release of a hazardous substance from which the damages have resulted have not occurred wholly before the enactment of CERCLA; or (iii) Resulted from the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. 135-135k; or (iv) Resulted from any other federally permitted release, as defined in section 101 (10) of CERCLA; or (v) Resulting from the release or threatened

[3] Potential sources of contamination to the Hudson River are described in further detail in USEPA's Data Evaluation and Interpretation Report on the Hudson River (Volume 2C - February 1997), and Table B.2-2 in EPA's 1991 *Hudson River PCB Reassessment RI/FS* identifies hazardous waste disposal sites near the Upper Hudson River.

release of recycled oil from a service station dealer described in section 107(a)(3) or (4) of CERCLA if such recycled oil is not mixed with any other hazardous substance and is stored, treated, transported or otherwise managed in compliance with regulations or standards promulgated pursuant to section 3014 of the Solid Waste Disposal Act and other applicable authorities.

- The Trustees must also determine whether the discharge meets one or more of the exclusions provided in section 311(a)(2) or (b)(3) of the CWA.

The Trustees do not believe that any of the potential injuries referred to herein meet one or more of the above criteria, nor are they subject to the exceptions to liability provided in sections 107(f), (i), and (j) and 114(c) of CERCLA, and section 311 (a)(2) or (b)(3) of the CWA. Therefore, the continuation of an assessment is not precluded.

3.0 PRELIMINARY IDENTIFICATION OF RESOURCES POTENTIALLY AT RISK

3.1 Preliminary Identification of Pathways

For a period of approximately 30 years beginning in 1947, wastewater discharges containing significant quantities of PCBs flowed from the Hudson Falls and Fort Edward plants into the waters and sediments of the Hudson River adjacent to the plants (USEPA 1991). From these areas the PCBs have spread down the entire river system through natural and human-directed perturbations. For example, a recent EPA study indicates that the sediments of portions of the upper river continue to be a major source of PCBs to the freshwater Hudson (USEPA 1997). Other potential ongoing sources of PCBs are five remnant deposits located between Hudson Falls and Fort Edward. Four of these remnant areas were capped in 1990-1991 as an interim measure (USEPA 1991).

In 1991 and 1992, measured PCB levels in the waters of the Hudson River rose significantly. As a result of further investigation, a continuing source of PCB releases to the Hudson River was discovered at the Hudson Falls plant site in October 1992. It was determined that residual PCB in the form of dense non-aqueous phase liquid (DNAPL) was seeping through fractured bedrock beneath the Hudson Falls plant site and into the Hudson River. Although these releases appear to be significant given the increased PCB concentrations in the river, the exact quantity of PCBs in these releases is unknown. Additional sampling has indicated that there are also ongoing PCB releases from the Fort Edward plant outfall area (NYSDEC 1995; USEPA 1997).[4]

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[4] For additional information on PCB discharges from the Hudson Falls and Fort Edward plants, see O'Brien & Gere (1997), Dames & Moore (1996), EPA's "Data Evaluation and Interpretation Report" (1997).

3.1.1 Surface Water Pathways

One pathway of PCBs from the capacitor plants to the Hudson River was a combination of wastewater and stormwater discharged during the manufacturing process. After capacitors were filled with dielectric fluids that contained PCBs, the excess fluids were washed away using hoses, detergents and water. The resultant wastewater was then discharged, untreated, through outfalls that eventually led to the Hudson River (USEPA 1991). As a result of the stormwater and wastewater discharges, as well as subsequent releases from contaminated sediments and the Hudson Falls contaminated groundwater release, elevated levels of PCBs have been detected in the surface waters of the river, particularly in the Upper Hudson. In turn, EPA has determined that the water column of the Upper Hudson serves as a significant pathway of PCBs to the entire freshwater Hudson (USEPA 1997).

3.1.2 Groundwater Pathways

In 1992 and 1993, NYSDEC determined that PCBs in the form of DNAPL underlie the Hudson Falls and Fort Edward plant sites. NYSDEC further discovered that PCBs from the Hudson Falls plant site were entering the Hudson River as part of the groundwater discharge to the river and contributing significantly to PCB loading to the sediment and water column (Farrar 1997; USEPA 1995a).[5]

3.1.3 Airborne Pathways

PCBs have been detected in the atmosphere in the Hudson River environment. Sampling by GE in the Fort Edward area in 1989 detected a maximum PCB concentration of 2.3×10^{-7} parts per million (see Exhibit 6). PCBs have also been detected on vegetation in the Hudson River area as a result of atmospheric fallout (USEPA/NYSDEC 1987; Buckley 1981). A recent study indicates that under certain conditions the volatile loss of PCBs from wet soils and sediments may be rapid and substantial (Chiarenzelli et al. 1997).

3.1.4 Food Chain Pathways -- Bioaccumulation

PCBs are stored in the fatty tissue of organisms and tend to bioaccumulate in the food chain (Bush 1995). Bioaccumulation through the food chain is believed to preferentially concentrate PCB congeners of higher chlorine content (USEPA 1996b).

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[5] While NYSDEC investigation has determined that PCB-contaminated groundwater discharges from the Hudson Falls plant are entering the Hudson River, contaminated groundwater discharges from the Fort Edward plant may not be entering the river due to unique geologic and hydrologic conditions (Ports 1997).

3.1.5 Particulate Movement Pathways

Particulates suspended in the water column of the Upper Hudson contribute to the total PCB loading to the freshwater Hudson (USEPA 1997). Suspended matter in the water column may also lead to elevated PCB concentrations in various species of fish in the river (USEPA 1991).

3.1.6 Sediments as Pathways

PCBs in the effluent from the manufacturing plant sites traveled through surface and groundwater and settled into the sediments within and adjacent to the Hudson River. Once sediments are contaminated with PCBs, they can serve as an ongoing source of PCBs to the environment. For instance, a link may exist between PCB-contaminated sediments and elevated PCB concentrations in the water column and biota (USEPA 1991). Specifically, a recent EPA study indicates that a large portion of the PCB load from the water column of the Thompson Island Pool originates from the sediments in the Thompson Island Pool. Moreover, the sediments of the Thompson Island Pool are believed to be a major source of PCBs to the freshwater Hudson River below the Thompson Island Dam (USEPA 1997).

3.1.7 Remnant Deposits as Pathways

The remnant deposits in the Hudson River are areas of former river bottom that became exposed due to changes in the water level following removal of the Fort Edward Dam in 1973 (USEPA 1984). The remnant deposits contain significant quantities of PCBs. Prior to the implementation of preliminary remedial activities in 1974, approximately 8,600 pounds of PCBs were scoured from these areas (Malcolm Pirnie 1978).[6] USEPA's 1984 Record of Decision on the Hudson River Superfund site called for in-place interim containment of Remnant Deposits 2, 3, 4, and 5, including capping and bank stabilization (USEPA 1984). Interim containment of these remnant deposits commenced in 1990 and was completed in 1991. Monitoring is being conducted to determine if these areas remain a continuing source of PCBs to the Hudson River. Remnant Deposit 1 has not been remediated and may also be an ongoing source of PCBs (Ports 1997).

3.2 <u>Exposed Areas</u>

3.2.1 General

The total area over which exposure or effects may have occurred includes the Hudson River from the Hudson Falls plant site south to the Battery in Manhattan, NY, including associated floodplains and wetlands. Specifically, exposed areas include those discussed below.

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[6]Some of the remnant deposits were subjected to preliminary remedial activities such as bank stabilization between 1974 and 1978 (USEPA 1984).

3.2.2 Exposed Surface Water Estimates and Concentrations

Measured PCB concentrations in surface waters of the Upper Hudson have historically exceeded both the EPA and NYSDEC Ambient Water Quality Criteria (AWQC). For example, mean PCB concentrations in the water column measured between 1986 and 1989 range from 3.4 x 10^{-5} parts per million at Waterford, NY, to 6.0 x 10^{-5} parts per million at Fort Edward, NY. These observed concentrations are above the EPA AWQC of 1.4 x 10^{-5} parts per million and the NYSDEC surface water standard of 1.0 x 10^{-6} parts per million (USEPA 1991). The United States Geological Survey (USGS) has conducted additional water column monitoring in the Upper Hudson since the late 1970s. During the period 1979 to 1989, the average concentration of PCBs in the water column at Stillwater was 2.9 x 10^{-4} parts per million.[7]

The maximum concentration of PCBs in the surface water of the Hudson River has been measured at 4.1 x 10^{-3} parts per million. This measurement occurred in September, 1991, near Fort Edward at Rogers Island and may be attributable to the continuing Hudson Falls release (USEPA 1997).

3.2.3 Exposed Sediment Estimates and Concentrations

Elevated levels of PCBs have been detected in sediments throughout the Hudson River below Hudson Falls. USEPA Phase II data indicate that PCB concentrations in sediments between Hudson Falls and the Battery range from below 1 part per million to over 2,000 parts per million. Sediment contamination by PCBs is highly variable within river reaches due to differential sediment and river characteristics, but PCB concentrations exceed 50 parts per million in numerous locations within the Hudson River between Hudson Falls and Troy (USEPA 1996a). A small sample of existing surficial sediment data is shown in Exhibits 7 and 8.[8] Further detail on sediment PCB concentrations can be found in USEPA (1996a).

3.2.4 Exposed Biota Estimates and Concentrations

Biotic resources that may have been affected by PCB contamination include a wide variety of benthic invertebrates, fish, birds, and mammals. PCB concentrations in fish in the Hudson River have historically been detected well above the two parts per million tolerance level recommended by the Food and Drug Administration (FDA) (21 CFR Part

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[7] For additional information on PCB concentrations in the water column, see USEPA's Reassessment RI/FS (1991), USEPA's Database for the Reassessment RI/FS (1996a) and USEPA's Data Evaluation and Interpretation Report (1997).

[8] Exhibit 7 presents measured PCB surficial sediment concentrations at 19 ecological sampling stations along the Hudson River. The sampling stations do not include areas of the river where sediment concentrations exceed 50 parts per million PCBs. Exhibit 8 presents PCB concentrations in surficial sediments believed to have been deposited in the Hudson River after 1990.

109.30(a)(7); USEPA 1996a). Since 1983, PCB concentrations in fish in the main stem Hudson River have shown little evidence of decline, and in 1996 concentrations averaged 12 parts per million for fish in the Upper Hudson River and three parts per million in the Lower Hudson River (USEPA 1996a). Historical data establish a link between PCBs released to the upper river and PCBs in fish throughout the river (Sloan and Field 1996; Skinner et al. 1996).

Numerous fish tissue samples taken throughout the river have shown lipid-based PCB concentrations up to four orders of magnitude greater than the background conditions in the river basin (see Exhibit 10). On a wet weight basis, PCB concentrations are one to three orders of magnitude greater than those considered protective of human health or the environment (Sloan and Field 1996). Species in the Hudson River that have been analyzed include American lobster, blue crab, brown bullhead, yellow perch, white perch, yearling pumpkinseed, striped bass, smallmouth bass, and largemouth bass (Sloan and Field 1996; Skinner et al. 1996; NOAA 1996; USEPA 1991). Exhibits 9 and 10 present summary PCB concentrations in fish at various locations in the river.

PCBs have also affected birds along the Hudson River. Cases of lethal levels of PCBs in great horned owls have been documented in the Hudson River system (Stone and Okoniewski 1983). In addition, a recent study by the US Fish and Wildlife Service detected high concentrations of PCBs in tree swallow eggs and nestlings collected along the upper Hudson River (Secord and McCarty 1997). Abnormal reproductive behavior and plumage development were observed that may be related to PCB contamination. Elevated PCB concentrations in fish and benthic invertebrates of the Hudson River could have significant implications for other migratory birds utilizing the Hudson River flyway (Secord and McCarty 1997). Exhibit 11 presents PCB concentrations observed in tree swallow eggs and nestlings from the upper Hudson River.

Other species in the Hudson River Valley that may have been affected by PCB contamination include otter and mink. The potential is high for these mammals to experience deleterious effects from PCB contamination, since fish are a major part of their diet. A diet containing 0.64 parts per million PCB has been shown to cause complete reproductive failure in the mink (Platanow and Karstad 1973). PCB concentrations in fish in the Hudson River have been observed above this level (USEPA 1996a; Foley et al. 1988).

3.2.5 Remnant Deposit Estimates and Concentrations

In 1989, GE conducted sediment monitoring at several locations in the vicinity of the remnant deposits located above Fort Edward.[9] Total PCBs detected in sediment samples collected at the southeast corner of the remnant island ranged from less than 1 part per million to 99 parts per million, comprised of approximately 89 percent Aroclor 1242 and 11 percent Aroclor 1254 (USEPA 1997).[10] GE continues to conduct monitoring near the remnant deposits to determine if they are continuing to release PCBs (Ports 1997). Surficial soil samples collected by NYSDEC in 1992 at Remnant Deposit 1 included PCB concentrations of 1.6 parts per million in the center of the deposit and 12 parts per million on the downstream face of the deposit (USEPA 1997). Thus, the contaminated soils/sediments of Remnant Deposit 1 may continue to be a source of PCBs, via erosion, to the river. The total PCB content of the remnant areas has been estimated at 46,305 pounds (USEPA 1991).

3.3 Potentially Affected Resources and Resource Services

A wide range of natural resources and natural resource services under Federal or state trusteeship are affected or potentially affected by the release of PCBs from the manufacturing plant sites. These natural resources provide a variety of ecological and human services. Potentially affected resources, and the services they provide, are described further below. Federal and state ecological guidelines for PCBs in surface water, sediment, or wildlife are presented in Exhibit 12.

3.3.1 Surface Water and Sediment Resources and Services

Hudson River surface waters, and the services these waters provide, have been affected by PCB contamination. The surface waters of this system provide habitat for fish and shellfish species, including feeding, breeding, and nursery services. In addition, these waters support both consumptive and non-consumptive recreational activities such as recreational fishing, swimming, boating, and wildlife viewing.

Elevated PCB levels have been reported in sediments throughout the Hudson River (EPA 1997). River sediments, like surface water, serve as a medium for the transport of energy and nutrients, and as habitat for various aquatic biota, including benthic finfish and shellfish species. River sediments are believed to be the major sink for PCBs in the Hudson River estuarine system. Floodplain soils have also been affected by PCB contamination (the five remnant deposits are all located on the Hudson River floodplain) (USEPA 1984).

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[9] For additional data on remnant deposit monitoring, see GE's "Post-Construction Remnant Deposit Monitoring Program Reports."

[10] Measurements of Aroclor 1242 may also include Aroclor 1016.

Marine transportation is an important service provided by the waters of the Hudson River. The presence of PCBs in the sediments of the river has hindered dredging in the Hudson River and could increase the cost of future dredging activities undertaken for purposes of navigation. During the 1970s and 1980s the New York State Thruway Authority and the US Army Corps of Engineers dredged a significant volume of contaminated sediment from the Hudson River; however, there has been little navigational dredging in the past decade due to the presence of PCB contamination, the lack of appropriate spoil containment sites, and the lack of effective capping materials (USACE 1996; Sanders 1989; Farrar 1997).

3.3.2 Biotic Resources and Services

Elevated PCB concentrations have been detected in various aquatic resources in the Hudson River (USEPA 1991; USEPA 1996a; Sloan and Field 1996). As a result of this PCB contamination, fishing was banned in the Upper Hudson below Hudson Falls between 1976 and 1995, and fishing is currently limited to catch and release only. Fish in other areas of the Hudson River are subject to consumption advisories of varying degrees due to PCB contamination (NYSDOH 1997). Exhibit 13 summarizes some past and current fishing advisories on the Hudson River. A statewide advisory also exists in NY for the consumption of waterfowl because they contain PCBs and other contaminants (NYSDOH 1997). PCB contamination also likely affects various species of birds (e.g., tree swallow, great horned owl) and mammals (e.g., mink, otter) in the Hudson River environment.

3.3.3 Groundwater Resources and Services

Residual PCBs in the form of DNAPL have entered groundwater resources under both the Hudson Falls and Fort Edward plant sites. Sampling conducted by GE at the Hudson Falls and Fort Edward plant sites indicates elevated levels of PCBs and VOCs in the groundwater. In particular, Aroclor 1242, Aroclor 1254, chloroethane, dichloroethane, and trichloroethane have been detected at levels above NYSDEC groundwater standards (O'Brien & Gere 1997; Dames & Moore 1996).

4.0 PRELIMINARY DETERMINATION REGARDING PREASSESSMENT SCREEN CRITERIA

In accordance with section 11.23(e) of the Federal Natural Resource Damage Assessment Regulations (43 CFR §11.23(e)), the Trustees have determined that all of the following criteria have been met.

4.1 Criterion 1 - A release of a hazardous substance has occurred.

It has been documented that untreated wastewater containing PCBs was discharged from GE's capacitor manufacturing plant sites in Hudson Falls and Fort Edward, New York into the Hudson River. An estimated 209,000 to 1,330,000 pounds of PCBs were released from these plant sites. Over twenty years after GE ceased using PCBs, the sediments of the Hudson River continue to release PCBs to the water column, atmosphere, groundwater, and biota of the Hudson River environment (USEPA 1991).

A continuing source of contamination was discovered in 1992, when PCB residue in the form of DNAPL was found beneath the Hudson Falls plant site. In addition, samples collected in 1993 by NYSDEC and GE indicated elevated PCB concentrations in soil and water near an outfall at the Fort Edward plant site (USEPA 1997). These ongoing releases have contributed to additional contamination of the Hudson River environment (USEPA 1997).

4.2 Criterion 2 - Natural resources for which the Trustees may assert trusteeship under CERCLA have been or are likely to have been adversely affected by the release.

The exposed areas and the natural resources adversely affected by releases of PCBs are within the trusteeship of the Trustees as defined under CERCLA. Specific affected areas of trusteeship include: surface water, groundwater, sediments, air resources, biotic resources, floodplain soils, and surficial soils.

PCB concentrations in fish in the Hudson River have historically been detected well above the two parts per million tolerance level recommended by the FDA (21 CFR Part 109.30(a)(7); USEPA 1996a). In 1976, because of PCB contamination, commercial striped bass harvests in the Hudson River were eliminated (NYSDOH 1977). In addition, recreational fishing was banned in the Upper Hudson below Hudson Falls between 1976 and 1995, and it is currently limited to catch and release only along this stretch of the river. Fish in other areas of the Hudson River are subject to consumption advisories of varying degrees due to PCB contamination (NYSDOH 1997).[11]

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[11] For the most recent New York State fishing advisory, see New York State Department of Health's "1997-1998 Health Advisories: Chemicals in Sportfish and Game" (1997).

A USFWS study on tree swallows indicates that birds migrating, nesting, and breeding along the Hudson River may be affected by PCB contamination. For tree swallows, possible adverse impacts include abnormal reproductive behavior and plumage development (Secord and McCarty 1997).

Studies indicate that mink and otter that inhabit the Hudson River Valley may be adversely affected by PCB contamination (Foley et al. 1988; Geisy et al. 1994). PCB concentrations in fish in the Hudson River Valley have been observed to be greater than the level known to cause adverse reproductive effects in mink (Foley et al. 1988). There are also statewide consumption advisories on snapping turtles and certain species of waterfowl, particularly mergansers, due to PCB contamination (NYSDOH 1997).
In addition to recreational fishing, many other recreational activities undertaken in the Hudson River environment, such as wildlife viewing, boating, and swimming, are believed to have been affected by the presence of PCBs.

Sediments of the Hudson River have been affected by PCB contamination as well. The Trustees believe that groundwater, air, geologic or biological resources have been adversely affected as a result of their exposure to PCBs in the sediments.[12] In addition, PCB contamination of the sediments in the Hudson River has hindered navigational dredging necessary for marine transport (USACE 1996; Sanders 1989).

Detected PCB concentrations in surface waters of the Upper Hudson have historically exceeded both the EPA and NYSDEC Ambient Water Quality Criteria (USEPA 1991). PCBs have also been detected at levels above NYSDEC groundwater standards (O'Brien & Gere 1997; Dames & Moore 1996).

4.3 Criterion 3 - The quantity and concentration of the released hazardous substance is sufficient to potentially cause injury to natural resources.

Up to 1.3 million pounds of PCBs were released from the Hudson Falls and Fort Edward plant sites between 1946 and 1977. In addition, a portion of the unknown quantity of PCBs that remain under the Hudson Falls plant site continue to enter the Hudson River through fractured bedrock. According to sampling and investigation completed to date, the total quantity and concentrations of these releases is sufficient to cause injury to the sediment, waters, and biota of the Hudson River (USEPA 1991; USEPA 1997) [see also discussion in 4.2 above].

[12]PCB concentrations in certain sediments of the Hudson River have been detected at levels equal to or greater than 50 parts per million (USEPA 1996a). As a result, these sediments or floodplain soils would be subject to regulations pursuant to the Toxic Substances Control Act (TSCA). The TSCA regulations specify three options for the disposal of contaminated sediments or soils: incineration, disposal in a licensed chemical waste landfill, or an alternative accepted by the EPA Regional Administrator (USEPA 1994).

4.4 Criterion 4 - **Data sufficient to pursue an assessment are readily available or are likely to be obtained at a reasonable cost.**

Significant amounts of data relevant to natural resources and potential damages resulting from exposure to PCBs in the Hudson River are available from NYSDEC, NOAA, DOI, USEPA, GE, and other sources. These data include information on contaminant releases, concentrations in the environment, and the effect of contamination on natural resources. Given the volume of available information, additional data useful for an assessment could be obtained at a reasonable cost.

4.5 Criterion 5 - **Response actions carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.**

Interim measures to control identified releases of PCBs to the Hudson River environment, and the movement of PCB-contaminated sediments within the river, have been undertaken or are underway at several locations. Response actions taken to date, however, have not sufficiently restored the injured natural resources of the Hudson River, nor are they expected to preclude the continued release of PCBs.

EPA has not yet determined what additional remedial actions should be implemented. In the Phase I Feasibility Study, EPA delineates potential response actions for the river (USEPA 1991). This study provides an initial identification and evaluation of alternatives for mitigating PCB contamination and controlling its effects on public health, welfare and the environment. The Feasibility Study discusses remedial objectives and response actions, potential clean-up technologies, and an initial screening of technologies. The technologies and processes identified in the study are: containment; natural PCB degradation in sediments; and removal, treatment, disposal, and innovative technologies. Phases 2 and 3 of the Feasibility Study will continue to investigate potential remedial actions for the Hudson River.

Pursuant to EPA's 1984 Record of Decision, a Consent Decree and two Administrative Orders issued by EPA, and Consent Orders issued by NYSDEC, GE has taken some measures to contain the spread of PCB contamination from the remnant deposits and the Fort Edward and Hudson Falls plant sites. One significant remedial action occurred in 1990 and 1991, when GE contained four of the five remnant deposits as an interim measure, including capping and bank stabilization. EPA's Data Evaluation and Interpretation Report and GE's Remedial Investigation Reports provide detailed descriptions of the activities undertaken at the Hudson Falls and Fort Edward plant sites to minimize the release of PCBs and clean up contaminated areas (USEPA 1997; O'Brien & Gere 1997; Dames & Moore 1996).

The Trustees do not expect that the remedial measures carried out or planned will fully address the various sources and pathways of exposure of natural resources to PCBs, or the injuries resulting from such exposure. Therefore, the Trustees have determined that the response actions carried out or currently planned do not or will not sufficiently remedy the injury to the natural resources of the Hudson River without further action.

5.0 CONCLUSION

Following the review of information described in this Preassessment Screen, the Trustees have made a preliminary determination that the criteria specified in 43 CFR Part 11 (Natural Resource Damage Assessments) have been met. The Trustees have further determined that there is a reasonable probability of making a successful claim for damages with respect to natural resources over which the Trustees have trusteeship. Therefore, the Trustees have determined that an assessment of natural resource damages is warranted.

PREASSESSMENT SCREEN
FOR THE
HUDSON RIVER
1 October 1997
PREPARED BY THE
State of New York
United States Department of Commerce -- National Oceanic and Atmospheric Administration
United States Department of the Interior
REGARDING NATURAL RESOURCE DAMAGE ASSESSMENT & RESTORATION

THE STATE OF NEW YORK:

BY: John P. Cahill ______________________ 10/23/97
Date

John P. Cahill
Commissioner
New York State Department of Environmental Conservation
For the State of New York

NOAA:

BY: CNEhler ____________________ 10/10/97

Charles N. Ehler
Director
Office of Ocean Resource Conservation & Assessment
National Oceanic and Atmospheric Administration
For the United States Department of Commerce

Date

THE U.S. DEPARTMENT OF THE INTERIOR:

BY: Willie R. Taylor 10/7/97
Date

Willie R. Taylor
Director
Office of Environmental Policy and Compliance
For the United States Department of the Interior

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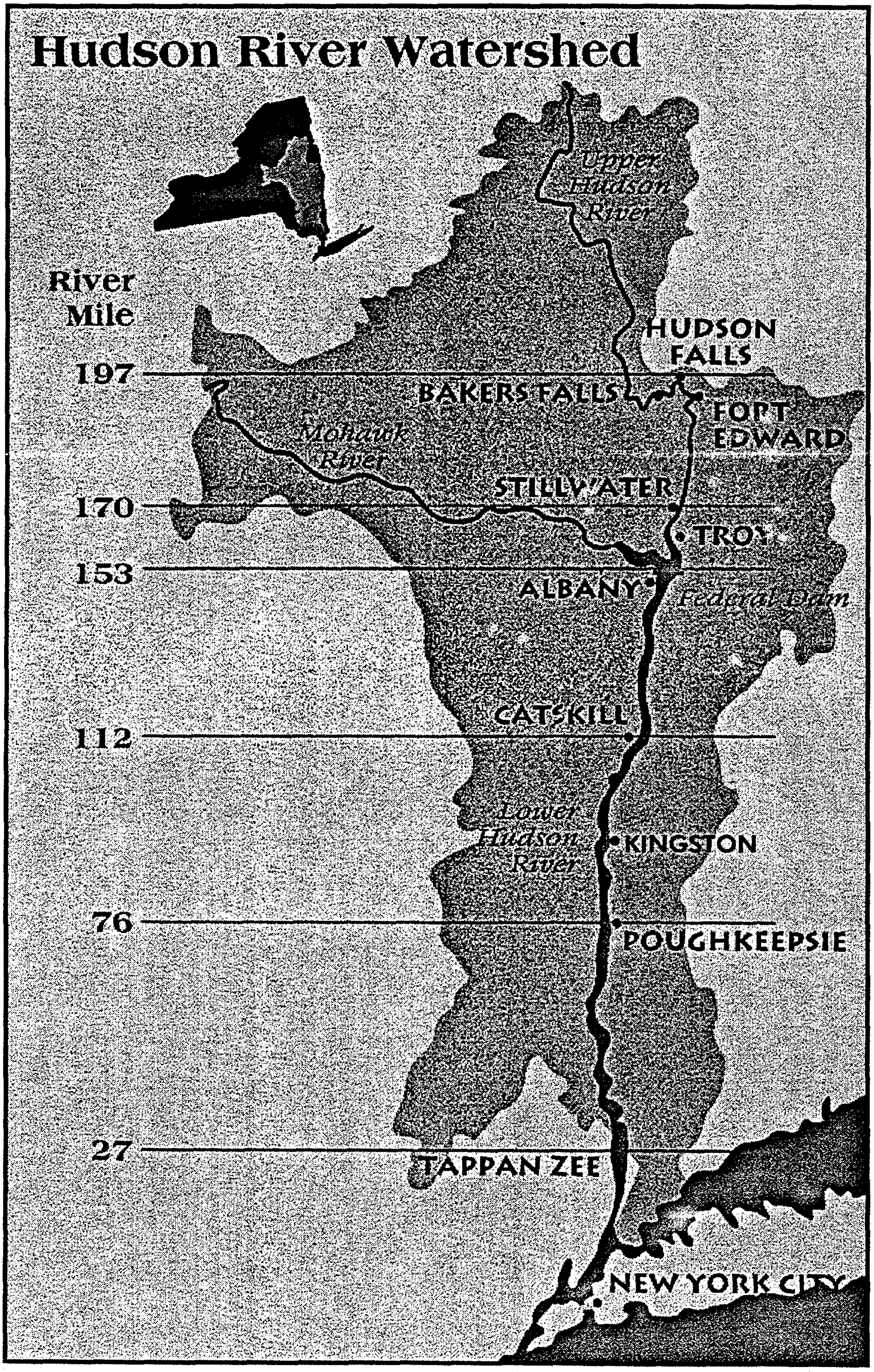
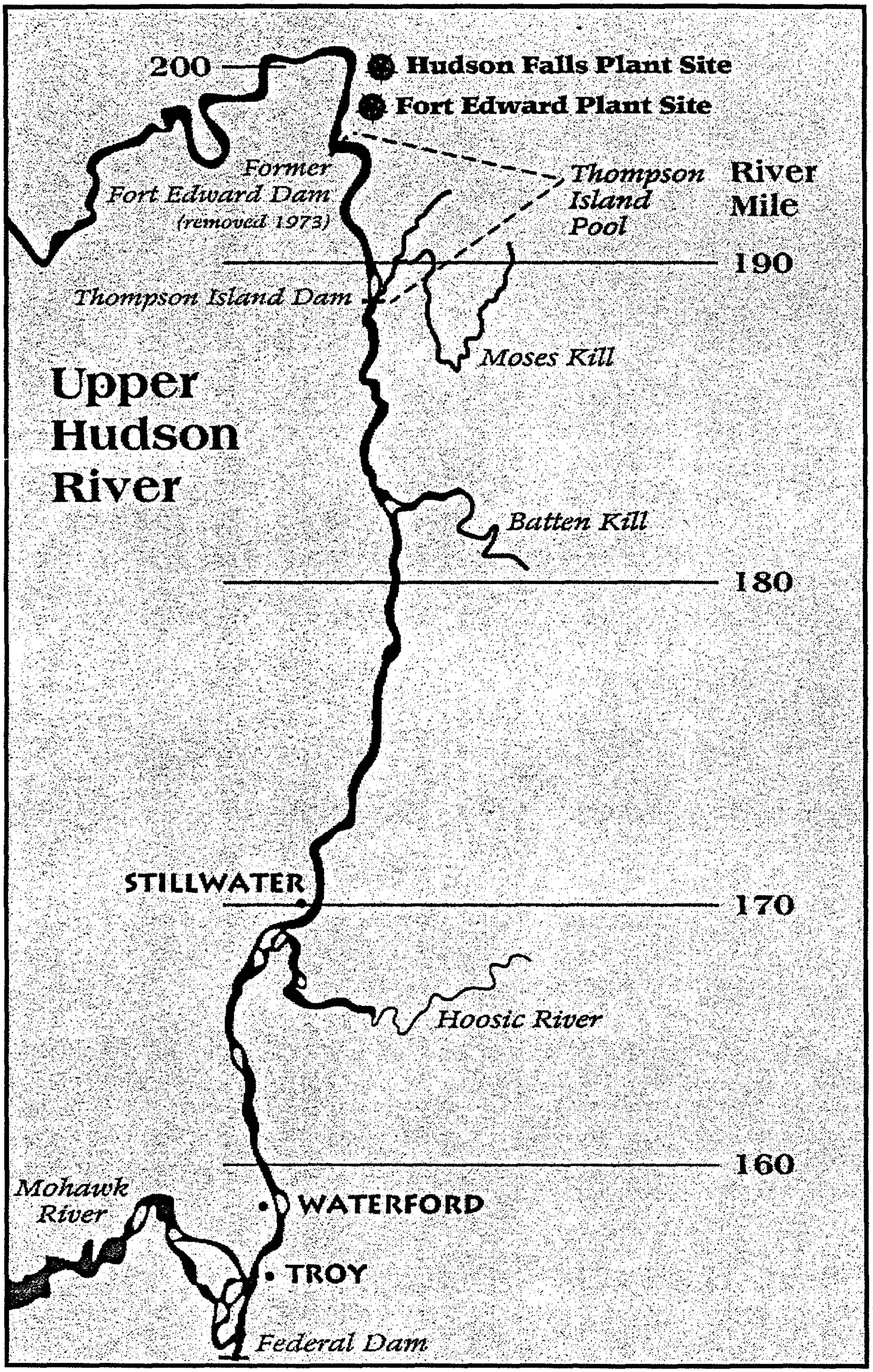
EXHIBIT 1 - Hudson River Watershed



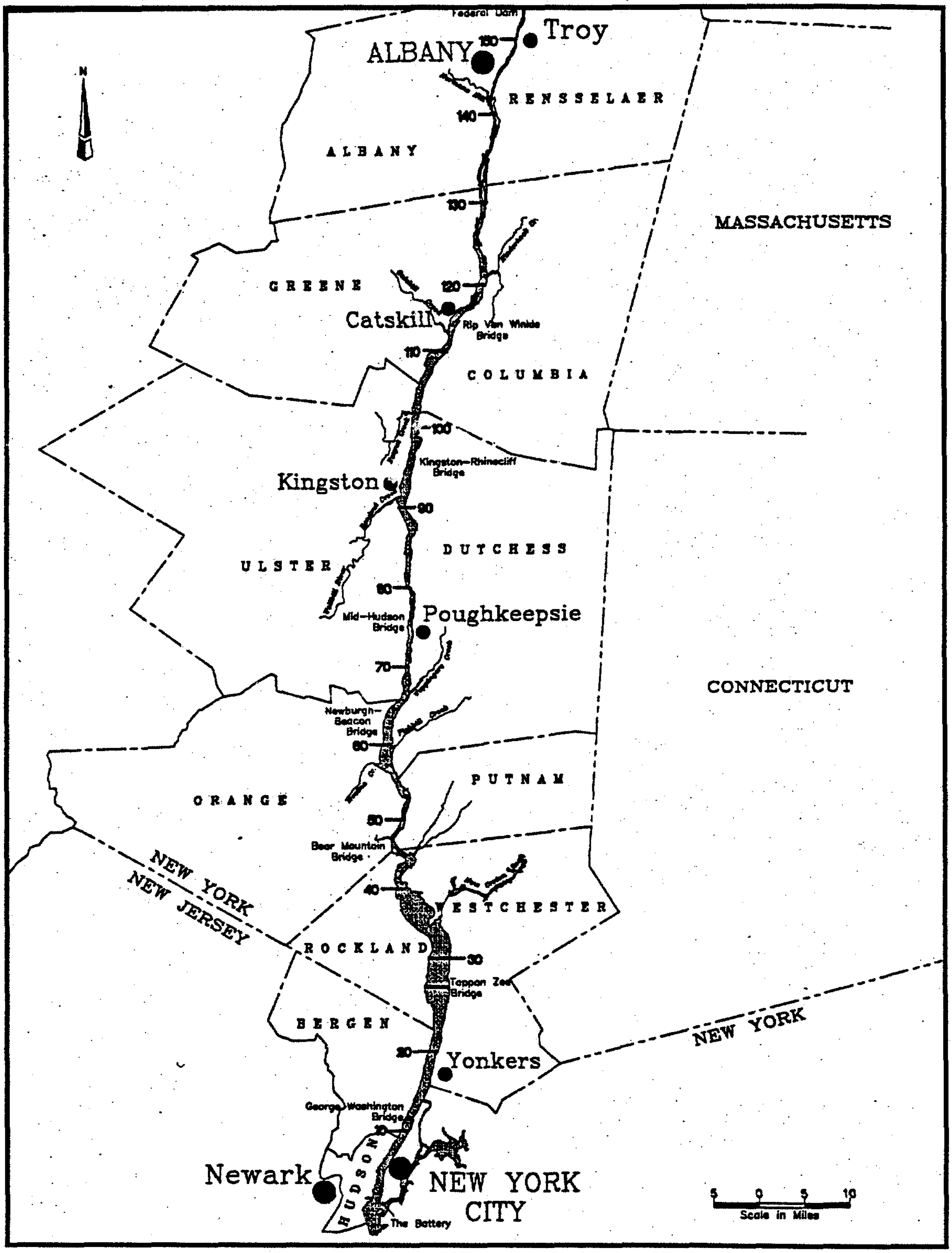
Source: (Sloan and Field 1996)

EXHIBIT 2 - Upper Hudson River



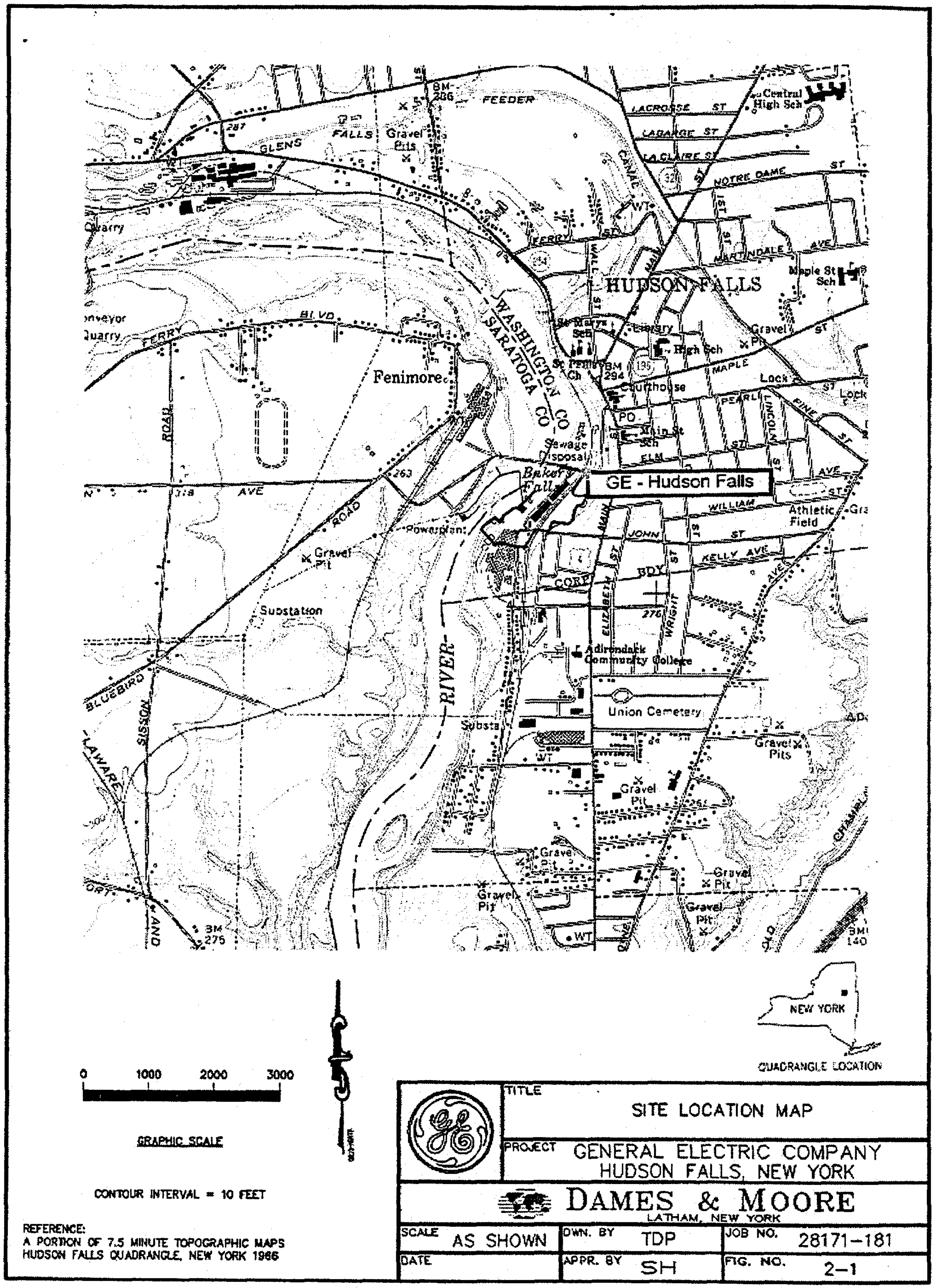
Source: (Sloan and Field 1996)

EXHIBIT 3 - Lower Hudson River



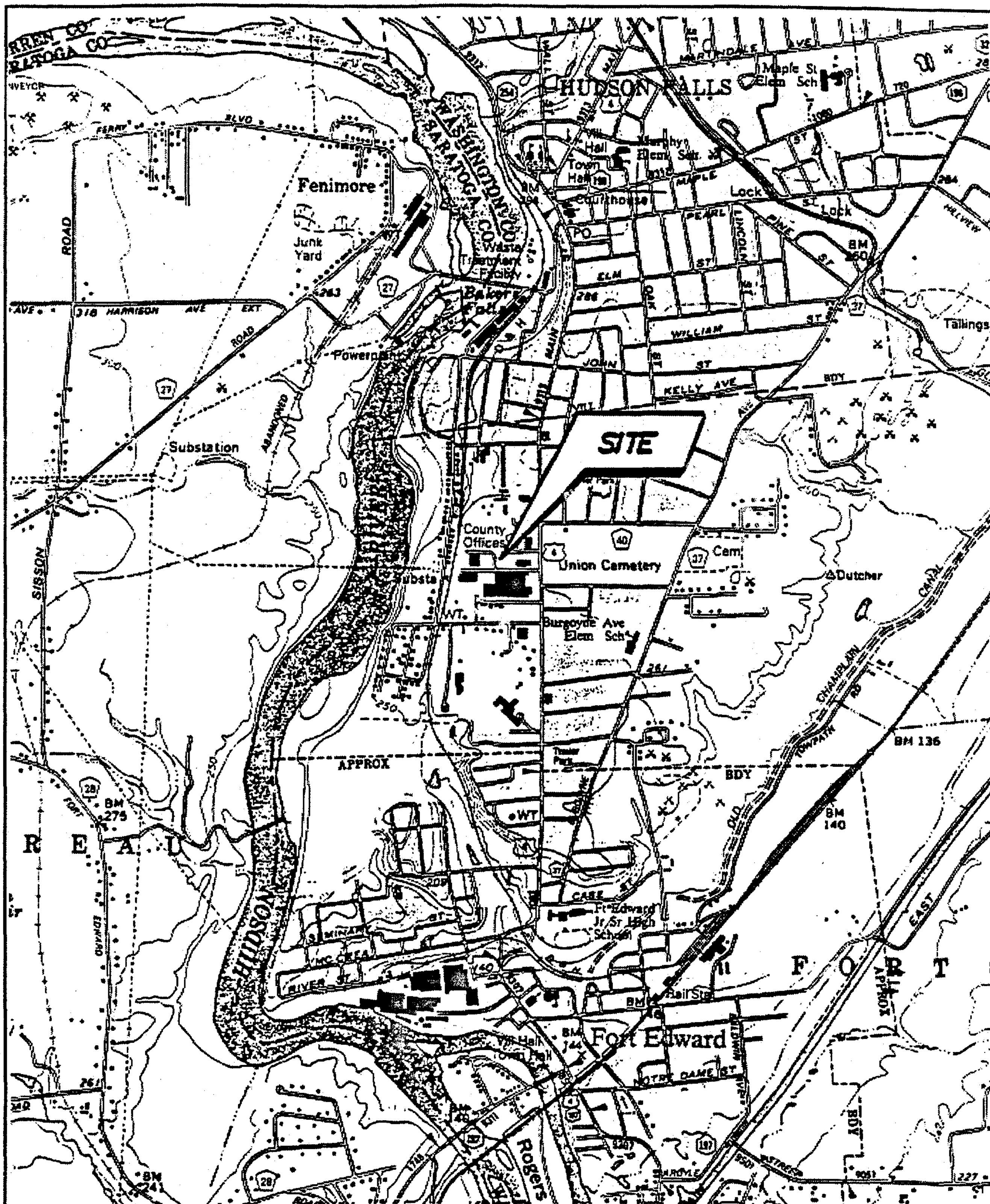
Source: (USEPA 1991)

EXHIBIT 4 - Hudson Falls Plant Site



Source: (Dames & Moore 1996)

EXHIBIT 5 - Fort Edward Plant Site



OBRIEN & GERE ENGINEERS, INC.	SITE LOCATION MAP GENERAL ELECTRIC COMPANY FORT EDWARD, NEW YORK	FILE NO. 5731.000 DATE. APR 1995 FIGURE 1-1

Source: (O'Brien & Gere Engineers, Inc. 1997)

EXHIBIT 6
PCBs in Air

Location	Sampling Period	PCB Concentration (ppm) min.	max.	Sample	Comments	Reference
Ft. Edward Area	early-mid 1970's	$3x10^{-7}$	$1.0x10^{-6}$		threefold decrease measured when GE halted use of PCBs	Limburg (1984)
Ft. Edward Area						
Caputo dump	1979	$1.3x10^{-4}$ *	$3.0x10^{-4}$	?	* = average	NYSDEC Tech. Paper 63 (1981)
Ft. Miller dump		$2.4x10^{-5}$ *	$3.5x10^{-5}$	?	? = not reported	
Remanant area		$9.0x10^{-6}$ *	$1.0x10^{-5}$	?		
Moreau & Site 3A		$5.6x10^{-6}$ *	$1.5x10^{-5}$	?		
Bouy 212		$7.0x10^{-7}$		?		
Old Moreau w/o Site 3A		$3.0x10^{-7}$		?		
Caputo dump						
Before Capping		$1.18x10^{-4}$ *		20		Shen (1982)
After Capping		$2.6x10^{-7}$ *		7		
LOCK 6 tailwater	1978	$7.3x10^{-8}$	$1.8x10^{-7}$	3	Samples immediately adjacent to the river	Buckley and Tofflemire (1983)
	1981	$2.0x10^{-8}$	$6.4x10^{-8}$	12		
	8/80-9/80	nd	nd	2	Aroclor 1221	
		$1.1x10^{-7}$	$5.2x10^{-7}$	2	Aroclor 1242	
		nd	nd	2	Aroclor 1254	
	8/81-9/81	nd	nd	7	Aroclor 1221	
		$3.1x10^{-8}$	$6.0x10^{-8}$	7	Aroclor 1242	
		nd	$1.3x10^{-9}$	7	Aroclor 1254	
Ft. Edward Area						
Lock 7	8/86		$8.3x10^{-8}$	3D	2-3 sets of duplicate	Draft Joint Supplement to the
Ft. Edward Landfill			$<7.0x10^{-9}$	3D	samples over 4 hours	Final EIS (USEPA/NYSDEC, 1987)
Site G			$<7.0x10^{-9}$	3D	at each site (4-6 samples)	
Burgoyne Ave School			NA	2D	NA = not available	
				#Det/#Samples		
Kingsbury Landfill	4/87-5/87	nd	$4.9x10^{-7}$	76/105	Aroclor 1016/1242	NYSDEC (June 23, 1987)
		nd	$5.2x10^{-7}$	5/105	Aroclor 1248	Memo from W. Webster to J. VanHoesen
Ft. Edward Area	1989					
(A2-north of remnant 3)		$<5.0x10^{-8}$	$2.3x10^{-7}$	3/84	Aroclor 1260	GE Baseline Monitoring Study
(A4-east of remnant 5)		$<5.0x10^{-8}$	$6.1x10^{-8}$	3/84		(Harza, 1990)
(A5-2 mi. south of Ft. Edward near Dead Creek)		$<5.0x10^{-8}$	$1.77x10^{-7}$	1/84		
Other NYS Locations						
Lake Placid (rural)			$6.9x10^{-9}$		368 Samples Statewide	NYS Toxics Air Monitoring Report (1982-4)
East Rochester (industrial)			$3.9x10^{-9}$		Aroclor 1016/1242 & 1254	
Niagara Falls (industrial/residential)			$3.0x10^{-9}$		were predominant species;	
Syracuse (urban)			$2.0x10^{-9}$		Aroclor 1221 - 1 sample	
Rensselaer (urban/industrial)			$2.0x10^{-9}$		Aroclor 1260 not detected.	
Poughkeepsie (residential/Hudson River)			$4.0x10^{-9}$			
Hempstead, Long Island (urban)			$5.0x10^{-9}$			
Brooklyn (industrial)			$6.2x10^{-9}$			
Staten Island (residential)			$7.2x10^{-9}$			

Source: (USEPA 1991)

EXHIBIT 7

Total PCBs in the Hudson River[1]

Ecological Sampling Station	Location[2]	Sediment[3] (ppm)	Benthic Invertebrates[4] (ppm)	Fish[5] (ppm)
Station 1	RM 203.3 - 204.7 (above Glens Falls)	0.07	NA	0.21
Station 20	RM 196.9 (Bakers Falls)	0.92	NA	7.54
Station 2	RM 194.1 (Ft. Edward)	20.35	NA	34.37
Station 3	RM 191.5 (Thompson Island Pool)	9.14	10.10	14.88
Station 4	RM 190.3 - 189.6 (Thompson Island Pool)	10.84	19.04	31.83
Station 5	RM 189 (Thompson Island Pool)	29.35	41.30	NA
Station 6	RM 188.7 (Thompson Island Pool)	14.58	13.93	NA
Station 7	RM 188.5 (Thompson Island Pool)	18.51	15.55	NA
Station 8	RM 169.5 - 169.2 (Stillwater)	41.59	NA	9.88
Station 9	RM 159 (Waterford)	4.80	NA	1.71
Station 10	RM 143.5 (Albany/Norman Kill)	1.03	NA	5.04
Station 11	RM 137.2 - 136.7 (Castleton-on-Hudson/Shad and Schermerhorn Islands)	1.38	NA	14.78
Station 12	RM 122.7 - 122.4 (Coxsackie/Kinderhook Creek)	1.19	0.81	4.52
Station 13	RM 113.8 (Catskill/Rogers Island)	0.87	NA	3.76
Station 14	RM 100 (Kingston/Tivoli)	0.37	0.39	0.68
Station 15	RM 89.4 - 88.7 (Kingston/Esopus Meadows)	0.83	0.20	2.98
Station 16	RM 58.7 (Newburgh/Moodna Creek)	0.30	NA	2.83
Station 17	RM 47.3 (Peekskill/Iona Marsh)	1.23	0.67	3.63
Station 18	RM 25.8 (Nyack/Piermont Marsh)	0.48	0.19	2.61

Notes:

1. The concentrations in this exhibit represent the sum of the values of various congener-based Aroclors.
2. Locations in the river are usually specified as river miles (RM). RM 0 is located at the Battery at the southern tip of Manhattan. RM locations are approximate.
3. Concentrations taken from surficial sediments (i.e. top five centimeters) at each station. In addition, because the sampling stations do not include areas where sediment concentrations exceed 50 parts per million PCBs, the PCB concentrations are not entirely characteristic of the degree of contamination in the sediments of the Hudson River.
4. Dry weight concentrations represent averages across all species at each station. Invertebrates sampled include amphipods, bivalves, chironimids, gastropods, isopods, odonata, and oligochaetes.
5. Wet weight concentrations represent averages across all species at each station. Fish sampled include Atlantic silverside, brown bullhead, brook silverside, cyprinid species (carp and minnows), longnose dace, rock bass, sucker species, smallmouth bass, spottail shiner, tesselated darter, white perch, and yellow perch. The total PCB concentrations for fish do not include below detection limit values.

Source: (USEPA 1996a; Secord and McCarty 1997)

EXHIBIT 8

Comparison of Total PCB Concentrations of Suspended Matter and Surficial Sediment Deposited After 1990

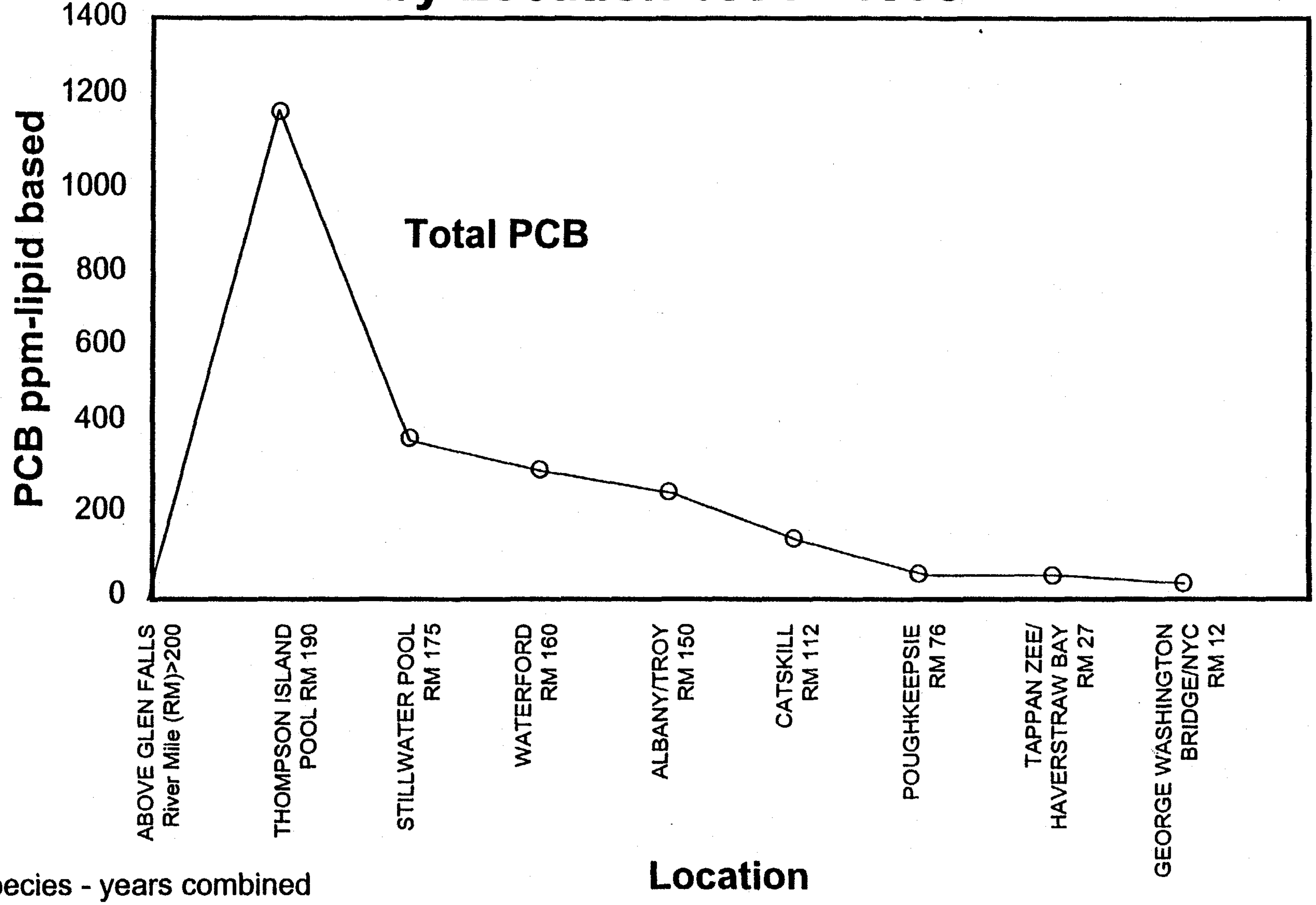
Core Location		Surficial Sediment Total PCB Concentration (ppm)	Water-Column Sampling Locations		Water-Column Transect Suspended Solids Total PCB Concentration (ppm)
Thompson Island Pool	RM 188.5	25.1	Rogers Island	RM 194.6	Median 17.3 Minimum 1.9 Maximum 21.3
			Thompson Island Dam	RM 188.5	Median 5.3 Minimum 3.2 Maximum 7.1
Stillwater Pool	RM 177.8	5.0	Stillwater	RM 168.3	0.4, 2.4, 4.7 (3 samples)
Stillwater Pool	RM 177.8	12.5			
Albany Turning Basin	RM 143.5	3.0	Green Island Bridge	RM 151.7	1.2, 1.8, 1.2 (3 samples)
Kingston	RM 88.5	0.96	Cementon	RM 110.0	0.8 (1 sample)
			Highland	RM 77.0	0.4, 1.5 (2 samples)

Source: (USEPA 1997)

880006

EXHIBIT 9

Hudson River PCBs in Fish by Location 1991 - 1995



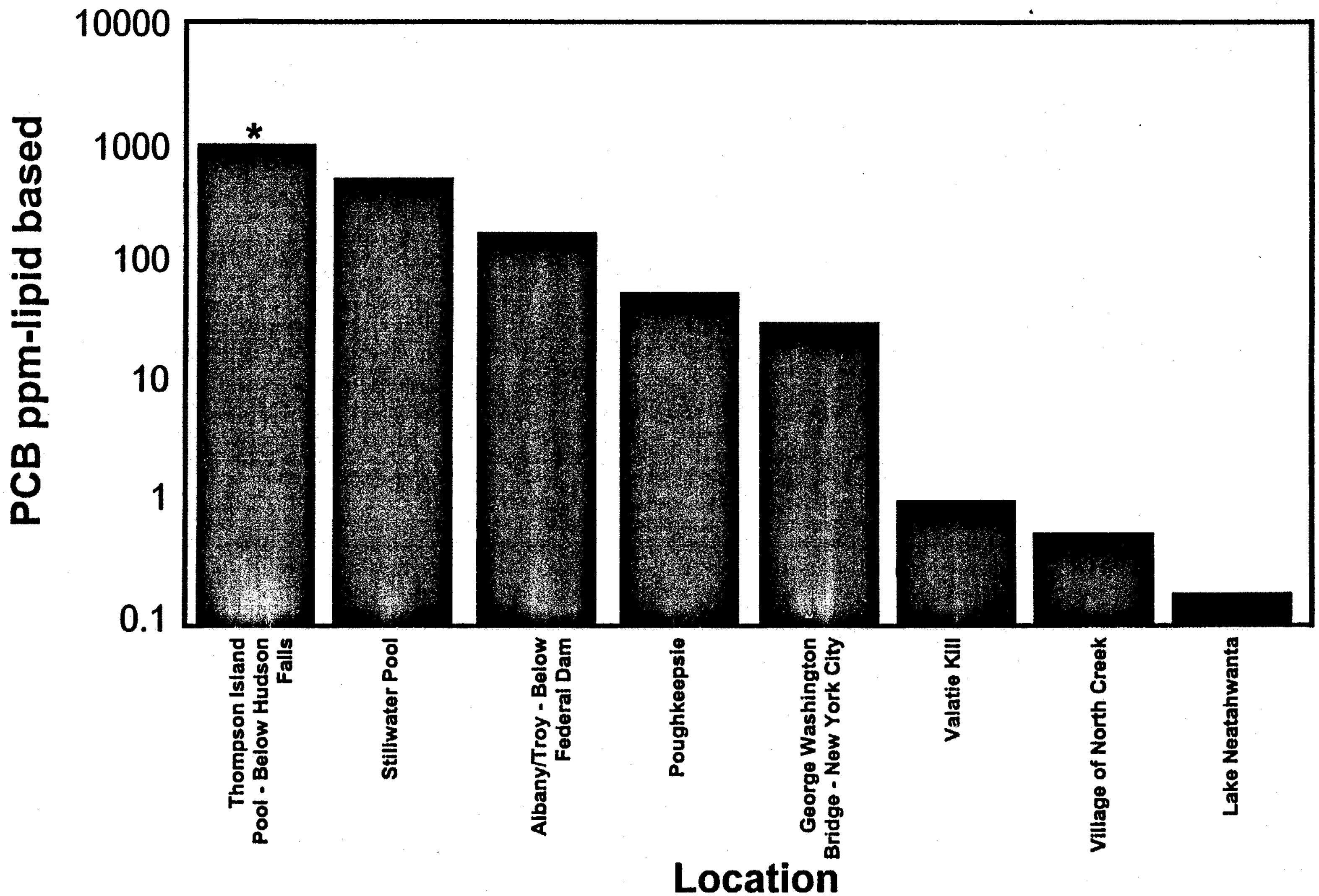
Species - years combined

Source: (Sloan and Field 1996)

680006

EXHIBIT 10

Hudson River 1991-95 Fish PCB Concentrations vs. Selected Background Areas



* In 1993 a Yellow perch set record at 15,460 ppm - lipid basis

Source: (Sloan and Field 1996)

060006

EXHIBIT 11

Concentrations of PCBs in Tree Swallow Eggs and Nestlings from the Upper Hudson River-1994

Matrix	PCB Concentration (ppm wet weight)			
	Lock 9*	**River Mile 195**	**River Mile 194**	**River Mile 181**
Eggs	0.852	6.55	29.6	18.5
	2.57	22.9	77.3	2.37
	5.72	12.9	17.6	15.7
	16.0**	4.6**	44.0**	13.0**
Egg Average	6.28	1 1.7	42.1	12.4
Nestlings	0.51	31.1	54.8	9.78
	0.244	27.1	56.8	0.721
Nestlg Average	0.377	29.1	55.8	5.25

Each value represents one, three egg composite or two nestling composite from a single nest (Kruskal-Wallis: eggs p=.044, H=8.10; nestlings p=.083, H=6.67).

* Lock 9 is located on the Champlain Canal, which feeds into the Hudson River. No significant sources of PCBs exist in the vicinity of Lock 9.

** Values represent total PCB as part of an organochlorine scan; all other data values represent cPCB, which is total PCB concentration determined by summing the congener concentrations.

Source: (Secord and McCarty 1997)

EXHIBIT 12

Summary of Proposed Ecological Guidelines for PCBs[a]

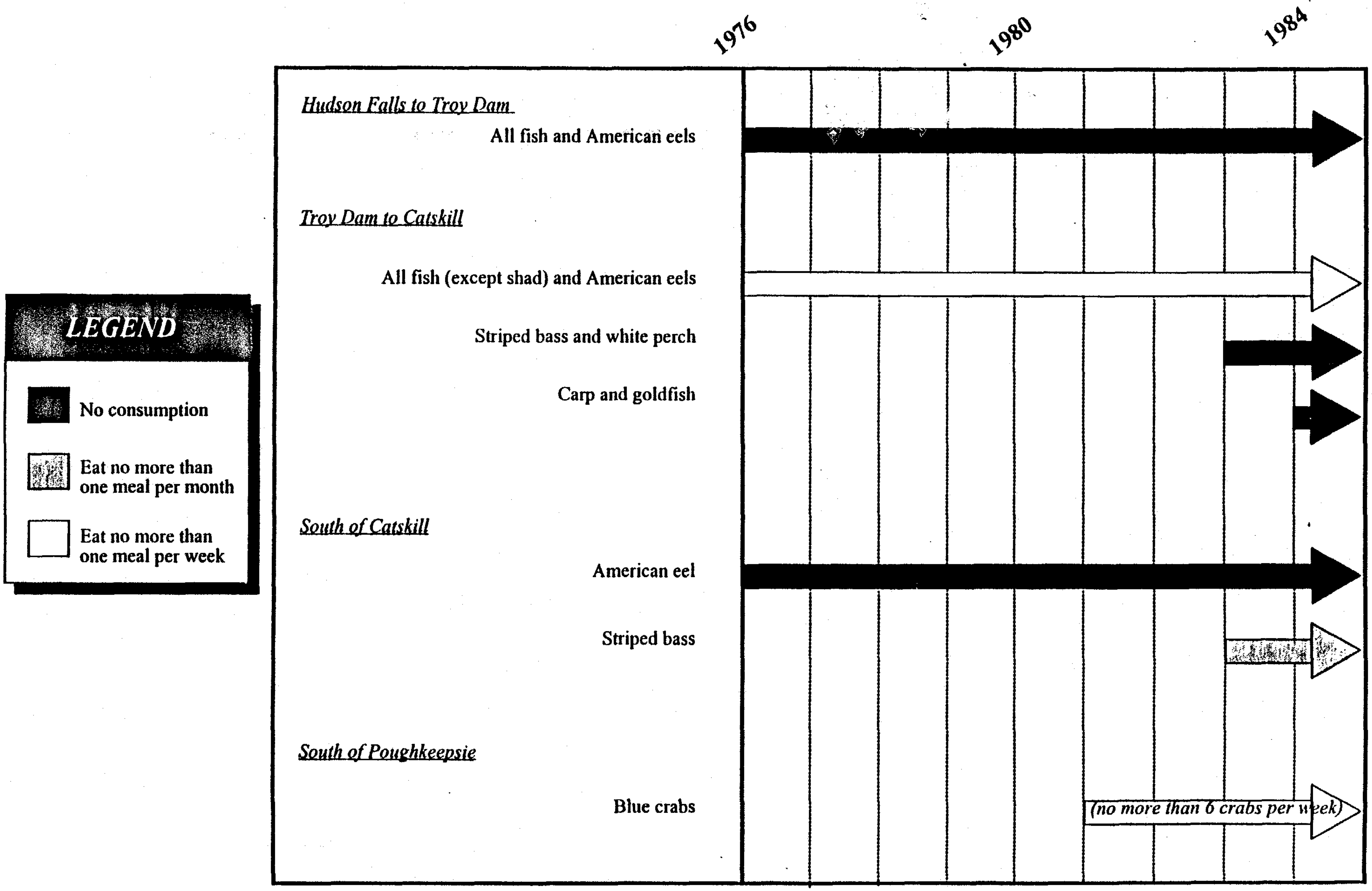
Medium or Organism	Basis	PCB Concentration (ppm)	Reference
Water (Fresh)			
EPA Ambient Criteria (AWQC)	chronic exposure/uptake (mink as sensitive species)	$1.4x10^{-5}$	USEPA (1980)
EPA Ambient Criteria	acute exposure (based on LC_{50})	$2.0x10^{-3}$	USEPA (1980)
NYS Ambient Criteria	chronic exposure (based on acute LC_{50})	$1.0x10^{-6}$	NYSDEC (1985)
Sediments			
	Probable Effect Concentrations for marine and estuarine ecosystems: Effects range - median	0.18	Long et al. (1995)
	Probable Effect Concentrations for freshwater ecosystems: Effects range - median	0.4	Long & Morgan (1990)
Fish			
body tissue	reproductive impairment in fish	0.4	EPA (1980)
body tissue	hazard to fish-eating wildlife (LOEL: 0.64 µg/g concentration in mink diet)	0.13	NYSDEC (Newell *et al.*, 1987)
eggs	decreased egg hatch; fry deformities	0.33	Niimi (1983)
Birds			
brain	bird mortality	310	Stickel et al. (1984)
whole egg	decreased egg hatch	5	Platanow and Karsted (1973)
Mammals			
mink[b]	dose	$1.54x10^{-3}$ $_{BW}$-d	Hornshaw et al. (1983)

<u>**Notes:**</u>
ppm concentrations refer to wet weight in diet/tissue and dry weight in soil/sediment
[a] None of these values are enforceable standards.
[b] Platanow and Karstad (1973) report a Lowest Observed Effects Level (dietary intake) of 0.64 ppm in mink.

Source: Adapted from (USEPA 1991)

EXH. T 13

Hudson River Fish Consumption Advisories*
(Chemical of Concern: PCB)
1976 - 1984

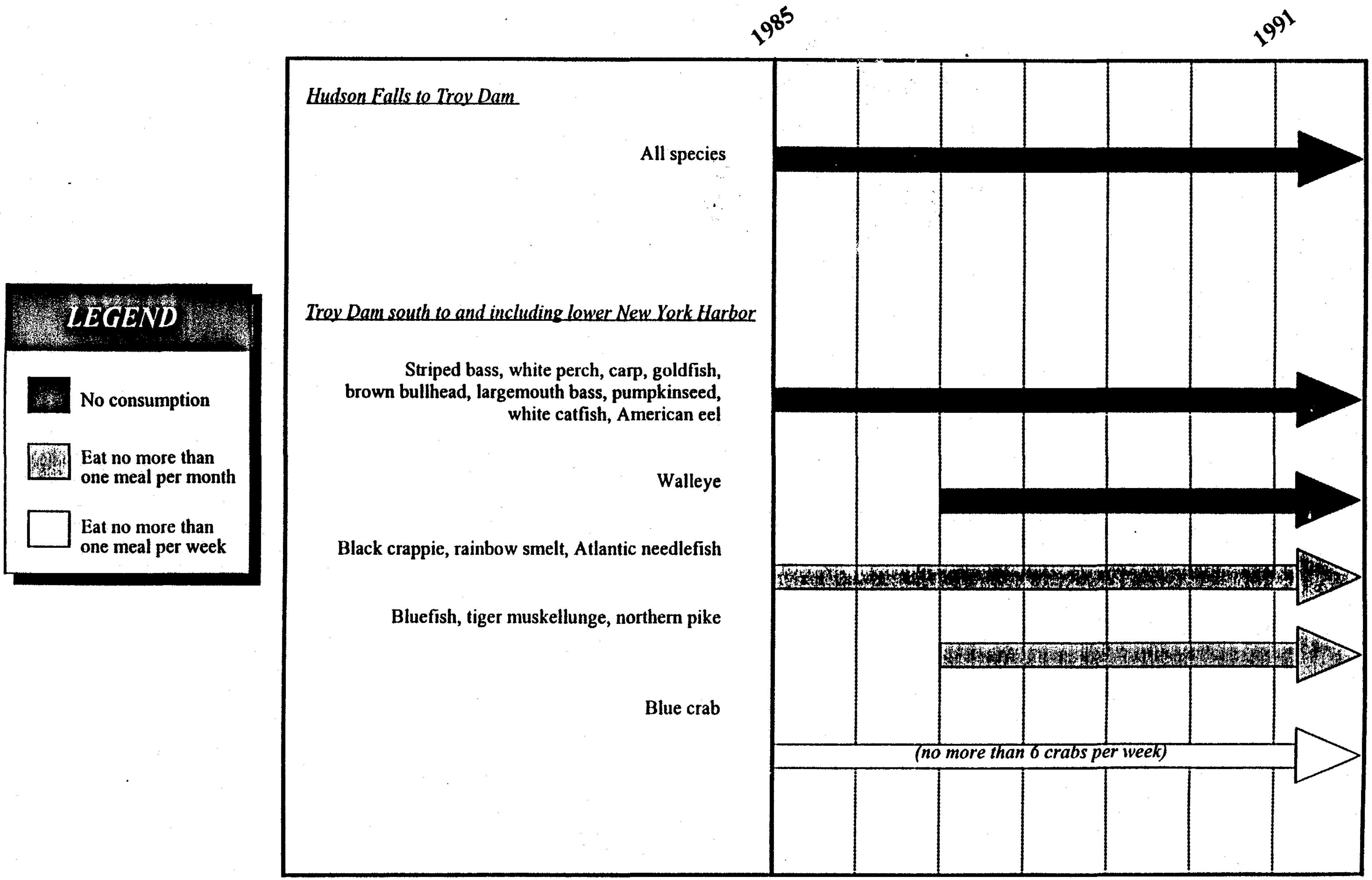


* It is recommended that infants, children under the age of 15, and women of childbearing age not eat any fish from the sections of the Hudson for which an advisory exists.

Source: (NYSDOH 1976 - 1998)

900093

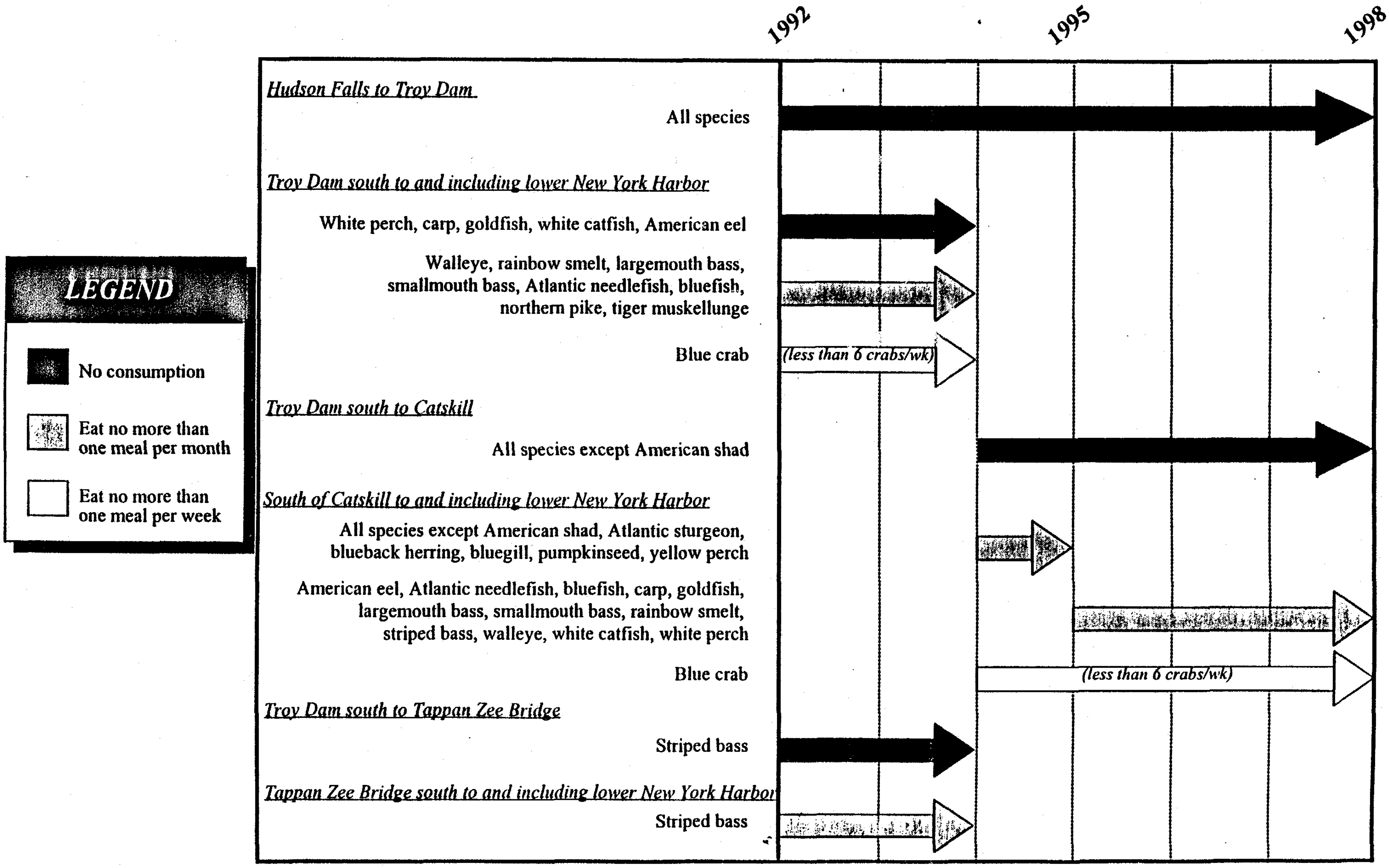
Hudson River Fish Consumption Advisories*
(Chemical of Concern: PCB)
1985 - 1991



* It is recommended that infants, children under the age of 15, and women of childbearing age not eat any fish from the sections of the Hudson for which an advisory exists.
Source: (NYSDOH 1976 - 1998)

EXHIBIT 1 (continued)

Hudson River Fish Consumption Advisories*
(Chemical of Concern: PCB)
1992 - 1998

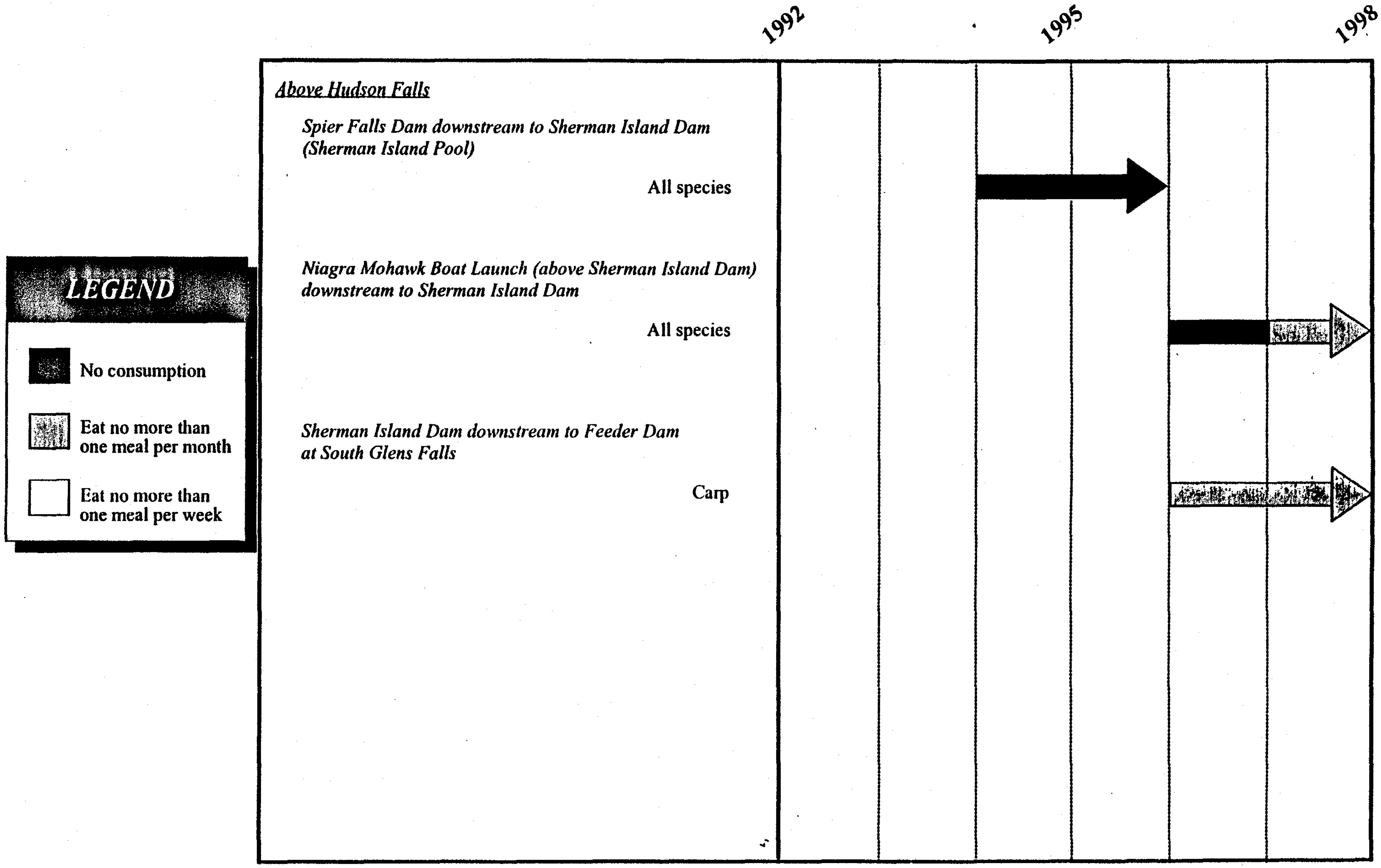


* It is recommended that infants, children under the age of 15, and women of childbearing age not eat any fish from the sections of the Hudson for which an advisory exists.

Source: (NYSDOH 1976 - 1998)

EXHIBIT (continued)

Hudson River Fish Consumption Advisories*
(Chemical of Concern: PCB)
1992 - 1998



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Source: (NYSDOH 1976 - 1998)