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Paul Simon, Esq.
Office of Regional Counsel
U.S. Environmental Protection Agency
Region II
290 Broadway
New York, NY 10007-1866

Re: Hudson River PCB Superfund Site: Lower River Sources of PCBs

Dear Mr. Simon:

I am writing on behalf of General Electric Company ("GE") to bring to EPA's attention recent data and analyses that reaffirm EPA's earlier conclusions about the importance of PCB sources in the Lower River and Harbor, particularly discharges from urban publicly owned treatment works ("POTWs") and combined sewer overflows ("CSOs"), to the estuary and the fishery which its supports, particularly the striped bass. EPA should consider this information in its reassessment of possible remedial alternatives for the Upper Hudson River PCB Superfund Site, and we request that this letter be placed in the administrative record for the Site.

In its Phase 1 Report, EPA recognized that discharges to the Lower River are important sources of PCBs to the Estuary. Relying on a variety of sources, including direct measurement, earlier estimates by other researchers, and modeling data, EPA attempted an estimate of PCB discharges into the Lower River. See EPA, "Phase 1 Report - Review Copy - Interim Characterization and Evaluation - Hudson River PCB Reassessment RI/FS" at section A-2 (1991) (hereinafter "EPA Phase 1 Report"). Based on a compilation of these data, EPA estimated that PCB discharges to the Lower River (not including Upper River contributions) ranged between 5.3 and 11.1 lbs/day and included contributions from tributaries, POTWs, CSOs and stormwater outfalls, atmospheric deposition and landfill leachate. Id. at Table A.2-2. EPA's estimate of the Lower River contributions may be low, because it does not appear to include contributions from industrial point source discharges.

More recent data collection by EPA and the New York State Department of Environmental Conservation ("DEC") as well as analysis by academics show that since the early 1980s, PCB discharges from POTWs, CSOs, and other facilities along the Lower River have been important sources of PCBs to the Lower River and Lower River fish. This conclusion is borne out through a comparison of the amounts of PCBs entering the Lower River from the Upper River with the amount entering the Lower River from Lower River discharges. It also is supported by analyses of the types of PCBs and other contaminants found in the sediment and striped bass in the Lower River. These two types of data demonstrate that sources other than GE's Hudson Falls and Fort Edward facilities have been providing significant loadings of PCBs to the Lower River and its fishery since the early 1980s.

Identifying and understanding sources of PCBs to the Lower River and its fishery is necessary if EPA is to comprehend the outcome of possible remedial actions in the Upper River. Although EPA is limiting its remedial evaluation to possible actions in the Upper River, the scope of the data and issues evaluated in the Phase 1 Report indicate that the Agency is examining whether and how such actions might affect the Lower River and the estuary. EPA's data show that loadings directly into the Lower River and estuary are now far more important to the biota in the estuary, particularly migratory fish, than loadings from the Upper River. Simply put, the presence of these other significant PCB sources means that actions to address Upper River loadings to the Lower River will have a negligible impact on the levels of bioavailable PCBs in the estuary.

There are several preliminary facts critical to a thorough understanding of the PCB issues in the Lower River and its fishery. First, the great mass of sediment entering the Lower Hudson River is transported rapidly to New York Harbor. According to one estimate, the inner Harbor receives 80% of the annual accumulation of fine-grained particles in the estuary. Olsen, et al., "An estuarine fine-particle budget determined from radionuclide tracers," *Geo-Mar. Lett.*, 4:157-160 (1984). Second, there is both a large amount of sediment transported to the Inner Harbor (on the order of 1.6 million metric tons/year), and a large amount of sediment dredged from the NY-NJ Port each year (averaging 2.72 million dry metric tons/yr). Chillrud, "Transport and Fate of Particle Associated Contaminants in the Hudson River Basin" at 16, Table 1-9 (1996). The dredged channels in the Harbor alone have an accumulation rate of 0.81 million metric tons per year. Id. Third, there is thorough mixing of sediment and related pollutants in the Harbor area by tidal action. Finally, given the large sedimentation rates, it is the surficial sediment layer, rather than buried sediments, which will impact the biological food chain and the fishery.

These facts mean that recent, rather than historical, PCB loadings provide the PCBs that are available to fish, such as the striped bass, that reside in and pass through the Harbor and Lower River. Moreover, the migratory nature of the striped bass and other fish, combined with the numerous other sources of PCBs outside the Hudson River and New York Harbor, mean that these fish are exposed to and can collect their PCBs from various locales other than the

Hudson River. At this time, we will not address the impact of PCB sources entirely outside the Hudson estuary system, but it is apparent that these sources must be considered and investigated to understand fully the PCB burden of fish in the Lower River. Given this migratory behavior, it is equally obvious that it is highly unlikely that migratory fish obtain all their contaminant load from the immediate vicinity in which they are caught, and that, therefore, the PCB loading throughout the Hudson estuary system, not primarily the upper estuary, is of central significance to understanding PCB levels in fish taken any place in the system.

1. The Quantity of PCBs from Lower River Sources Currently is Much Larger than the Quantity Entering the Lower River from the Upper River

Recent data collected by EPA and NOAA show that the loading of PCBs into the Lower River from Lower River sources has for some time been significantly larger than the loading coming over the Troy Dam from the Upper River. EPA has recently developed data, still incomplete, concerning the PCB discharges to New York Harbor from urban POTWs and CSOs that show that these discharges are a significant source of PCBs to the Lower River fishery. Preliminary estimates prepared by EPA Region II's Water Management Division indicate that the current average daily loading of PCBs to the New York Harbor from New York City and certain New Jersey POTWs and CSOs is 0.77 lb/day. See "New York/New Jersey Harbor PCBs Loading: A Review of the PCB Report submitted by New York City Department of Environmental Protection" (August 1995) and "New York/New Jersey PCBs Loading: A Review of the PCB Report Submitted by New Jersey Harbor Dischargers Group" (July 1995). As EPA notes in these reports, "these discharges are environmentally significant, and there is ample justification . . . to implement a track-down and clean-up program for significant dischargers of PCBs." Id.

As significant as these discharges are, EPA's preliminary estimate likely underestimates their true extent and clearly does not reflect all PCB discharges to the Harbor or Lower River. First, this estimate only includes POTW and estimated CSO discharges into the Harbor; it does do not attempt to quantify discharges from other sources into the Harbor or discharges elsewhere into the Lower River, which, as EPA's earlier estimates show, are significant. Second, in making its estimate, EPA relied on analyses of the sum of 71 PCB congeners in the influent and effluent from the New York City and New Jersey POTWs. To extrapolate from these results to derive total PCB discharges to the Harbor from these POTWs, EPA made various assumptions, including completely ignoring certain congener results where there were possible matrix interferences. By removing certain congener analyses from its estimate, EPA may have understated the total PCB discharges from POTWs and CSOs. Indeed, EPA's estimates of the 1995 discharges are less than half of Thomann's estimate of 1.60 lbs/day for these same discharges, see Thomann, et al., "Mathematical Model of the Long-Term

Behavior of PCBs in the Hudson River Estuary" (1989), and are well below EPA's earlier estimate of PCB discharges from POTWs in 1989 of 4.6 lbs/day. See EPA Phase 1 Report at A.2-3. This potential low bias in EPA estimates needs further evaluation.

Additional data collected by EPA shows the significance of PCB discharges to the New York Harbor from the Hudson River and other tributaries. A 1993 analysis of PCB congener concentrations prepared by Battelle for EPA, "Study of PCB in New York/New Jersey Point Sources," shows PCB concentrations of approximately 25 ng/l in the Hudson, Passaic, and Hackensack Rivers, and 13 ng/l in the Raritan River. Id. at 20-21. Concentrations of this magnitude in the New Jersey rivers could only derive from local sources.

Relying primarily on Batelle's data, EPA, DEC, the New Jersey Department of Environmental Protection, the United States Army Corps of Engineers and others have recently estimated the total load of PCBs to the Harbor to be 3.6 kg/day. See New York-New Jersey Harbor Estuary Program, "Comprehensive Conservation and Management Plan" at 79 (1996). They estimate tributary inputs (of which the entire Hudson upstream of the Harbor would be a part) form 50% of this load, with municipal point sources comprising 22%, storm water comprising 15%, CSOs contributing 10%, atmospheric deposition contributing 3%, and landfill leachate less than 1%.

NOAA, too, has recognized that the contributions of PCBs from the Upper River cannot account for all PCBs present in the Lower River. Comparing the rate of PCBs dredged out of the Harbor against the estimated 1981 input rate of PCBs to the Lower River at Troy Dam of 0.4 tonnes/yr, NOAA's report concluded that "input at the upper end of the tidal river in the late 1970's had fallen well below the rate of removal from the lower end of the river. Recent inflows from the upper Hudson obviously cannot account for the PCBs levels being found in the lower river." NOAA, "An Historical Reconstruction of Major Pollutant Levels in the Hudson-Raritan Basin: 1880-1980." at Vol. 3, p. 80 (1988). Although this report conjectures that various long-range transport mechanisms of PCBs from the Upper River might account for this discrepancy, it ignores the other significant sources of PCBs from Lower River discharges that the other reports described above have documented and which provide a far more obvious and direct explanation of the mass of PCBs found in the Lower River.

In fact, the amount of PCBs directly discharged into the Lower River is significantly larger than even the most conservative estimates of PCBs reaching the Lower River from the Upper River in recent years. The EPA Phase 1 Report, for example, estimates PCB loads over the Troy dam decreasing from 4.4 lbs/day in 1980 to approximately 0.3 lbs/day in 1991. EPA Phase 1 Report at B.4-27 to 28. Even assuming that all the Upper River discharges derived originally from GE (and such an assumption would be erroneous, see EPA Phase 1 Report, section B.2, which describes other Upper River PCB sources), these data demonstrate

that while GE's contribution of PCBs to the Upper Estuary may still be important, GE's contribution to existing bioavailable PCB contamination in the lower estuary sediments and biota is of limited significance.

2. Analysis of the PCBs Found in Lower River Sediment and Fish Show that a Large Proportion of Their PCBs Come From Non-GE Sources in the Lower River

There are compelling data showing that a large proportion of the PCBs found in Lower River sediments and striped bass are not of the type used or discharged by GE at Fort Edward and Hudson Falls and, therefore, must derive from other sources. This is because the Aroclors used at and discharged from GE's Fort Edward and Hudson Falls plants were the less chlorinated Aroclors 1016 and 1242, rather than the higher chlorinated Aroclors 1254 and 1260, which provide a higher proportion of PCBs to Lower River sediments and striped bass.

Sediment data collected in the Lower Estuary and Harbor demonstrate that the higher chlorinated Aroclors, as represented by Aroclors 1254 and 1260, have for some time been a significant source of PCBs. Based on analyses of New York Harbor sediment, Chillrud has concluded that (1) there was a decline in total PCBs found in the surficial sediment layers in New York Harbor from the early 1980s to 1989 and (2) urban POTWs and CSOs are the most significant current sources of PCBs to the Harbor and striped bass. Chillrud, "Transport and Fate of Particle Associated Contaminants in the Hudson River Basin" (1996). Chillrud bases his conclusions on two complementary sets of sediment data. He first analyzed the correlation of CUxs (a form of copper used as an indicator of discharges from urban POTWs and CSOs) to the hepta+octa PCBs (indicating higher chlorinated Aroclors) in New York Harbor sediment cores. His analysis showed a strong correlation between CUxs and hepta+octa PCBs, thus supporting the conclusion that the higher chlorinated PCBs derive from local urban sources and not Upper River sources. Id. at 157-60. Chillrud then examined the ratio of hepta+octa PCBs (indicating the higher chlorinated Aroclors) to total PCBs in these same sediment cores. His analysis showed that this ratio increased from just below 0.25 in 1974 to nearly 0.72 in 1989, indicating a substantial relative increase of the higher chlorinated Aroclors from urban POTWs and CSOs over time. Id. at 209. Although based on a limited number of sediment cores, Chillrud's analysis shows that the relative importance of PCBs from the Upper River (lower chlorinated Aroclors) in New York Harbor sediments has steadily decreased since 1975, while the relative importance of PCBs from urban POTWs and CSOs (higher chlorinated Aroclors correlated with CUxs) to these sediments has increased. Id. at 209. Chilrud concludes that not only are the Lower River/Harbor inputs more important now, these discharges will likely increase in importance over time.[1]

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[1] Chilrud's general conclusions are consistent with Bopp, who, in earlier studies of sediment cores in the New York Harbor, concluded that local sources of PCB inputs to the Harbor increased from approximately 25% of the total Harbor loading in 1971 to at least 50% by 1989. See Bopp,

(continued...)

Chillrud's thesis is supported by his comparison of PCB types and concentrations in Lower River sediments with those found in striped bass. Consistent with the relative increase in the higher-chlorinated Aroclors in sediment, Chillrud concludes that the decline in total PCB levels in striped bass since 1978 is driven almost entirely by the decline in the lower-chlorinated Aroclors. Id. at 215-219. In other words, while the levels of Aroclors 1016 and 1242 (associated with the Upper River sources) have declined in spring-caught striped bass downstream of Poughkeepsie over time, the levels of Aroclors 1254 and 1260 (associated with the Lower River sources) in these fish have remained fairly constant. Chillrud thus concludes that the Lower River and Harbor sources are now and will continue to be an important source of PCBs to striped bass in the Lower River and Harbor.

Thomann, *et al.* also conclude that Lower River PCB sources have controlled PCB levels in striped bass in the Hudson River for some time and, as inputs from the Upper River continue to decline, will become even more important in the future. Thomann, *et al.*, "Mathematical Model of the Long-Term Behavior of PCBs in the Hudson River Estuary" (June 1989). These researchers based their conclusions on the results of a complex model of fate, transport and striped bass bioaccumulation of PCB homologs in the Hudson River Estuary and surrounding waters, founded upon existing surface water, sediment, and fish data. Their model demonstrates the importance of the Lower River sources through a simulation run that shows that completely removing the "Upper River Source" does not measurably change the time by which PCB concentrations in striped bass will fall below 2 ppm (the FDA tolerance). This is so because "the impact of downstream inputs and sediment releases of PCBs is determining the time for recovery of the striped bass fishery to levels below 2 ug/g(w). The upstream load is contributing only about 10% to current striped bass PCB concentrations." Id. at 1-5.

Chillrud's and Thomann's conclusions are consistent with data collected by the DEC on the levels and types of PCBs in Hudson River striped bass. These data show that since 1982, the higher chlorinated Aroclors -- 1254 and 1260 -- comprise the bulk of the PCBs found in the striped bass in the reaches of the River downstream from Catskill:

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[1] (...continued)
R.F. and Simpson, H.J.. "Contamination of the Hudson River - The Sediment Record," in "Contaminated Marine Sediments - Assessment and Remediation" (National Academy Press) (1989); Bopp, R.F., et al., "Polychlorinated Biphenyls in Sediments of the Tidal Hudson River, New York," Environmental Science and Technology (Feb. 1981).

> Analysis of variance for the shift in PCB composition over the years, 1978-1994, indicates little change in the forms of PCB as presented in this report since 1982 (Tables 30 and 31, Figure 20). The bulk of the PCB (80-90 percent) after 1982 in striped bass is composed of the more highly chlorinated compounds as measured by estimates of Aroclors 1254 and 1260 as compared to that represented by Aroclors 1016, 1242 or 1248 (i.e., lesser chlorinated material).

NYSDEC, "PCB Paradigms for Striped Bass in New York State" at 16 (October 1995). EPA earlier recognized the importance of analysis of this phenomenon: :

> This observation is significant, because sewage inputs of PCBs to the estuary from the NYC metropolitan area are thought to be characterized by a larger percentage of higher chlorinated congeners than the input to the estuary from the Upper Hudson.

EPA Phase 1 Report at A.3-11. EPA's more recent direct monitoring of these discharges , described above, confirms that the higher chlorinated congeners predominate.

We recognize that these data must be reviewed with caution because the higher chlorinated PCBs tend to bioaccumulate at a higher rate and persist for a longer time in fish. Nevertheless, the predominance of the higher chlorinated PCBs in the striped bass underscores the presence of sources other than GE, a conclusion supported by Chillrud's analysis of Harbor sediment, Thomann's model, as well as the effluent data from New York and New Jersey POTWs and CSOs, all of which indicate that Lower River discharges provide primarily the higher chlorinated PCBs (Aroclors 1254 and 1260) to the Lower River and Harbor. E.g., Battelle, "Analysis of WPCP Influent and Effluent Samples for PCB and Dioxin - Dry Weather Events I and II for New York City Department of Environmental Protection" and "Laboratory Analytical Services on Wastewater Samples - Dry Weather Events I and II, Wet Weather Events I and II for New Jersey Harbor Dischargers Group". The higher levels of PCBs found in striped bass caught in the Harbor compared to fish caught further upriver or in deeper marine waters provides additional evidence of the significance of PCB discharges in the Harbor area as a source of PCBs to the striped bass. NYSDEC, "PCB Paradigms for Striped Bass in New York State" at 12-13, 18.

3. The Identification of Other PCB Sources is Critical to the Reassessment

These studies demonstrate that since at least the early 1980s, PCB discharges from sources other than GE's Fort Edward and Hudson Falls plants have been a significant source of PCBs to the Lower River and its sediment and fish. This is shown not only by the current

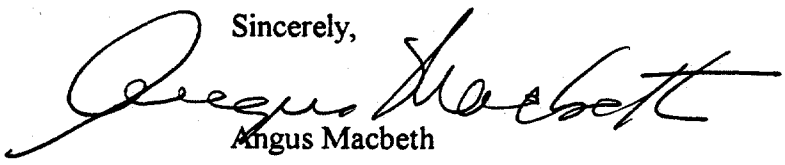
estimates of PCBs in the most significant Lower River discharges in relation to the amount of PCBs passing over the Troy Dam, but also from the current and historical sediment and fish data which indicate the increased importance of Harbor area sources since the early 1980s.

This understanding has significant relevance to EPA's ongoing reassessment of the Site and its consideration of possible remedial actions in the Upper River. As we note above, these data expose the fallacy that long-range transport of PCBs from the Upper River is the only or major source of PCBs to the Lower River and estuary and the fishery they support. Because Upper River loadings are only a small part of the story, actions to cut off these loadings will have little impact on the bioavailable levels of PCBs to the Lower River and estuary. Therefore in addressing possible remedial alternatives in the Upper River, the Agency must recognize that actions in the Upper River will do little to reduce PCBs levels in the striped bass and other migratory and resident fish in the estuary even if the remediation were completely effective in stopping PCBs entering the Lower River over the Troy Dam.

The recognition that there are important PCB sources other than GE also means that if EPA were to broaden its focus to consider the Lower River as part of the Hudson River Superfund site, the Agency would have to make a very substantial effort to identify and seek the participation of other PRPs. If the Agency were to address the Lower River as a Superfund site, it would have to evaluate the full array of PCB and other hazardous substance discharges to the Hudson estuary system for the relevant time period; the hydrodynamics of and transport of PCBs in the Upper and Lower Rivers, including the New York Harbor; the removal of material from the system; and the location, both longitudinally in the estuary system and in sediment depth, of the PCBs which contribute to the loadings in fish, such as the striped bass. The studies we have discussed provide much valuable information on these issues.

We trust the information we are providing is helpful to the difficult task you are addressing. We would be happy to meet with you to discuss this issue and the relevant data at a mutually convenient time if that would be useful to you.

Sincerely,



Angus Macbeth

cc: Richard Caspe
Douglas Tomchuck
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