Monsanto

FROM (NAME & LOCATION) **CORPORATE LAW DEPARTMENT**

DATE: September 15, 1975

cc: F. J. Fitzgerald - B3SA
D. B. Hosmer - E1SF

SUBJECT: Hudson River PCB -- NRDC Action Request

REFERENCE:

TO: Messrs. D. R. Bishop - B1ND
G. L. Bratsch - B3NA
W. R. Corey - B2SA
W. B. Papageorge - B2SK

SEP 15 1975

In view of the impending visit by the Walter Cronkite CBS news crew to the Krummrich Plant to film the PCB production unit, you might be interested in the text of the August 29, 1975, letter from the Natural Resources Defense Council to the EPA which requested the following action concerning PCBs. The letter, a copy of which is attached, requests that the EPA take the following action:

1. Take immediate action under Section 504 of the Federal Water Pollution Control Act (the "Emergency Powers" provision) to reduce PCB discharges into the Hudson River to a level which will insure that receiving water concentrations of two (2) parts per trillion will not be exceeded.

2. ". . . as early as possible and certainly within a very few years . . ." to commence enforcement nationwide of a "no discharge" policy regarding PCBs.

3. Immediate suspension of dredging activities in the Hudson River which might have the effect of disturbing PCB-contaminated sediments or sludges.

This letter, and/or the organization which prepared and submitted it, may have played a significant role in generating interest by the news media in this subject.

Phocion S. Park

/jf

Enclosure

PCB-ARCH0749798

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August 29, 1975

Russell E. Train
Administrator
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Mr. Train:

We are writing on behalf of the Natural Resources Defense Council and the Hudson River Fishermen's Association to request that you take immediate and decisive action under Section 504 of the Federal Water Pollution Control Act Amendments of 1972 (the Act) to curtail the discharge of polychlorinated biphenyls (PCB's) into the Hudson River from industrial and other sources.

As a result of past and continuing discharges of this extremely toxic and cancer-producing chemical from General Electric and other plants on the Hudson River, it is now almost impossible to catch fish in the Hudson which can be considered safe to eat under the existing Food and Drug Administration (FDA) contamination limits applicable to PCB's. Yet the Hudson supports an intense recreational and commercial fishery. It is estimated that approximately 22 million pounds of Hudson River striped bass are consumed each year from both commercial and sport catches. Accordingly, the continued discharge of PCB's into the Hudson constitutes a serious and imminent danger to the health and welfare of the public.

Ample authority exists under Section 504 of the 1972 Act for the Environmental Protection Agency (EPA) to correct this poisoning by a few firms of a major food

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and recreational resource. We urge that you initiate legal proceedings under this provision immediately. In the 1972 Act Congress declared the "national policy that the discharge of toxic pollutants in toxic amounts be prohibited." Section 101(a)(3). The current Hudson River situation presents a compelling case for the implementation of this important policy.

In the remainder of this letter we set out certain considerations which should be helpful to you in implementing Section 504. First, we will describe briefly the toxic and carcinogenic properties of PCB's. Next, we will summarize the data indicating the nature and extent of the Hudson River fishery. Then, we will set out the facts as we know them regarding the discharges of PCB's into the Hudson and the resulting contamination of the fish population. Finally, we recommend appropriate steps for EPA to take under Section 504 and otherwise.

I. Chronic Toxicity of PCB

The toxicity of PCB to humans has been clearly demonstrated. In 1968 a severe form of skin disease was diagnosed of Japanese families that consumed rice oil contaminated with Kanachlor 400 (PCB with 48% chlorine content). 1,2/ A total of 1,057 poisoning cases have been recorded to date in Japan, 3/ and the disease is characterized by swelling of the upper eyelids, visual impairment, acne-like formations and heightened pigmentation of the skin. 4/ Patients with this disease also exhibited neurological disorders and showed signs of hearing loss. Several babies born of women patients had many of the symptoms of the disease which indicated a placental transport of PCB,

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1/ R.D. Kimbrough, "The Toxicity of Polychlorinated Polycyclic Compounds and Related Chemicals," CRC Critical Reviews in Toxicology, January 1974, p. 445.

2/ M. Kuratsune, et al., "An Epidemiological Study on 'Yusho' or Chlorobiphenyls Poisoning," Fukuoka Acta Med., 60, 513, 1969.

3/ M. Kuratsune, et al., "Epidemiological Study of Yusho, a poisoning caused by ingestion of rice oil contaminated with a commercial brand of polychlorinated biphenyls," Environ. Health Perspectives, No. 1, 119, 1972.

4/ Op. cit., Kimbrough, p. 466.

and most fetuses were born smaller than the national average. 5/ Another disturbing feature of this disease was the observation that most patients recovered very slowly, which suggested that PCB was retained in the human body over a very long period. 6/

It should be noted here that human contamination with PCB's is not isolated. PCB's have been detected in human adipose tissue in such widespread occurrence that over 40% of the U.S. population contains 1 part per million (ppm) or more. 7/

A number of studies have conclusively shown the effect of PCB's on the reproduction of several animal species. At 100 ppm in the diet of experimental rats, PCB (Aroclor 1242 and 1254) 8/ caused a reduction in the number of offspring that were born. 9/ Similarly, in another study, dietary levels of as little as 20 ppm of Aroclor 1254 caused a decreased number of litters to be born to female rats. 10/ In a reproduction study carried out with minks, dietary levels of less than 1 ppm of PCB's caused a marked depression on the ability of minks to reproduce. 11/ The effects or PCB on the reproduction of

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5/ Ibid, p. 466-467.

6/ Op. cit., Kuratsune, et al., Environ. Health Perspectives.

7/ H.A. Price and R.L. Welch, "Occurrence of PCB's in Humans," Environ. Health Perspectives, No. 1, April 1972.

8/ Monsanto, the sole producer of PCB in the U.S., sells its product under the trade name, Aroclor. This product is sold under different formulations: Aroclor 1260, 1254, 1248, 1242, 1016, etc. The last two digits in this biphenyl series denote percentage of chlorine in the mixture. Aroclor 1016 is an exception to this nomenclature, since it contains 41% chlorine, and in fact is very similar in composition to Aroclor 1242. Other trade names abroad for PCB are: Kanaclor and Santhaterm in Japan, and Clophen, Flenclor, Phenoclor and Sorol in Europe.

9/ Op. cit., Kimbrough, p. 455.

10/ Ibid, p. 455.

11/ N.S. Platonow and L.H. Karstad, "Dietary Effects of Polychlorinated Biphenyls on Mink," Canadian J. Comp. Med., 37, 391, 1973.

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pheasants and chickens have also been demonstrated. Aroclor 1254 has a noticeable effect on both the production and hatchability of pheasant eggs. 12/ With chickens, dietary levels of as little as 10 ppm of Aroclor 1242 and 100 ppm of Aroclor 1254 caused thinning of eggshells, reduced egg production and reduced hatchability. 13/ In this context, it is important to note that homologs of PCB with lower chlorine content may have a greater effect on reproduction than biphenyls with higher chlorine content. In a recent review article on the toxicology of PCB, Dr. Renate Kimbrough of the Center for Disease Control in Atlanta, Georgia stated: 14/

> "The results obtained from the reproduction studies in birds particularly seem to indicate that the lower chlorinated biphenyls affect reproduction more than the higher chlorinated biphenyls, and it is very important to determine whether the lower chlorinated biphenyls that have been suggested as replacements for presently employed chlorinated biphenyls have an effect on reproduction."

In an extensive series of studies carried out by Dr. James Allen and his colleagues at the University of Wisconsin Medical School, PCB's fed in the diet of rhesus monkeys caused significant effects that mimicked both the symptoms of known human toxicity and reproduction failures in experimental animals. When female rhesus monkeys were given 25 ppm of Aroclor 1248 for a period of two months, severe symptoms of facial swelling and skin eruptions were manifested. 15/ At lower dietary levels of 5 ppm and 2.5 ppm (Aroclor 1248) similar clinical

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12/ R.B. Dahlgren, R.L. Linder and C.W. Carlson, "Polychlorinated Biphenyls: Their Effects on Penned Pheasants," Environ. Health Perspectives, No. 1, 89, 1972.

13/ M.L. Keplinger, O.E. Fancher and J.C. Calandra, "Toxicologic Studies with Polychlorinated Biphenyls," Toxicology & Applied Pharmacology, 19, 402, 1971.

14/ Op. cit., Kimbrough, p. 455.

15/ J.R. Allen, L.A. Carstens and D.A. Barsotti, "Residual Effects of Short-Term, Low-Level Exposure of Nonhuman Primates to Polychlorinated Biphenyls," Toxicol. & Appl. Pharmacol., 30, 440, 1974.

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symptoms were observed after a few months, and more significantly, these low levels of PCB caused marked effect on reproduction. After three matings with male monkeys, only 12.5% of the 5 ppm PCB dietary group and 37.5% of the 2.5 ppm group were pregnant as compared to 90% pregnancies with a comparable control group. 16/ At the same time, fetuses that were born were significantly smaller in size and continued to ingest high PCB levels from the nursed milk of their mothers. 17/ These effects at low PCB levels are particularly important to note, since the present Food and Drug Administration tolerance limit for PCB residue in fish and shellfish is 5 ppm, 18/ and were based on an assumption of a higher no-effect level.

Of serious concern is a recent study conducted by a group of research investigators at the Center for Disease Control, Atlanta, Georgia, the U.S. Environmental Protection Agency, the National Cancer Institute and the Johns Hopkins University School of Medicine. 19/ They observed that when Sherman strain female rats were fed 100 ppm of PCB (Aroclor 1260) for about 21 months, 26 of 184 of the experimental animals examined had malignant liver tumors (hepatocellular carcinoma), whereas only 1 of 173 control animals had the same disease. At the same time 146 of the experimental and none of the control animals had tumorous lesions (neo-plastic nodules) in the liver. That PCB's can cause malignancies in experimental animals is not altogether surprising, since it has been pointed out in the studies with rhesus monkeys that PCB is metabolized to a potent carcinogenic intermediate compound, the arene oxides: 20/

16/ J.R. Allen, "Response of the Nonhuman Primate to Polychlorinated Biphenyl Exposure," Federation Proceedings, 34, 1675, 1975.

17/ J.R. Allen, University of Wisconsin Medical School, Regional Primate Research Center, Madison, Wisconsin, private communication.

18/ Federal Register, Vol. 38, No. 129, p. 18096, July 6, 1973.

19/ R.D. Kimbrough, R.A. Squire, R.E. Linder, J.D. Strandberg, R.J. Montali and V.W. Burse, "Induction of Liver Tumors in Sherman Strain Female Rats by Polychlorinated Biphenyl Aroclor 1260," preprint of study obtained from R.D. Kimbrough, Center for Disease Control, Atlanta, Georgia.

20/ Op. cit., Allen, Federation Proceedings, p. 1679

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> "The arene oxides have been shown to be strong alkylating agents capable of producing sufficient changes in the proteins and nucleic acids to cause death or neoplastic transformations in affected cells."

Other toxic effects of PCB that have been reported in the scientific literature include:

1. increase in the biological activity of certain hydroxylating enzymes in the liver and increased estrogenic activity in the rat,

2. induction of liver porphyria in several animal species,

3. interference with the immune defense mechanisms of rabbits,

4. neurological disorders in rats,

5. increased PCB residue in fatty tissues, serum and milk, and

6. teratogenic effect in the chick embryo. 21, 22/

After reviewing data such as the preceding, the Lake Michigan Toxic Substances Committee made the following observations in its draft report: 23/

> "1. The effect level of PCBs in primates reproduction is recently documented as less than 2.5 ppm and is much lower than has been observed in Standard test mammals (rats).

21/ "Polychlorinated Biphenyls and the Environment," Interdepartmental Task Force on PCB's, Washington, D.C., May 1972.

22/ J.R. Allen and D.H. Norback, "Polychlorinated Biphenyl and Terphenyl-Induced Gastric Mucosal Hyperplasia in Primates," Science, 179, 498, 1973.

23/ Environmental Protection Agency, et al., State of Concerns of the Lake Michigan Toxic Substances Committee Related to Polychlorinated Biphenyls, draft, July, 1975, p. 21.

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> 2. As a result of recent court decisions the FDA is now enforcing the 5 ppm residue maximum in fish intended for human consumption and is likely to review the 5 ppm maximum allowable based on recent primate toxicological evidence."

The FDA review of its 5 ppm residue maximum referred to by the Lake Michigan Committee is timely and essential. Our present judgment is that the available data support at least an order-of-magnitude reduction of this PCB residue maximum, i.e. at least a reduction to 0.5 ppm. Significantly, this recommended 0.5 ppm maximum permissible PCB concentration in fish is the same as that recommended by the National Academy of Sciences and the National Academy of Engineering in Water Quality Criteria, 1972 24/ and by EPA in its proposed Criteria for Water Quality. 25/

II. Importance of Hudson River Fishery

The Hudson River is a productive breeding ground for fish, not only for resident species such as white perch but for migratory oceanic species like striped bass, shad and herring. The shortnose sturgeon, which has been classified as an endangered species, is also an inhabitant of the Hudson River. 26/

24/ NAS-NAE, Water Quality Criteria, 1972, p. 177.

25/ EPA, Criteria for Water Quality (Proposed), October, 1973, p. 21.

26/ U.S. Department of the Interior, "Endangered Species of the United States," Bureau of Sport Fisheries & Wildlife, U.S. Fish & Wildlife Service, 1970. Because the sturgeon is a bottom-feeding fish, eating mostly snails, clams and crustaceans, as well as plants, it may be particularly threatened with PCB contamination. Any failure by EPA to act with respect to PCB effluents in the Hudson would appear to violate Section 7 of the Endangered Species Act of 1973, 16 U.S.C. § 1536, which requires all agencies of the federal government to take such actions necessary to "insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species . . . or result in the destruction or modification of habitat of such species determined by the Secretary [of the Interior] . . . to be critical."

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Striped bass are the most economically important of the fish that spawn in the Hudson since the species supports a major recreational and commercial fishery. For that reason, too, it is a species of particular concern in terms of invoking Section 504 because of the high levels of public consumption of Hudson River striped bass and the economic dependence of commercial fishermen on the species.

The weight in 1970 of the striped bass commercial catch in the New England Region plus New York State (including the Hudson River) was 2,780,000 pounds. 27/ The weight in 1970 of the striped bass sport catch in the North Atlantic (which includes New York State) was 45,844,000 pounds. 28/ Hudson-spawned striped bass are a major component of the Atlantic stock. Though estimates have varied, there is no doubt that the contribution is substantial. The Staff of the Nuclear Regulatory Commission 29/ has taken the position that:

1. The Hudson River stock is the major source of striped bass caught in the Hudson River, the western half of Long Island Sound, and the New York Bight (Barnegat Inlet, N.J. to Moriches Inlet, N.Y.). In this "Inner Zone" of influence the NRC Staff estimates that more than 50% of the sports and commercial landings are made up of Hudson-spawned striped bass and uses a figure of 90% for its own estimates. 30/

2. In the "Outer Zone" of influence, extending from Maine to Cape May County, N.J. (less the Inner Zone), Hudson-spawned striped bass constitute somewhere between 10 and 50% of the sports and commercial fishery.

27/ National Marine Fisheries Service Publication, "Fisheries Statistics of the United States," 1971.

28/ Deuel, D.G., "1970 Salt-Water Angling Survey," U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Current Fishery STatistics No. 6200, 1973 .

29/ Final Environmental Statement (FES), Operation of Indian Point Nuclear Generating Station Unit No. 3 (Consolidated Edison Company of New York, Inc.), February 1975.

30/ FES, p. V-169.

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The average annual commercial catch of striped bass for the years 1961-1969 in the Inner Zone was 268,200 pounds. 31/ Using the NRC's 90% figure, 241,400 pounds represents the average annual commercial catch in the Inner Zone attributable to Hudson River striped bass. The average annual commercial catch in the Outer Zone is 1,969,000, 32/ 50% of which is 984,500 pounds. The annual total for commercial catch of Hudson River striped bass is therefore estimated to be about 1,200,000 pounds.

In 1970, a pound of striped bass would bring a commercial fisherman $.26/lb. on the average. The retail price would be, at a minimum, 3 times that amount. Striped bass is now selling at $1/lb. in New York. Using this retail value of $1/lb., the value of the commercial catch of Hudson River striped bass appears to be in the range of $1.2 million per year.

In 1970, the striped bass sports catch exceeded the commercial catch in the North Atlantic (which includes N.Y. State) by a factor of 16.5. 33/ Assuming an annual commercial catch of 1,200,000 pounds of Hudson River striped bass, one can extrapolate to a sports catch of 21,200,000 pounds. This amount represents a little less than 50% of the 45,844,000 1970 sports catch of striped bass in the North Atlantic and, therefore, is if anything an underestimation of the Hudson River sports catch. In sum, something on the order of 22,000,000 pounds of Hudson River striped bass are probably consumed each year, if we combine these commercial and sports catch figures. Moreover, the problem is even more serious than the above information would indicate. The striped bass is a migratory fish with stock from various sources (e.g., the Chesapeake, Delaware, and Hudson) intermingling. Since there is no way to distinguish origin of a striped bass, the entire North Atlantic stock may be contaminated.

III. Hudson Fish Contamination and Industrial Dischargers

Studies performed over the past few years by both EPA and the State of New York confirm the severe contamination of Hudson River fish by PCB's. New York State results, for example, show

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31/ FES, Table V-24.

32/ FES X 1-86.

33/ FES, p. V-176.

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that striped bass samples collected in 1973 at the Tappan Zee Bridge area had PCB levels ranging between 3.7 ppm and 49.6 ppm, with over 80% of the fish sampled in excess of the FDA maximum of 5 ppm. Striped bass samples collected this year had levels averaging around 6 ppm, with one sample as high as 37.8 ppm. Results typically higher than 5 ppm have been found at other Hudson sites.

EPA investigators have found similar results in the Hudson Falls - Ft. Edward Area. 34/ This study yielded PCB concentrations in yellow perch averaging 17 ppm. Shiner minnows ranged from an average of 7 ppm at one site above the General Electric plants to 78 ppm below them. A sample of rock bass below GE contained 350 ppm. The EPA report noted:

> "It is significant that the shiners and snails both contained PCB's, especially since these species are important grazers upon periphyton communities and serve as food for large consumers, namely the game fish; i.e., pike, pickeral, bass and larger yellow perch.
>
> The PCB level in the rock bass is greater than the maximum level documented for fish taken from any industrial river of the U.S. (Nisbet & Sarofim, 1972). This represents a new record for PCB contamination of fresh water fish.
>
> Although the game fish species are not commercially utilized in this stretch of the Hudson, sport fishing is a common widespread recreational activity for the inhabitants of Hudson Falls and Ft. Edward."

Industrial and related discharges are the principal source of PCB's in surface waters. The chemical is biomagnified as it moves up the food chain to fish which may eventually be caught and eaten by people. The PCB's remain biologically active throughout this process. Significantly, the Lake Michigan Committee made the following recommendation:

34/ R.J. Nadeau and R.P. Davis, "Investigation of Polychlorinated Biphenyls in the Hudson River: Hudson Falls-Fort Edward Area," EPA Region II Report, circa October, 1974.

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> "Because biological accumulation of PCBs by fish and other aquatic organisms has been documented as greater than 40,000 and 75,000 times the exposure level respectively, it is recommended that PCBs do not enter the receiving waters of Lake Michigan at detectable concentrations." 35/

There appear to be several point sources discharging PCB's into the Hudson. Prominent among them are the General Electric facilities at Hudson Falls - Fort Edward. In its NPDES permit application GE indicated that it was regularly discharging approximately 30 lbs./day of PCB's from these plants into the Hudson, and this is the amount the company is permitted to discharge today under its proposed EPA permit. The amount actually being discharged by GE today may be somewhat smaller but is still far in excess of acceptable levels. For example, EPA's proposed permit limit on PCB's (which is presently under challenge by GE and is not in effect) would require GE to reduce its PCB discharge to roughly 1/4 pound per day over the next two years. Yet even a discharge of 1/4 pound per day would result in an estimated concentration of PCB's in the Hudson 10 times higher than that recommended by the NAS-NAE and EPA. 36/ In light of the large past and continuing discharges of PCB's from these GE plants, it is not surprising that the EPA study concluded that the contamination of aquatic species at the sites downstream of the GE plants "is probably from the General Electric outfalls" and that "the high level of contamination in the downstream sediments is probably from the Ft. Edward [GE] outfall." 37/ The EPA analysis of the fish samples taken below

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35/ Lake Michigan Committee Report, op. cit., pp. 12-13.

36/ Both Water Quality Criteria, op. cit., and Criteria for Water Quality (Proposed), op. cit., recommend that the receiving water concentration of PCB not exceed 2 parts per trillion (ppt). Using a stream flow of 2000 cfs, in-stream dilution of a discharge containing .25 lbs./day yields a downstream PCB concentration of roughly 20 ppt.

37/ "Investigation of PCB's in the Hudson River," op. cit., p. 15.

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the GE outfalls indicates that the PCB in the edible tissue appeared to be a mixture of Aroclor 1242 and 1016. 38/ Aroclor 1242 was the PCB mixture discharged by GE until about two years ago, at which time Aroclor 1016 was substituted.

IV. Recommended EPA Actions

Under Section 504 the EPA Administrator is given the authority to seek whatever emergency relief may be necessary to deal with pollution sources presenting "an imminent and substantial endangerment to the health of persons or to the welfare of persons." In light of the evidence outlined here -- fish consistently contaminated with PCB's far above acceptable levels, the great danger to the public health posed by ingestion of PCB's, and the adverse economic impact on a major national commercial fishery which depends on the Hudson -- we believe that EPA must use its emergency powers to curtail the discharge of PCB's.

The harm posed by the continued discharge of PCB's into the Hudson unquestionably meets the criteria set out in Section 504. There is clearly an "endangerment" to human health, since continued ingestion of sport and commercial fish contaminated with PCB's presents a "liability or exposure to harm or injury" (Oxford English Dictionary). The endangerment is also "substantial," as amply documented by the scientific studies on the adverse effects of PCB ingestion and the information available on the size and nature of the Hudson River fishery. Furthermore, the endangerment is "imminent" ("impending threateningly, hanging over one's head" -- Oxford English Dictionary). Imminence does not require actual illness or death from the pollution, though illness certainly may have occurred already. Likewise, there is a serious and imminent endangerment to the welfare of commercial fishermen who make their living selling fish from the Hudson.

We therefore call upon you to take the following steps:

1. To initiate legal actions pursuant to Section 504 to reduce the PCB discharges from all industrial and other point sources on the Hudson, including for example the General

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38/ Memoranda from Gilman D. Veith, Ph.D., Research Chemist, National Water Quality Laboratory, Duluth, to Dr. Rogal L. Nadeau, EPA, Region II, September 13, 1974, and October 23, 1974.

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Electric plants, to a level which will ensure that receiving water concentrations of 2 ppt will not be exceeded and that, to the fullest extent possible, PCB contamination levels in edible species will not exceed .5 ppm. 39/ These levels should be achieved on an urgent basis within a period not to exceed one year.

2. To announce that as early as possible and certainly within a very few years EPA will commence enforcement on a nationwide basis of a strict policy of no discharge regarding PCB's. Such a policy could, and hopefully will, result in a ban on PCB manufacture or use. There are excellent reasons to believe that PCB substitutes exist, even for the one allegedly indispensable use -- a dielectric fluid in transformers and capacitors. Possible substitutes in transformers and/or capacitors include mineral oil, silicones, alkylated chlorobiphenyloxide (Dow XFS:4169L), and dioctyl phthalate. 40/ Japan now has a ban on PCB's, and Canada is seriously considering such a step.

3. To impose, in cooperation with other federal and state agencies, an immediate moratorium on all dredging activities in the Hudson which might have the effect of disturbing PCB contaminated sediments or sludges. Extensive investigations should be undertaken of the potential effects of such dredging.

39/ See the discussion on p. 7 and in note 36, supra.

40/ We do not by these references endorse any of these specific substances.

We appreciate this opportunity to share our views with you on this important matter. Please let us know in what ways we can cooperate further with you in this effort.

Respectfully,

J.G. Speth

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cc: Stanley Legro