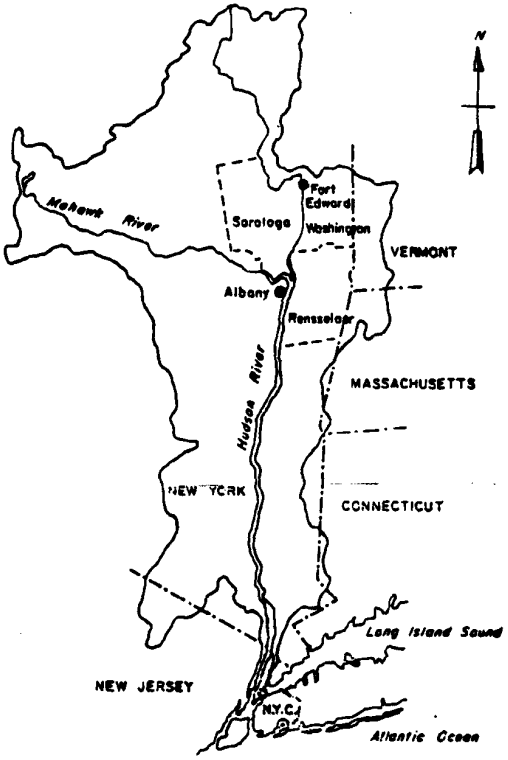
ENVIRONMENTAL IMPACT STATEMENT

ON THE HUDSON RIVER PCB RECLAMATION DEMONSTRATION PROJECT

SUPPLEMENTAL
DRAFT
AUGUST, 1981



U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II
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NEW YORK, NEW YORK 10278

CHAPTER 1

Introduction

ERRATA

THE 45 DAY COMMENT PERIOD FOR THIS DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT WILL END ON OCTOBER 13, 1981 NOT OCTOBER 6, 1981 AS STATED IN THE ATTACHED COVER LETTER.

CHAPTER 1
INTRODUCTION

The purpose of this Supplemental Draft Environmental Impact Statement is to respond to comments received from the public concerning the Draft Environmental Impact Statement (DEIS) on the Hudson River PCB Reclamation Demonstration Project issued on May 8, 1981. Comments were received during the three public hearings and during the 45 day public review period for the DEIS. This Supplemental DEIS also serves to modify parts of the text of the DEIS based on comments and recently acquired information.

Included in this Supplemental DEIS as an appendix is the Response to the Executive Summary prepared by the New York Department of Environmental Conservation (NSYDEC). This document includes a description of the monitoring and contingency plans that would apply if the recommended project is implemented.

I. Summary of Public Hearings

Three public hearings on the DEIS were held at the following locations and times:

June 23, 1981: 7:00 PM
Washington County Courthouse
Route 4 and Maple Road
Hudson Falls, N.Y..

June 24, 198I: 7:00 PM
Dutchess County Community College
Pendell Road
Poughkeepsie, N.Y.

June 25, 1981: 6:30 PM
2 World Trade Center
Main Hearing Room, 44th floor
New York, N.Y.

Public notice of these hearings was made available through an Environmental Protection Agency (EPA) notification as well as through news releases in local

newspapers in Albany, Poughkeepsie, and New York. The meetings were co-chaired by the EPA and the Army Corps of Engineers (COE). Representatives of EPA, the COE, and WAPORA, Inc. participated in the presentation and were available to answer questions and comments.

EPA and COE opened the hearing with a brief synopsis of the purpose of the hearing and format. WAPORA, Inc. followed with a presentation of the key project issues, findings of the DEIS, and recommendations.

EPA invited all parties to make comments during the hearing and submit any additional written comments on the DEIS or COE permit to EPA prior to July 6, 1980. The following is a summary of comments made at the public hearing or received after the public hearing during the 10 day comment period. Responses to comments are contained in Chapter 3 of this report, and a complete list of organizations and individuals from which comments were received is on pages 4-1 and 4-2.

1. HUDSON FALLS PUBLIC HEARING

Most of the comments expressed at the Hudson Falls public hearing were in opposition to the proposed project. Verbal and written comments were submitted by local government representatives, farmers and landowners with property near the proposed containment site, and other concerned organizations and individuals. The Citizen-Environmentalists Against Sludge Encapsulation (CEASE, Inc.) expressed disapproval of the site and presented preliminary results of a poll they conducted of public opinion about the proposed project. The PCB Project Citizens Advisory Committee (CAC) presented comments and recommendations but had not yet taken a position for or against the project. The New York Farm Bureau and the Warren-Washington County Farm Bureau expressed oposition to the project. The main areas of concern raised at the hearing were:

- Too little emphasis given to agriculture in the DEIS;
- Potential reduction in property values, especially for farms, near the containment site;
- Public health concerns about the dredging and containment operations;

- Long-term stability of the containment site;
- The need for detailed monitoring and contingency plans for the project;
- Possibility of detoxification of dredge spoils instead of long-term containment; and
- Presence of trace contaminants associated with PCBs at the containment site.

2. POUGHKEEPSIE PUBLIC HEARING

Almost all comments at the Poughkeepsie Public Hearing were in support of the project, although most approvals were expressed with concerns and recommendations. Several major environmental groups gave conditional approval of the project, including:

- Sierra Club
- Hudson River Fishermen's Association
- Scenic Hudson
- Clearwater, Inc.
- National Audubon Society.

Most of the comments and recommendations concerned the following subjects:

- Preference for the full-scale project, but qualified approval for the reduced-scale project;
- Safety of downstream drinking water supplies during and after dredging operations;
- Need for identification and mitigation of the unknown source of PCBs in the upper Hudson River;
- Need for detailed monitoring and contingency plans for the project;
- Importance of continued monitoring of fisheries;
- Education of local people about potential hazards of eating contaminated fish;
- Need for team of experts to oversee all phases of the project; and
- Urgency of implementing the project as soon as possible to avoid further dispersion of hot spots.

3. NEW YORK CITY PUBLIC HEARING

Comments received at the New York City Public Hearing were generally in support of the recommended project, although most approvals were expressed with comments and recommendations. The following organizations gave full or conditional approval:

- The Port Authority of New York and New Jersey
- New York City Department of Ports and Terminals
- Save Our Port
- International Union of Operating Engineers Local 251
- Seafarer's International Union
- United New York and New Jersey Sandy Hook Pilots Association.

The Natural Resources Defense Council, Inc., raised a variety of issues about PCB transport mechanisms in the Hudson River, wetland hot spots, monitoring, and other subjects they believed were not adequately addressed in the DEIS. Most comments and recommendations made by organizations and individuals at the hearing involved the following subjects:

- Concern about PCB contamination of New York Harbor sediments, and implications for future maintenance dredging and ocean disposal of spoils;
- Underestimation in DEIS of major benefits of the proposed project for New York Harbor;
- Concern over drinking water supplies taken from the Hudson River;
- Need for detailed monitoring and contingency plans for the project;
- Preference for the full-scale project, but qualified approval for the reduced-scale project;
- Need to identify the unknown source of PCBs in the upper Hudson River;
- Need to assess the stability of remnant deposits.

2. Page 1-10

The first sentence of the first paragraph is revised as follows:

All fishing in the Hudson River between Fort Edward and the Troy Dam is prohibited.

3. Page 2-5

First paragraph, first sentence, is modified as follows:

The bioassay matrix presently used by EPA, the COE and the United States Fish and Wildlife Service (USFWS) for determining the viability of ocean disposal of PCB contaminated sediments indicates that organisms are presently showing uptake from sediments in the 1 ug/g (ppm) and below range. A flood event could cause concentrations to increase to levels which would preclude ocean dumping.

4. Page 2-25

The following sentences should be added to the second paragraph:

An access road to remnant deposit 3 already exists. It was constructed for the removal of remnant deposit 3A in 1978.

5. Page 2-40

The following paragraph should be inserted after paragraph three:

Franklin Research Institute, Philadelphia, Pennsylvania, has recently developed a process which could detoxify PCB contaminated materials. In this process, a polyethylene glycol reagent is used to strip the PCB molecule of chlorine atoms. The sodium in the reagent then combines with the chlorine to form a salt. The biphenyl molecule can then be broken down

by bacteria in a landfill. This process is still pending approval by EPA. EPA plans to evaluate the process in the near future with tests on PCB-contaminated soils. If successful, the process will also be evaluated with Hudson River sediments by EPA laboratory tests. Depending on these test results, the cost-effective feasibility of the process for a full-scale application will be determined.

6. Page 2-43

The third paragraph, first sentence, is revised as follows:

During each dredging season, the proposed site would receive spoil from the dredging operations. The maximum dredging season will extend from May through November of each year.

7. Page 3-17

The second paragraph, last sentence, is revised as follows to reflect the 1980 EPA criteria for PCBs:

Replace 0.16 ug/l (ppb) with 0.079 ng/l (ppt) for a lifetime cancer risk of one in one million.

8. Page 3-27

The following sentence should be added to the end of the first paragraph under the section entitled "1980 Fisheries Data":

Latest preliminary data from NYSDEC indicate that PCB levels in pumpkinseed sunfish in the upper Hudson River have increased substantially in the last year (Pirone, PCB Settlement Advisory Committee, June 24, 1981). NYSDEC is presently investigating the reason for this increase.

13. Page 4-59

The last two sentences of the first paragraph should be deleted and replaced with:

The possible use of such measures results from an air quality analysis performed by WAPORA, using extremely adverse meteorological conditions and emissions estimates developed by HydroQual (Appendix J), which indicated the potential for a violation of the NYSDOH guideline. However, under normal meteorological conditions and dredging conditions, it is predicted that the NYSDOH guideline will not be exceeded with any regularity.

14. Page 4-63

The first paragraph, first sentence, is modified as follows:

...the PCB levels in the various crops...should be monitored at approximately 100 m (330 ft) intervals to a distance from the containment site at which all foliar PCB levels reach background levels of forage.

The last sentence is deleted and replaced with the following:

Buckley's work also indicates that background levels will be reached at 200 m (650 ft) from the containment site and monitoring should be carried out to this distance.

II. AIR QUALITY ANALYSIS

An air quality analysis was performed by WAPORA, Inc., as part of DEIS in order to assess the effect of PCB volatilization from the proposed containment site on ambient concentrations of PCBs downwind of the site. To be consistent with the NYSDOH proposed guideline of 1 microgram (ug)/cubic meter (cu m) averaged over a 24-hour period (Appendix I of the DEIS), "worst case" concentrations of PCBs were predicted at residences nearest the containment site. Below is a review of the methods used in the air quality analysis.

The general approach followed in performing this analysis was to identify a series of worst case conditions or values for each of the various emission, meteorological, and site operation parameters used in modeling the dispersion of PCBs as an airborne pollutant, and then to determine maximum PCB concentrations assuming that these worst case values occur simultaneously. Whenever it was necessary to make assumptions in quantifying these parameters, preference was given to the particular assumption that would lead to an upper bound of all possible impacts rather than to an average impact. Maximum pollutant concentrations obtained following this approach therefore conform to the intent of the NYSDOH recommendation, which specifies a concentration not to be exceeded.

While it is theoretically possible that, individually, any of these worst case conditions might occur during the filling of the containment site and before it is capped, it is extremely unlikely that all of these conditions would occur simultaneously, as assumed in the analysis. Consequently, the PCB concentrations can properly be interpreted as representing an upper bound on the maximum values possible. Actual concentrations are expected to be considerably below the theoretical worst case values presented.

Ambient pollutant concentrations at a receptor are affected by the emission strength of the pollutant as it leaves the source, the vertical and horizontal distance between the source and receptor (as well as by the presence of obstructions or irregular terrain features between the two), and the prevailing meteorological conditions during the time the pollutant is dispersed. Air quality models, which are mathematical representations of how these various factors combine to determine downwind ambient concentrations, are commonly used to estimate present and future pollutant concentrations. The following paragraphs briefly discuss the methodology, including the dispersion model, input data and assumptions, which lead to the prediction of worst case PCB concentrations.

EPA's PTMPT computer dispersion model, normally used to model emissions from point sources of pollution, was adopted to this study by: 1) suppressing the plume rise feature of the model so that the effective "stack heights" of the

sources are near ground level; 2) dividing the containment site into 25 cells, each with its own emission rate (depending on cell size and turbulence); and 3) modeling each cell as a "virtual point source" of pollution. These virtual or imaginary sources represent the upwind locations where each pollutant plume would have to originate from a stack in order to reach the horizontal dimensions of the containment cell on its way to a downwind receptor. Figure 4-1 shows the modeling of the containment site as emission cells, the location of the nearest residence, and the direction of the critical wind angle, which was found by the computer model to maximize PCB concentrations at the receptor.

Since there are no meteorological data for the containment site environs, and since the complex geography of the area precludes the use of data from Albany or Glen Falls, the most severe (from an air pollution standpoint), yet plausible, wind speed, wind direction and stability class conditions were selected for the analysis. The wind was assumed to blow at a steady speed of 1 m/sec and to vary only 12 degrees to either side of the critical or maximizing wind angle over the 24-hour period. Stability class, which is an empirical indication of atmospheric turbulence as measured by the change in wind speed and direction with altitude, was assumed to be of category E (very stable).

The air quality modeling analysis was conducted using "dummy" emission rates of 1000 ug/m^3-hr for all cells save the one nearest receptor (cell no. 17), when a rate of 10,000 ug/square meter (sq m) - hr). was used to approximate the emissions under turbulent conditions of spoil pipe material stirring the cell. When a more rigorous study of emissions was conducted (see Appendix J of the DEIS), the resulting refined emission estimates were used simply to apply a linear factor to the predicted concentrations. This simple adjustment is made possible by the one-to-one relationship between concentrations and emissions.

III. SUMMARY OF IMPACTS FOR THE RECOMMENDED PLAN

Table 2-1 is a summary of the significant impacts, both beneficial and adverse, that would be associated with the recommended plan. The purpose of the table is to provide a brief review of potential impacts, and the reader should

refer to Chapter 4 of the DEIS for a more detailed discussion of impacts. Impacts of the full-scale project would be similar in nature to those of the reduced-scale project, but they would differ in degree. The full-scale project would have greater long-term benefits, and also have greater short-term adverse impacts, because more hot spots and a larger quantity of PCBs would be removed from the Hudson River.

Table 2-1

IMPACT SUMMARY OF RECOMMENDED PLAN[1]

Component	Beneficial	Adverse
• In-river containment of hot spots	Short-term: none	Short-term: • potential health risk to workers • annoyance from construction noise • damage to benthic communities • localized destruction of wetlands • suspension of PCB-laden sediments.
	Long-term: • prevent erosion of hot spots, decreasing PCB contamination of river - protect downstream water supply - decrease PCB uptake by ecosystems - increase potential for reopening fishery - decrease threat to continuation of maintenance dredging and ocean disposal of spoils.	Long-Term: • changes in drainage of wetlands, perhaps reducing their value.
• In-place containment of remnant deposits	Short-term: none	Short-term: • potential health risks to workers and public • annoyance from construction and traffic • temporary increases in PCB losses to air and river • destruction of vegetation at access roads and deposits

Note 1. Potential impacts of the full-scale and reduced-scale projects are similar but differ in degree. The full-scale project would have greater long-term benefits, and greater short-term adverse impacts, because more PCBs would be removed from the river.

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Table 2-1 (continued)

Component	Beneficial	Adverse
• In-place containment of remnant deposits (cont.)	Long-term: • reduce losses of PCBs to air and river - decrease risks to public health - decrease uptake to ecosystems - decrease threats to continuation of maintenance dredging and ocean disposal of spoils - increase potential for reopening fishery	Long-term: • potential for contamination of river if containment fails • potential impediment to hydroelectric development
Dredging of hot spots	Short-term: none	Short-term: • losses of PCBs and heavy metals to water • destruction of benthic organisms • adverse effects on sensitive aquatic fauna • temporary increases in PCB volatilization • potential risk to worker heal • annoyance from construction noise • disruption of normal river traffic • possible destruction of wetla
Dredging of hot spots	Long-term: • reduce PCB concentrations in water and air - decrease risks to public health - improve quality of downstream water supplies - decrease uptake by fauna and flora - increase potential for reopening fishery - decrease threat to continuation of maintenance dredging and ocean disposal of spoils	Long-term: • possible loss of wetlands • creates need for containment of contaminated dredge spoils

Table 2-1 (continued)

Component	Beneficial	Adverse
Containment Site	Short-term: none	Short-term: • volatilization of PCBs during disposal operations • temporary increase in PCB uptake by vegetation near site • annoyance from construction activity • increased PCBs in river from site dewatering • potential health risk to workers and public
• Containment Site (Cont.)	Long-term: • PCBs prevented from dispersion through environment - decreased public health risks - decreased contamination of ecosystems - decrease in amount of PCBs entering lower Hudson and estuary • contaminated sediments are dewatered, concentrated and readily available for detoxification if an effective process becomes feasible	Long-term: • minor quantities of site leachate discharged to Hudson River • potential lower market values for adjacent properties • need for long-term monitoring

EXECUTIVE SUMMARY

DATE:	May 1981
TYPE OF STATEMENT:	Supplemental DEIS
RESPONSIBLE FEDERAL AGENCY:	U.S. Environmental Protection Agency (EPA) Region II
TYPE OF ACTION:	Administrative

RECOMMENDED ACTION

Based on public health, environmental, cost, and engineering evaluations carried out by EPA and its environmental consultants, the EPA recommends that the action alternative be implemented if contingency/mitigation measures ensuring public safety are developed (Table S-1).

Resolution of these issues will ensure that minimal risk to public health, safety, and welfare will result from the implementation of this project. Modifications and contingencies developed will be submitted for public comment before a National Environmental Policy Act (NEPA) decision is reached.

EPA recommends that a project to dredge and/or stabilize all known polychlorinated biphenyl (PCB) hot spots be implemented. After carefully evaluating both the original full-scale proposal and reduced-scale proposal submittted by New York State Department of Environmental Conservation (NYSDEC), EPA recommends funding a modification of the original full-scale project, since greater potential benefits will be realized. However, if additional funding is not available, the reduced-scale project is also recommended, although it offers only a reduced potential benefit, because it will provide for demonstration of river recovery and indefinite storage while not endangering public health, safety, and welfare.

As discussed below, the authorization by Congress under Section 10 of the Clean Water Act (CWA) Amendments is $20,000,000. If the action alternative is

Table S-1

USEPA Recommended Program

Full- Scale	Reduced-Scale
Dredging or in-river containment of all 40 hot spot areas in the river bed with containment in a secure upland site.	Reduction of the number of hot spots to be dredged or contained in-river
Design and construction of a secure upland containment site capable of indefinite long-term isolation of contaminated material	Same, except for a reduction in capacity at the containment site
Deletion of remnant deposit removal and upland containment; instead, provision of secure cap and top dressing, and further bank stabilization if necessary	Same
Elimination of provision for the containment of PCB-contaminated material from dumpsites in the Fort Edward area.	Same
Provision for containment of contaminated materials from three New York State Department of Transportation (NYSDOT) dredge spoil sites (212, 13 and 204 Annex)	Same
Provision for dredging and containment operational standards and procedures, mitigation measures, monitoring programs, and contingency plans necessary to safeguard public health and agricultural resources	Same
Provision for research studies/environmental monitoring programs necessary to demonstrate the improvement in the rate of recovery of the river and storage of contaminated material	Same

approved, the recommended action is to undertake the originally proposed $40,000,000 full-scale project with the required modifications. Additional funds from either federal, state, or perhaps outside sources will be required to implement the full-scale project, while affording protection of the public health and the environment. Although not as desirable as the full-scale project, it is recommended that the $26,700,000 reduced-scale project could be undertaken along with the aforementioned project modifications.

HISTORY AND OVERVIEW OF THE EXISTING PROBLEM

Polychlorinated biphenyls are a class of chemical compounds that have been used in agriculture and industry for decades. Since 1930, the compounds, have been used principally in electrical transformers and capacitors, but they have also been used in a variety of other products including lubricants, pesticides, cutting oils, plasticizers, and adhesives.

During a thirty-year period ending in 1977, more than 227,000 kilograms (kg) (500,000 pounds [lb]) of PCBs were discharged into the Hudson River from two General Electric (GE) capacitor manufacturing plants at Fort Edward and Hudson Falls, New York. Much of the discharged PCBs was adsorbed by the bottom sediments of the river and accumulated behind the Fort Edward Dam. When the dam was removed in 1973 due to its deteriorating condition, an estimated 650,000 cu m (850,000 cu yd) of the PCB-contaminated sediments was released and migrated downstream. The downstream migration was further accelerated during flood situations, causing PCBs to concentrate in river bottom sediments from Fort Edward to New York Harbor.

PROJECT DEVELOPMENT BY NYSDEC

As part of an administrative proceeding between NYSDEC and GE, approximately $3,000,000 was spent by NYSDEC to investigate the extent of PCB contamination in the Hudson River and methods to reduce and remove the threat of continued PCB contamination.

Forty PCB "hot spots" have been identified in the upper Hudson River, based on five years of scientific and engineering studies. Hot spots have been defined as sediments containing 50 micrograms per gram (ug/g) (parts per million [ppm])

or more of PCBs. PCB concentrations along the depositional shore range from 5 to 1,000 ug/g (ppm) in fine grained sediments. In addition, five PCB-contaminated remnant deposits have been identified. Remnant deposits were exposed as a result of the removal of the Fort Edward Dam, which caused water levels of the river behind the dam to drop significantly. This caused once-submerged bottom sediments to be exposed to the atmosphere. At present, PCB concentrations in the remnant deposits range from 50 to 200 ug/g (ppm).

The investigations conducted by NYSDEC resulted in a project which proposed to demonstrate the feasibility of removing PCB-contaminated sediments from the upper Hudson River and of depositing those sediments in a secure upland containment site. The environmental analysis, costs, engineering, and feasibility of the project proposed by NYSDEC are presented in a draft environmental impact statement (EIS) prepared in accordance with the State Environmental Quality Review Act (SEQRA). The full-scale project recommended in the draft SEQRA EIS was estimated to cost $40,000,000.

Subsequent to the draft SEQRA EIS and in response to Congressional action described below, NYSDEC rescoped the originally proposed project to accommodate the $20,000,000 funding authorized by the amendments to the Clean Water Act (CWA) [Sections 116(a) and (b)] and State matching funds. The reduced-scale project, as developed by NYSDEC, would cost $26,700,000. A comparison of the full- and reduced-scale projects is presented in Table S-2.

CONGRESSIONAL ACTION

In September 1980, Congress passed an amendment to the CWA under Title I, Section 116(a) and (b), entitled the Hudson River PCB Reclamation Demonstration Project. Funds for this project have been authorized under Title II, Section 205(a) of the Act. Under this legislation, EPA is authorized to expend up to $20,000,000 towards a proposed demonstration/reclamation project for removing and disposing of PCB-contaminated sediments from the Hudson River.

> Section 116(a). The Administrator is authorized to enter into contracts and other agreements with the State of New York to carry out a project to demonstrate methods for the selective

Table S-2

NYSDEC Recommended Program

Full-Scale	Reduced-Scale
Dredging of all 40 hot spot areas in the river bed with containment in a secure upland site	Reduction of the number of hot spots to be dredged from 40 to approximately 20
Design and construction of a secure upland containment site capable of long-term isolation of contaminated material	Same, except for a reduction in in capacity at the containment site
Excavation of two remnant deposits (areas 3 and 5) located above the former Fort Edward Dam site, and removal to the upland containment site	Deletion of remnant deposit removal and upland containment; instead provision of top dressing and fencing for remnant deposit areas 3 and 5
Provision for containment of material from three PCB contaminated dump sites (old Fort Edward, Fort Miller and Caputo) should removal be found more suitable than in-place containment	Elimination of provision for the containment of PCB-contaminated material from Old Fort Edward, Fort Miller and Caputo dump sites
Provision for containment of contaminated materials from three NYSDOT dredge spoil sites (212, 13 and 204 Annex)	Same
Destruction of the recovered PCBs at such time as a technologically and economically feasible procedure becomes available	Same
Provision for funding for research studies related to environmental monitoring	Reduction in the amount of funding for research studies

removal of polychlorinated biphenyls contaminating bottom sediments of the Hudson River, treating such sediments as required, burying such sediments in secure landfills and installing monitoring system for such landfills. Such demonstration project shall be for the purpose of determining the feasibility of indefinite storage in secure landfills of toxic substances and of ascertaining the improvement of the rate of recovery of a toxic contaminated national waterway. No pollutants removed pusuant to this paragraph shall be placed in any landfill unless the Administrator first determines that disposal of the pollutants in such landfill would provide a higher standard of protection of the public health, safety, and welfare than disposal of such pollutants by any other method including, but not limited to, incineration or a chemical destruction process.

(b). The Administrator is authorized to make grants to the State of New York to carry out this section from funds allotted to such State under Section 205(a) of this Act, except that the amount of any such grant shall be equal to 75 per centum of the cost of the project and such grant shall be made on condition that non-Federal sources provide the remainder of the cost of such project. The authority of this section shall be available until September 1983. Funds allotted to the State of New York under Section 205(a) shall be available under this subsection only to the extent that funds are not available, as determined by the Administrator, to the State of New York for the work authorized by this section under Section 115 or 311 of this Act or a comprehensive hazardous substance response and cleanup fund. Any funds used under the authority of this subsection shall be deducted from any estimate of the needs of the State of New York prepared under Section 516(b) of this Act. The Administrator may not obligate or expend more than $20,000,000 to carry out this Section.

The overall goal of the Congressional authorization is to allocate funding to assist in the cleanup of the PCBs in the upper Hudson River. The specific purpose of the authorization is to demonstrate the improvement of the rate of recovery of a toxic contaminated national waterway by:

- selective removal of PCB-contaminated sediments from the Hudson River
- treating the contaminated sediments as required and burying those sediments in a secure landfill
- development of monitoring and scientific studies for water quality and fish, and monitoring the landfill site

The legislation also states that prior to placing any contaminated materials in a secure landfill the Administrator of EPA must first determine that the

placement of the pollutants in a secure landfill would provide a higher degree of protection of public health, safety, and welfare than either leaving the PCB-contaminated sediments in place or disposing of them by any other methods. In addition, before funding under Section 116 of the CWA can be provided, the Administrator of EPA must determine that funding is not available under Sections 115 and 311 of the Act, as well as any existing "Superfund" legislation (Comprehensive Hazardous Substance Response and Clean-Up Fund established by the Act).

PURPOSE OF FEDERAL EIS

With the passing of the Section 10 Amendments to the CWA in October of 1980, Congress authorized EPA to make grants to the NYSDEC in order to carry out the intent of the "Hudson River PCB Reclamation Demonstration Project."

On January 12, 1981 EPA-Region II issued a Notice of Intent (NOI) to prepare a NEPA EIS. The purpose of the NEPA EIS is to identify and analyze any potentially significant impacts on the quality of the human environment resulting from a proposed project.

In addition, the NEPA EIS decision-making process provided the forum for soliciting public comments on the proposed project by conducting a series of public meetings and hearings. A twenty-one member Citizens Advisory Committee (CAC) has been formed to advise EPA on issues of public concern regarding the project.

As stated in the NOI, it was EPA's intent to evaluate further the following in the NEPA EIS:

- no-action alternatives
- control of river flow
- in-river detoxification
- in-river containment
- remnant deposit alternatives in the area of the former Fort Edward Dam
- complete or partial dredging, combined with upland containment
- dredge spoil disposal and treatment options
- other alternatives concerning PCB removal, including alternative dredging and transport

These alternatives were evaluated for potential beneficial and adverse, short- and long-term impacts under normal river flow, as well as flooding conditions. The major primary and secondary impact assessment objectives are as follows:

A. Public Health

1. Protection of downstream water supply
2. Protection of groundwater in the area of the containment site
3. Reduction of PCB volatilization from river bed/bank, and remnant deposits into the air
4. Reduction of containment site volatilization
5. Reduction of exposure through the ingestion of food

B. Fisheries

1. Permanent reopening of the commercial and recreational fisheries
2. Protection of endangered species (shortnosed sturgeon)
3. Reducing the bioaccumulation of PCBs through the food web.
4. Protection of wetlands

C. Maintenance Dredging and Navigation

1. Mitigation of future maintenance dredging and disposal problems in the upper Hudson River as well as the estuary
2. Maintenance of a navigable waterway serving transportation needs of the upper and lower Hudson communities

D. Agriculture

Protection of livestock and their food sources through:

1. Reduction of river bed/bank, and remnant deposit volatilization
2. Reduction of containment site volatilization
3. Protection of groundwater in the area of the containment site used for dairy industry purposes

E. Other Impacts

1. Evaluation of impacts to future hydroelectric dam construction and usage

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6. The public health risks associated with the no-action alternative are greater than those associated with the full- or reduced-scale alternatives.

7. The reduction in average PCB sediment concentrations in the New York harbor due to removal and in-place containment of PCBs from the upper Hudson River is expected to be relatively small. Under extreme flooding conditions or in local areas of rapid deposition, the action alternative may have a beneficial impact on the harbor area and areas in the upper estuary such as the Albany Turning Basin.

8. As presently proposed by NYSDEC, PCB volatilization caused by the discharge of contaminated dredged sediment into the containment site could exceed the New York State Department of Health (NYSDOH) recommended maximum allowable 24-hour average ambient air PCB concentration at nearby residences and at other sensitive receptors under worst case dissolved PCB concentrations and meteorological conditions. However, the analysis conducted by EPA shows that with mitigation measures presented below, the 1 microgram per cubic meter (ug/cu m) ambient air guideline should not be exceeded.

The modifications to the original project, as well as to the reduced-scale project referenced above, include changes in the design, operational standards, contingencies, and long-term monitoring and maintenance. These recommendations are consistent with the Congressional intent of Section 10 of the CWA Amendments. The purpose of these modifications is to provide a higher standard of protection for public health, safety, and welfare during dredging and disposal operations and throughout the life of the containment site. Prior to the NEPA decision and granting of federal funds to undertake site construction and dredging, the modifications described below must be fully developed, submitted for public comment, and approved by EPA.

Since neither the original or reduced-scale project contains the specific provisions to carry out financial assurances, contingencies, long-term monitoring, operational standards and procedures, operations and maintenance, or land acquisition, the NYSDEC must obtain firm commitments for additional funding for these provisions from either state or other federal sources prior to project approval. Federal or state matching funds currently appropriated for this

project are not sufficient to be used for these purposes. These current funds are to be used only for dredging, site construction and closure, and a monitoring program only for the duration of the project operations. Although there are a substantial number of modifications and additions to the original and reduced-scale projects, most are directed toward long-term elements subsequent to containment site closure, the costs of which are to be borne by New York State. Therefore, the modified project should not substantially reduce the material planned to be removed from the river.

The recommended modifications to the project are specified below under the separate categories of "Dredging, In-River Containment, and Stabilization", "Disposal", "Long-Term Storage", and "Water Quality Monitoring".

Dredging, In-River Containment, and Stabilization

1. Study and make recommendations to maximize in-river containment of hot spots where feasible and cost effective. (This will be studied in detail during the 45-day draft NEPA EIS review period).

2. Cap/in-place stabilization and denial of access of remnant deposits 3 and 5 as an immediate measure.

3. Maximize upriver flow regulation at Sacandaga Dam as a flood-control measure during the dredging operation.

4. Develop operational standards and procedures, mitigating measures, monitoring programs, and contingency plans to eliminate excessive volatilization and resuspension of PCB-contaminated sediments to protect workers, residents, agricultural resources, and water supplies.

Disposal

1. Modify disposal operations at the containment site, including the provision for smaller containment cells, addition of PCB adsorbants, and possible cell cover during loading operations to minimize volatilization.

2. Develop operational standards and procedures, contingency plans, and monitor program surrounding the proposed containment site for the duration of the disposal operations to assure the NYSDOH 1 ug/cu m ambient air guideline, and the 0.2 ug/g (ppm) standard for crops set by the U.S. Food and Drug Administration are not exceeded.

3. Develop specific contingency plans for additional treatment of the supernatant from initial dewatering prior to its discharge back to the river if permit limits (to be established) are exceeded.

Long-Term Storage

1. Development of long-term maintenance and monitoring programs for a minimum of 30 years with periodic program review by EPA and NYSDOH.

2. Contingency plans for (a) long-term leachate collection and treatment, (b) landfill cap maintenance, (c) excessive PCB volatilization or methane generation, and (d) alternate water supply should monitoring indicate that the containment site has failed.

3. The development of grievance and arbitration procedures and the investigation of the feasibility of liability insurance for any claims arising in connection with the public health aspects of the project.

4. Provision for specific funding mechanisms by NYSDEC to assure implementation of long-term contingency plans, operation, maintenance, and monitoring.

5. Redesign of the containment site leachate collection and storage system to improve operations and to avoid clogging and buildup of leachate within the site.

6. Provision for storage of NYSDOT maintenance dredging materials from sites 212, 13, 204 Annex from Washington County only (if removal is deemed necessary), under the condition that the state bear the incremental costs associated with relocation and long-term encapsulation.

Water Quality Monitoring

1. Develop a long-term monitoring program to evaluate the improvement of the recovery rate of the river and fisheries.

2. Develop a long-term monitoring and maintenance program if in-river containment is implemented to determine leaching of PCBs back into the river.

3. Develop a downstream public water supply monitoring program for PCBs and heavy metals to be implemented before, during, and after dredging operations, especially during and shortly after high flows. Contingency plans to provide additional water treatment or alternate water supplies also should be developed.

4. Develop a short-term monitoring program for air quality, water quality, and biota during dredging and disposal operations.

CITIZEN INVOLVEMENT

It is also recommended that if either the full-scale or the reduced-scale project is undertaken, the CAC and the Settlement Advisory Committee (SAC) be continued at least through the operational phase of the project, and beyond if so desired by the respective committees. The committees would serve as a community focal point for the distribution of project information and data and, at the same time, provide oversight and local and technical liaison between the affected communities and the operational and regulatory agencies, including EPA.

The CAC has raised two issues of public concern which should be considered by New York State.

1. NYSDOT should develop a comprehensive PCB dredge spoil disposal plan for the upper Hudson River, also within the same time frame as this proposed project.

2. NYSDEC should consider providing assurances that neither the proposed containment site nor the surrounding land acquired by New York State will be used for the future disposal of any hazardous waste generated from either within or outside Washington County.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

CHAPTER 3

Responses to Comments

CHAPTER 3
RESPONSES TO COMMENTS

Comments on the DEIS were received from a variety of government agencies and other interested parties during the DEIS public hearings and comment period. A list of these organizations and individuals is given on pages 4-1 and 4-2 of this Supplemental DEIS. Written comments were reviewed, and representative sections of these comments are addressed below. The comments that follow are direct quotations. When two or more comments were received on similar or related subjects, the one most representative of the others was chosen and is addressed below.

The comments addressed are divided into 6 main catagories as follows:

- CAC Comments
- Dredging Operations
- PCB Containment Site
- Monitoring and Contingency Plans
- Alternative Actions
- Miscellaneous

All comments received from the PCB Project CAC have been included with responses because of the committee's special involvement in the review process for the proposed dredging project.

I. CAC COMMENTS

The CAC comments were presented by George R. Mulvaney, Chairman, at the PCB Project Public Hearing at Poughkeepsie, New York, on June 23, 1981. At the time, the CAC neither endorsed nor condemned the project. The CAC comments, with responses, are presented below.

I-1. Comment: Dec has earmarked funds for the full-scale project and has the responsibility to seek such funding in the future.

Response: This was a recommendation in the DEIS.

I-2. Comment: [We would like] Assurances that the scaled-down containment facility will also be able to accommodate the dredged material recovered from the full-scale project.

Response: There is adequate area at the proposed containment site for the additional capacity that would be needed.

I-3. Comment: EPA should include in its final environmental impact statement a copy of the legal agreement between the State of New York and General Electric which releases General Electric from responsibility (above $3,000,000.00) for the Hudson River clean-up.

Response: A copy of the settlement agreement between General Electric and New York State is included in Appendix C of this Supplemental DEIS.

I-4. Comment: We recommend that EPA/DEC guarantee that Hudson riverbank residents will be contracted at least two weeks before any action is taken affecting the property of those residents (e.g. cutting or removal of trees, brush; removal of docks, etc.).

Response: Contact procedures for river bank residents that may be directly affected are defined in the project operational plans designed by NYSDEC and are included in Appendix A.

I-5. Comment: We recommend that EPA/DEC provide plans to insure the safety of riverbank residents from PCB volatilization during dredging operations adjacent to their property (e.g. shallow cove dredging).

Response: Plans to ensure the safety of riverbank residents, as well as residents near the proposed containment site, are described in the project monitoring plan designed by NYSDEC and included in Appendix A.

I-6. Comment: We recommend that EPA/DEC provide monitoring devices to measure volatilization for the duration of dredging adjacent to the property of riverbank residents.

Response: Provisions for measuring PCB volatilization from the river before, during and after dredging are contained in the project monitoring plan prepared by NYSDEC and included in Appendix A.

I-7. Comment: We recommend that EPA/DEC guarantee the safety of residents living in close proximity to hot-spot dredging operations. If air levels of PCBs exceed those recognized as safe, we recommend that residents be housed in safe areas at the expense of New York State for the duration of the dredging adjacent to their property.

Response: Although excessive PCB volatilization during dredging is not expected, plans for mitigating such volatilization are contained in the mitigation and contingency plans prepared by NYSDEC and included in Appendix A.

I-8. Comment: We find it unacceptable that EPA recommends in its Draft EIS that as an area of "possible savings" (p. 8-23), they would leave in place the approximately 12-acre roughing and storage, surge pond and treatment pond dikes after the completion of the dredging project. We recommend that EPA/DEC guarantee that this area will be covered and monitored and treated as a part of Site 10 maintenance within 2 budget years of completion of the project.

Response: A plan for closing the roughing and storage area, sewage pond and pond dikes will be made part of the total containment site closure plan and defined in the Toxic Substances Control Act (TSCA) permit.

I-9. Comment: We recommend that EPA/DEC guarantee that Site 10 be monitored and maintained in perpetuity with New York State funds allocated through legislation for this exclusive purpose.

Response: The long-term monitoring program designed by NYSDEC and the relevant financial assurances are included in Appendix A of this final EIS.

I-10. Comment: We recommend that EPA/DEC conduct a study to find out the feasibility of protecting the down-river drinking water supplies with powdered activated carbon and to guarantee these communities safe drinking water.

Response: It is not projected that any down-river drinking water supplies will become contaminated as a result of dredging activities. However, as an added safety measure, contingency plans to ensure safe drinking water to those communities which derive their water supply from the Hudson River have been prepared by NYSDEC and are included in Appendix A of this Supplemental DEIS. A study solely to determine the feasibility of protecting down-river water supplies with powdered activated carbon is not part of this project.

I-11. Comment: We recommend that EPA/DEC guarantee that trucking of PCB-laden materials or other contaminated materials from the river and surrounding areas take place in specially designed sealed trucks.

Response: There are presently no plans in the recommended project to truck any PCB-contaminated materials. If monitoring determines that the remnant deposits are releasing significant amounts of PCBs

into the Hudson River, complete or partial removal of the deposits, possibly by trucking, may be recommended in the future. A plan for the safe removal of remnant deposits would then be designed and implemented.

I-12. Comment: We recommend that EPA/DEC guarantee that a citizen oversight committee be funded for the duration of the project.

Response: NYSDEC will provide a consultant to oversee the dredging and disposal operations. This consultant will ensure that environmental and health specifications, as well as quality control, are carried out effectively. NYSDEC officials will also be involved with periodic inspection of all aspects of the project. Citizen oversight of the project will be provided by the PCB Settlement Advisory Committee. A recommendation in the DEIS is to continue the operation of the CAC throughout the duration of the project and beyond, if they so desire. The issue of funding the CAC beyond the period of the EIS preparation will be considered in the award of the final project grant.

II. DREDGING OPERATIONS

Comments on the dredging operations were mainly concerned with the following issues:

- Selection of areas to be dredged;
- Dredging procedures;
- Losses of PCBs to the water;
- Impacts on downstream water supplies;
- Worker and public health impacts; and
- Long-term impacts on PCB levels in sediments subject to maintenance dredging.

II-1. Comment: The proposed budget of $26+ million is only for a partial dredging program. The public has not been notified of a timetable or allocation of funds to complete the project. (Burkhardt, Fort Edward, New York).

Response: The EPA has determined that the reduced-scale project offers potential benefits and will provide for demonstration of river recovery while not endangering public health. If the final NEPA (National Environmental Policy Act) decision is to implement the project and additional funding has not yet been committed, the reduced-scale project will be initiated. Additional funds will continue to be sought by state, federal agencies and environmental organizations. If additional funds become available during the implementation of the reduced-scale project, dredging will continue and the containment site will be expanded to its original full-scale design.

II-2. Comment: The proposed Reclamation Plan involves dredging only the "hot spots" in the Upper Hudson. It assumes that areas of highest PCB concentration contribute most to the downstream load and concludes that they should be dredged first. Yet many hot spot areas are stable sediments and may be scoured under only the severest flood conditions. Some sediments containing relatively lower concentrations of PCBs appear to scour at a higher rate and could be contributing significantly to the overall PCB downriver flow.

The primary method of PCB transport in the water column, whether dissolved or adsorbed to particulates, has not been clarified. To properly assess remedial measures we need more information about the mode of transport. (Natural Resources Defense Council, Inc., New York, New York).

Response: As part of the pre-dredging monitoring program, NYSDEC will sample sediments in the upper Hudson River to define hot

spots, as well as areas with less than 50 ug/g (ppm) PCBs, in terms of location, extent, PCB concentration, depth of contamination, and PCB mass. These results will be compared to data collected in previous years to determine which areas have changed significantly. NYSDEC will also assess how susceptible the contaminated areas are to scouring under normal and flood conditions. This pre-dredging sampling is described in Appendix A.

In addition, NYSDEC will conduct a study to determine the relative importance of scouring and desorption in releasing PCBs to the river. This will clarify whether PCBs are primarily transported in the water column, adsorbed to particles or dissolved in the water. This program is also described in Appendix A, and results will be used to finalize the decision as to exactly which areas will be dredged.

II-3. Comment: The reduced program does not provide for restoration of "especially valuable wetlands," at hot spot 40 and between hot spot 30 and lock 2. The final Environmental Impact Statement should comment on this. The EIS should also identify precisely which hot spots will be contained and which will be dredged for off-site disposal under a reduced program. The identification of the 20 hot spot areas should not be done during the 45-day comment period on the EIS. (Solomon, Congressman, United States House of Representatives, Washington, D.C.)

Response: No restoration of wetland hot spots will take place under either the full- or reduced-scale plans. NYSDEC wetland biologists have identified which hot spots contain particularly valuable wetlands (Chapter 3, Section 3B of the DEIS) and the possible preservation of such wetlands will be taken into account when it is determined which specific hot spots are to be dredged. It is unlikely that hot spot 40 will be dredged under the reduced-scale project. An extensive sampling program will be implemented prior to any dredging operations to identify the locations and PCB concentrations of hot spots and other areas of deposition. It is advantageous to have the sampling program immediately precede the onset of dredging to minimize the possibility that movement of any hot spots occurs between the time of the sampling and the dredging.

In-place containment is another alternative for dealing with PCB hot spots, particularly wetland hot spots. NYSDEC has identified two valuable wetland hot spots that are suitable for containment in-place under both the full- and reduced-scale programs. (Appendix A).

II-4. Comment: What effect will hot spot dredging have on wetlands? The possibility that wetland values may preclude dredging of some hot spots should be thoroughly investigated, particularly in connection with the full-scale project. (Natural Resources Defense Council, Inc., New York, New York).

Response: See comment II-3 and response.

II-5. Comment: Please define "dredging season": i.e., give months, temperature range, etc. (Shapot, CAC, Cold Spring, New York).

Response: The maximum dredging season during which PCBs could be removed from the river is from May to November. This is based on typical weather conditions of the region. Freezing of the river usually occurs in December and forces the barge canal system to close. Ice conditions can persist into March, and high flows from the spring thaw occur through April. The remainder of the year should be suitable for dredging activities, unless a storm temporarily creates unusually high flows.

II-6. Comment: The dry, low flow season has correctly been selected for commencing dredging operations to reduce high flow dredge plume losses. However, for high flow conditions during or immediately following severe storm runoffs, will dredge operations be curtailed? It may be advisable that high flow cutoff and dredging resumption levels be established to reduce plume losses. Again, such precautions should be established at this time. (Kim, Director, Bureau of Toxic Substances, New York State Department of Health, Albany, New York).

Response: As described in Appendix A, NYSDEC plans to utilize existing flow control structures in the upper Hudson River as much as possible to moderate flows during dredging operations. If high flows occur because of a storm or other factor, dredging operations will be halted for the duration of the high flow to avoid excessive plume losses.

II-7. Comment: Please explain for reader why PCB concentrations are lowest in the moderate flow range. (Shapot, CAC, Cold Spring, New York).

Response: NYSDEC data indicate that PCB concentrations in the upper Hudson River tend to be highest during high flows, lowest during intermediate flows, and somewhat higher at low flows. Concentrations are highest during high flows because scouring of sediments is occurring and PCB-contaminated particles from the riverbed are being suspended into the water column. Lesser amounts of PCBs are added to the water column by desorption from contaminated sediments, a process which is fairly constant over all river flows. During low flows, it is thought that PCB concentrations result from desorption from the sediments and also from the suspension of contaminated particles due to the operation of barges in shallower water. Flows in the intermediate range are *not* swift enough to suspend contaminated particles, and contaminated sediments are not stirred up by boat traffic because waters are deep

II-8. Comment: The EIS asserts that during the dredging operation 2 to 5 percent of the PCBs would be lost back into the water column or would not be captured. The basis for that assumption of such a low release is not clear, nor is there much discussion of the likely negative impact of those releases. (Solomon, Congressman, United States House of Representatives, Washington, D.C.).

Response: Losses of PCBs to the water during dredging are discussed in Chapter 2, Section 3A, and Chapter 4, Section 3A, of the DEIS. Tables 2-10 and 2-11 of the DEIS present the following data on PCB losses:

Type	Loss Mechanism	Estimated PCB loss (%)
Clamshell with hydraulic pumpout	Missed during dredging	5
	Lost in dredging process	0.8 -4
	Lost in return flow	0.01-0.1
	Total Loss	5.8 -9.1
Hydraulic dredging and transport	Missed during dredging	2
	Lost in dredging process	0.4 - 2
	Lost in return flow	0.1
	Total Loss	2.5 - 4.1

These data are based on estimates by MPI, and laboratory and field measurements collected by NYSDEC and COE, as discussed in the DEIS. Since the clamshell dredging is recommended in the reduced-scale project, the total losses are estimated to be 6 to 9 percent. However, by utilizing special dredging buckets with seals and shrouds as planned, total losses should be closer to 6 percent. The dredging operation will be monitored closely, and operational/mitigation plans have been developed to minimize adverse impacts. These are described in Appendix A. Based on the information presented in the DEIS, it has been concluded that the dredging operation, with the required modifications and safeguards, will not have significant adverse effects, although there may be short-term dis-turbances in the immediate area of the dredging operation.

II-9. Comment: At present the rescoped project recommends clamshell dredging with hydraulic pumpout. The selection of clamshell over hydraulic is not adequately substantiated with an analysis of relative cost and effectiveness. This is especially important since the hydraulic method is more effective and does not cost much more than clamshell. (Natural Resources Defense Council, Inc., New York, New York).

Response: MPI and NYSDEC (MPI, 1980c) considered several different types of dredging, transport and unloading systems for use in the Hudson River PCB Project. Each system was evaluated in terms of technical, environmental and economic feasibility for removal of contaminated deposits from the river and disposal in the proposed containment site.

The hydraulic dredge offers greater PCB removal efficiency and cutting precision as compared with the clamshell dredge, and therefore has smaller short-term environmental effects. Its use is limited, however, to hot spots which are less than one mile from the containment site, or two miles with a booster pump, and to those which have suitable substrate (no large debris or exposed ledgerock). The clamshell would be the most suitable dredge for the remaining hot spots. Dredging in shallow areas may require specialized equipment such as a mud cat. Recycling of the clamshell pumpout water reduces the project cost as well as PCB losses to the river. In general, the cost differential between alternatives is slight (MPI, 1980c). As described in Appendix A of this Supplemental DEIS, modifications will be made to either dredge system to minimize PCB losses to the river.

Under the full-scale project, hydraulic dredging would be most suitable for dredging of hot spots relatively near the proposed containment site, such as the Thompson Island Pool hot spots, but clamshell dredging would be required for the lower pools. Under the full-scale program, NYSDEC planned to defer final selection of either system until the competitive bidding for the dredging was completed and cost-performance data was available (MPI, 1981).

With the reduced-scale program, significantly less funds will be available for the second season of dredging of the lower hot spots. If a clamshell system is not used at the Thompson Island Pool, remaining funds may not be adequate for construction and amortization of the special equipment that would be required for the lower pools (MPI, 1981).

Therefore, clamshell dredging with hydraulic pumpout is likely to be the most effective system for the reduced-scale project.

II-10. Comment: On the subject of short-term health concerns as raised in the EIS, I believe there should be a better quantification of the "minimal" public health effects of short-term air and water PCB releases during the construction phase of the project (see page 4-19) and more detail on worker protection measures. (Solomon, Congressman, United States House of Representatives, Washington, D.C.)

Response: The predicted levels of PCBs in air and water during the construction phase of the project are not likely to exceed NYSDOH recommended guidelines. These guidelines are conservative levels formulated for the protection of public health. A quantification of minimal public health effects of short term exposure to these low levels of PCBs cannot be made.

For details of worker protection measures, see comment II-15.

II-11 Comment: I would like to question the information in the last paragraph in your summary on page A-11, Appendix A concerning human exposure and risk assessment associated with the dredging program.

If you do not possess the data to quantify the increases in atmospheric, fish and drinking water levels should a flood resuspend contaminated sediments, you cannot possibly assess the danger which the disturbance of contaminated sediments by clamshell dredging poses for residents of this area.

I do not see how it is possible to proceed with a project of this nature until you can be more specific about the impact of the project on human health. (Mulvaney, Argyle, New York).

Response: Based on the projected losses of sediment from the dredging process described in the DEIS (Chapter II, Section 4 and 5 and Chapter IV, Section I-4 and I-5), no significant, adverse impacts on public health or natural resources are expected in the affected area (also see comment II-8). As a precautionary measure, however, monitoring, operational standards and mitigative measures to ensure public safety are required as part of the project and are described in Appendix A of this document.

II-12. Comment: The Environmental Impact Statement fails to respond adequately to the effect of the dredging process on drinking water in localities downstream not using activated carbon filtration systems to purify their drinking water. Not enough is known about PCB levels in drinking water supplies in those communities today and this data should be collected in order to determine if the installation of carbon filtration systems should be required as part of the demonstration project. (Solomon, Congressman, United States House of Representatives, Washington, D.C.).

Response: It is not expected that dredging will have a detrimental impact on downstream drinking water supplies. Monitoring of past Hudson River dredging operations and other studies conducted by NYSDEC and confirmed by COE show that the dredge plume will not extend more than two miles downstream (Chapter 4, Section II3A of the DEIS). Waterford, which is about 6 miles downstream of hot spot 40 and 30 miles downstream of the Thompson Island Pool, is the closest direct water supply intake to potential dredging activities. Waterford uses powdered activated carbon in addition to conventional water treatment methods. Poughkeepsie and Rhinebeck, which also draw water directly from the Hudson River, also use powdered activated carbon. Stillwater and Schuylerville utilize wells adjacent to the river, and Green Island uses infiltration galleries on an island in the river. Flow through the ground provides substantial filtration of raw river water. Some homes along the river use water directly from the Hudson River for watering lawns and gardens.

Although no increases in PCB levels in water supplies are likely from the dredging operations, both riverwater and water supplies will be monitored. Contingency plans, including use of activated carbon, have been developed by NYSDEC and are described in Appendix A.

II-13. Comment: On page 4-57 the EIS states that if PCB and heavy metals near water supply intakes exceed "safe limits" during the dredging process, additional treatment or alternative supplies will be required. I believe there is a need for fuller explanation of the action that would be required (and on whom the responsibility would fall) under such circumstances and how quickly it could be put in place to protect drinking water supplies if problems were detected.

Likewise, it is not known how many private individuals are drawing water from the river through privately owned wells located near the river and the EIS does not indicate what protective measure should be taken for them. (Solomon, Congressman, United States House of Representatives, Washington, D.C.).

Response: Monitoring and contingency plans to protect water supply have been designed by NYSDEC and are discussed in Appendix A. In addition, an inventory of private water supplies is presently being conducted and provisions will be made to provide a safe and adequate source of potable water supply, if necessary.

II-14. Comment: One of the safeguards protecting downstream water supplies is the halting of dredging operations if the ambient PCB levels exceed 0.5 parts per billion (p. 4-43). No provisions are made, however, for the monitoring and mitigation of other toxic chemicals that have been discharged into the project area from industrial sources for many years. We would recommend that testing of the sediments be performed to determine the extent of the problem and that appropriate measures then be taken. (Fear, Captain, U.S. Coast Guard Chief of Staff, Third Coast Guard District, Governors Island, New York).

Response: Levels of heavy metals, in addition to PCBs, will be measured before, during and after the dredging and disposal operations as part of NYSDEC's sampling program for the project. The NYSDEC sampling program is described in Appendix A. Heavy metals that will be measured include: arsenic, cadmium, chromium, copper, lead, mercury, nickle, silver and zinc (Tofflemire, NYSDEC, July 30, 1981). Levels of heavy metals will be measured in: the Hudson River downstream of dredging operations, the water flowing from the containment site to the Hudson River as dredge spoils undergo dewatering; the groundwater at monitoring wells around the containment site; and the wells of residents near the site. Contingency plans

to protect drinking water supplies, as described in Appendix A, apply to heavy metals as well as PCBs.

II-15. Comment: We recommend that respirators designed for removal of organic vapors be provided for all workers on dredges and at the containment site. They should be instructed in use of the respirators, informed of existing OSHA standards and NIOSH and DOH guidelines concerning PCBs, and informed of air sampling results as soon as they are available. Each worker should be free to determine whether he or she wishes to use respiratory protection at PCB concentrations below the OSHA standard. (Kim, Director, Bureau of Toxic Substances, New York State Department of Health, Albany, New York).

Response: Use of respirators was a recommendation by EPA in the DEIS.

II-16. Comment: Sentence 6 on page S-10 which states that "removal and in-river containment of PCBs from the upper Hudson River is not expected to significantly reduce the PCB sediment concentrations in the New York Harbor" is misleading as worded. The draft states that the proposed reduced-scale project would reduce the PCB flow into the estuary to 61.200 kg, compared to the "no action-no routine maintenance dredging" alternative flow of 112,000 kg. (Hammon, Vice Chairman, Save Our Port, New York, New York).

Response: As discussed in the DEIS, it is likely that much of the PCBs that flow over the Troy Dam into the Hudson River estuary settle in the Albany Turning Basin/ Harbor, which is routinely dredged, and other depositional areas along the length of the estuary. In addition, there will be volatilization of PCBs from the estuary as well as the upper Hudson River, further reducing the amount of PCBs reaching New York Harbor. As discussed in the DEIS, it is estimated that only about 30 percent of the PCBs that are transported over the Troy Dam reach New York Harbor. Therefore, the reduced scale project, when compared to the no-action alternative with navigational dredging, will reduce the amount of PCBs entering New York Harbor by approximately 8,000 kg (17,600 lbs) between 1981 to 2013. It is expected that an equal or greater amount of PCBs will be removed for the harbor by routine maintenance dredging.

In addition, it has also been estimated by Bopp (1979) that a substantial amount of the PCBs (25 to 30 percent) in the New York Harbor originated from discharges along the lower Hudson River. PCBs were used in numerous manufacturing processes and have been discharged from municipal sewage and industrial outfalls, dump sites and other sources. Thus, a significant reduction in PCB concentrations in New York Harbor sediments cannot be quantitively projected on a harborwide, average flow basis.

It is important to consider, however, that the calculations of PCB transport to New York Harbor presented in the DEIS assumed that river flows would be constant and sediments would be distributed harborwide. Actually, substantial loadings of PCBs to the harbor may occur for short periods during flood events on the river. Instead of being evenly distributed, it is likely that local deposition of PCBs will occur at certain harbor areas. Heavy, short-term loadings and localized deposition of PCBs in the harbor could be critical to the continuation of maintenance dredging in the harbor and ocean disposal of dredge spoils, especially because some harbor sediments already have PCB levels of 3 to 4 ug/g (ppm). (PCB levels of above 4 ug/g (ppm) in dredge spoils could preclude ocean disposal of the spoils, depending on the outcome of COE toxicity testing.) Although it is not quantifiable, the full- and reduced-scale dredging alternatives may have a significant beneficial impact on areas of high deposition within New York Harbor or during periods of flood conditions, compared to the no-action alternative.

II-17. Comments: Insufficient emphasis has been placed on the effect of no-action on dredging the Hudson channel. Last year's operation in the Albany Turning Basin produced PCB levels approaching the 50 ppm level. Obviously, failure to remove the hot spot would risk future dredging of this vital component to the Albany Port, or at least greatly increase the cost since a specially designed and contained disposal site would be needed. The same problems would be encountered in maintaining the barge canal system. Just this past spring, an emergency dredging of a PCB hot spot in the Champlain section of the canal produced a number of problems. Future occurances would threaten the state DOT's ability to maintain a navigable system. All of these very real threats are downplayed in the EIS in favor of the potential, and apparently unlikely, threat to the habor. (Cohn, Chief, Planning Division, North Atlantic Division, COE, New York, New York).

Response: The risks to the continuation of maintenance dredging in the upper Hudson River because of excessive PCB-contamination of sediments were recognized in the DEIS. A finding of the DEIS (page 5-9 of the Executive Summary) was that removal of PCBs from the upper Hudson River would reduce the risk that navigable waterways in both the upper and lower Hudson River would be closed because of the inability of New York State Department of Transportation (NYSDOT) to provide adequate upland disposal of contaminated sediments. In Chapter 2 of the DEIS (page 2-3), it was recognized that critical navigational areas in the upper Hudson River, such as the Albany Turning Basin, already have high PCB levels. Under the no-action

alternative, PCB levels at Albany can be expected to increase over the next 30 years. Although the problems may be more immediate in the upper Hudson River, it was also recognized in the DEIS that PCB contamination threatens the continuation of ocean dumping of dredge spoils and of maintenance dredging in New York Harbor. A substantial amount of the PCBs in New York Harbor sediments originates from the upper Hudson River.

III. CONTAINMENT SITE

Comments about the proposed containment site generally concerned the following subjects:

- Design and operation of the containment facility;
- Geologic stability of the site;
- Short- and long-term monitoring;
- Threats to public health;
- Threats to agriculture; and
- Other possible contaminants in the site.

III-1. Comment: I feel EPA has taken a reasonable position in viewing the containment site as a permanent depository of the dredge spoils, since the technology for ultimate destruction of the spoils does not appear to be available in the near future. However, if the spoils are to be stored at the site indefinitely, I recommend that the EIS contain an analysis of the anticipated persistence of PCBs in the site. A similar analysis of the persistence of other toxic substances in the spoils would also be helpful. Such analyses would give an indication as to how long the site would contain hazardous wastes. This estimate, in turn, would help in determining how long the site would require monitoring, and also what may be the likelihood of groundwater contamination in the long term (although the Richard estimates on page 4-61 suggest this would not be a problem until the extremely distant future). (Whyatt, Scenic Hudson, Inc. and the Hudson River Fishermen's Association)

Response: Because PCBs are extremely stable in the environment and heavy metals do not degrade, these contaminants will persist indefinitely. Although the long-term monitoring program for the containment site is being defined as a 30-year program, monitoring and maintenance of the site will continue well beyond the 30-year period. Because the site is designed for indefinite storage, it is not expected that the groundwater will ever become contaminated to an extent that would preclude its use as a source of drinking water supply.

III-2. Comment: The leachate drainage system [at the containment facility] appears to have a reasonably projected probability of clogging, which can lead to capping rupture. (Coffin, Poughkeepsie, New York).

Response: Potential clogging problems with the leachate collection system have been addressed by NYSDEC, and a discussion is included in Appendix A.

The collection system has been designed so as to prevent or minimize clogging. If the dredged material contains a large proportion of fine grained particles, clogging may eventually occur in some portions of the leachate collection system. However, a key point is that the leachate collection system offers a much easier pathway out of the containment area than percolation through the clay bottom. If there are sufficient fine-grained material to clog the collection system, they will also effectively seal the idnterfacie between the dredged material and the clay bottom, thus preventing any leachate escape at all. In that event it would be necessary to remove leachate throuth vertical wells located on the site. Therefore, rupture of the cap would not occur.

III-3. Comment: With a limited capability in the field of hydraualic engineering, one must assume observable conditions. In my experience, liquids will percolate downward in the spots of highest permeability. Thus, it follows that generally the leachate will migrate downward at the spots offering the least resistance, and further, the less permeable (more resistant) soils will provide somewhat of a "table" to collect additional liquids to seep down the softer spots.

Thus one must conclude that liquid leachate, with whatever contaminants are dissolved in it, would sink through the underside in about 5 to 6 years. In most land areas that I am acquainted with, once seepage (drainage) begins, the process is usually self-expanding. Hence, a presumption of groundwater contamination is a necessity from the data supplied (Coffin, Poughkeepsie, New York).

Response: It is incorrect to use permeability values to calculate the amount of time it will take for interstitial waters to pass through the clay liner from the containment site, as done by Mr. Coffin. The permeability values given in the DEIS (page 4-61) are rates of lateral movement that take place when a given material contains water with a water table slope of 1 on 1 (45 degrees). Any calculations of flow rates must take into account the water table slope, projected to be approximately 5 degrees for the completed containment site (Sanders, PCB Settlement Advisory Committee, June 26, 1981). According to Darcy's Law, the rate at which water flows through a permeable substance is basically proportional to the permeability of the medium and the difference in height of the water table (Dewiest, 1965).

Based on a projected finished slope of 5 degrees and the permeability values determined by field and laboratory investigations of the proposed site, it has been estimated that

it would take 600 years for leachate from the containment site to travel a distance of 60 m (200 ft) to the property line of the site. It would take over 1000 years for water within the containment facility to seep through the inside face of the dike (page 4-61 of the DEIS). The movement of PCBs and heavy metals would be further slowed by adsorption onto clay particles. Adsorption onto clay would reduce the movement of these contaminents to 1/100 to 1/10,000 of the water flow rate (page 4-61 of the DEIS).

It is unlikely that downward percolation of leachate from the containment structure will take place because the groundwater beneath the clay is under a slight artesian (upward) pressure. In other words, water has a slight tendency to flow upward through the clay instead of perculating downward as shown in Figure 3-1.

EPA regulations (40 CFR 761, Feb. 17, 1978) require an in-place soil thickness of 1.2 m (4 ft) or a compacted soil thickness of 0.9 m (3 ft) with a permeability no greater than 3.9×10^{-8} in/sec (1.0×10^{-7} cm/sec) for PCB disposal sites. New York State regulations (6 NYCRR 360, May 17, 1977) require a clay seal having a permeability of not greater than 3.9×1^{-6} in/sec (1×10^{-5} cm/sec). Laboratory tests on clays from the proposed site yielded permeabilities on the order of 4×10^{-8} and 4×10^{-9} in/sec (1×10^{-7} and 1×10^{-8} cm/sec) in both the vertical and horizontal directions. Field permeability tests are largely controlled by horizontal permeability, and field permeabilities were generally found to be higher than permeabilities measured in the lab because of more pervious horizontal seams. Clays at the site will be compacted for construction of liner walls, eliminating the effect of horizontal seams. This will result in material with a permeability of less than 3.9×10^{-8} in/sec (1×10^{-7} cm/sec) (MPI, 1980a). Clays at the base of the containment site will also be disc-harrowed and recompacted to eliminate any imperfections in the clay layers. The compacted clay liner plus the natural clay base with a vertical permeability of less than 3.9×10^{-8} in/sec (1×10^{-7} cm/sec) will provide an impermeable base for the containment area that meets both state and federal regulations concerning PCB disposal sites (MPI, 1980a).

Satisfactory geologic conditions were major factors considered by NYSDEC in selection of a possible PCB disposal site. The results of the geotechnical investigation of subsurface conditions of the site conducted by Mueser-Rutledge-Johnson and Desimore, Consulting Engineers, for NYSDEC's consultant, Malcolm Pirnie, Inc., are given in PCB Hot Spot Dredging Program, Upper Hudson River, Containment Site Investigations (MPI, 1980a).

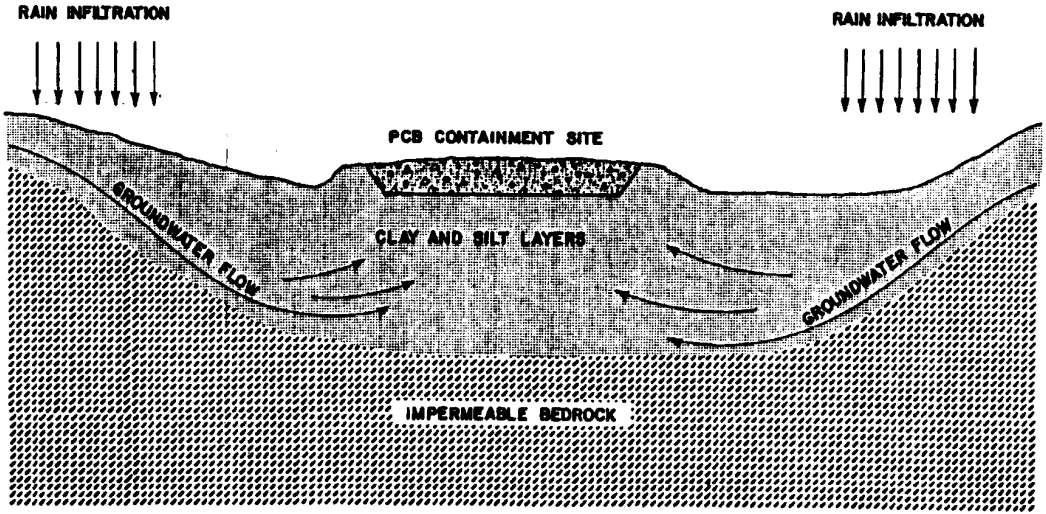

FIGURE 3-1 ARTESIAN GROUNDWATER FLOW

III-4. Comment: We find this impact report having conflicting ideas in it. It appears that a lot of time and thought has been given to water quality and protection in areas outside the containment site. Then you find a statement such as, "in one boring that penetrated the bedrock, artesian conditions were encountered, but the full height was not measured", (page 3-15). It is not (page 3-16) that New York State regulatory bodies would have to provide a waiver of their own laws governing water tables being less than 10 feet from the botton of the containment facility as being a secure landfill. (McMurray, President, Warren-Washington County Farm Bureau).

Response: It is highly unlikely that any downward percolation will take place because the groundwater beneath the clay is under a slight (but as yet not determined) amount of artesian (i.e., upward-directed) pressure. This artesian pressure will, of course, be determined in any future research at Site 10. It could not be determined previously, because the owner closed the site after allowing some preliminary work to be carried out.

III-5. Comment: Land-use planning maps developed for this county [Washington County] ... clearly state that this proposed site is not suitable for erection of any structure larger than a one-family home because the shale underlayment will not readily accept the weight of a larger structure. (Saunders and Saunders, Greenwich, New York).

Response: The land use planning maps show generalized land use suitabilities. Preparation of the maps does not involve specific investigations of geological conditions at particular sites.

Detailed geotechnical investigations of the proposed containment area were performed to assess the site's suitability for long-term storage of PCB-contaminated dredge spoils (MPI, 1980a). A stability analysis was also performed to determine if the site has sufficient shear strength to withstand long-term static loading as well as earthquake stress (see comment no. III-6). These investigations confirmed that geological conditions at the site are suitable for long-term containment of the dredge spoils.

The shale beneath the proposed containment cells is covered by 9 to 23 m (30 to 75 ft) of clay. This clay and not the shale is the primary load-bearing strata. In addition, there are no cavities within the clay or underlying shale which would permit major shifts in substrata beneath the site. There is not a major fault or underground stream channel below the site, but a depression in the bedrock which is completely filled with clay and other fine-grained material which prevents water movement (Thomas, MPI).

III-6. Comment: The EPA itself, in its EIS admits that seismic events in the area have been "moderately common" and that the locality is listed in zone 2, a moderate damage seismic risk area. They go on to say that, "there is approximately a ten percent chance that the bedrock units in the area will undergo horizontal acceleration (shaking) that exceeds nine percent of the force of gravity at least once in a 50-year period." (Hague, Member of Assembly, 110th District, Albany, New York).

Response: A stability analysis for the proposed containment site was performed by Mueser-Rutledge-Johnson and DeSimone, Consulting Engineers. The analysis was based on a geotechnical examination of the site, and results are presented in Appendix B of PCB Hot Spot Dredging Program Containment Site, Design Report (MPI, 1980b). The conclusion of this analysis was that the site has sufficient shear strength to withstand an earthquake of intensity VII on the modified Mercalli Scale, with a substantial margin of safety. The modified Mercalli Scale is used as a measure of the ground-shaking effects of an earthquake. There are 12 levels of intensity, with XII representing the most intense level. An intensity VII earthquake is considered severe and would have accelerations of as much as 10 percent of the mass of the mobilized soil. In general, the stability analysis concluded that there are adequate factors of safety for the containment site to withstand potential earthquake loadings.

III-7. Comment: Another question is the monitoring of groundwater. Page 4-67 gives a detailed account of how the monitoring wells shall be constructed, using sand around, and 2 feet above the top of, the screen. Now, using the information that PCB particles will be clinging to an organic object and information found on page 2-7 of the Draft Environmental Quality Review that "conventional sand filters remove some 60 to 90% of PCB," and that a PCB test is not 100% accurate, how is this test well going to monitor the water? (McMurray, President, Warren - Washington County Farm Bureau).

Response: A property of PCBs is that they readily adhere to particles, especially fine-grained particles, such as clays, or organic particles. That is why they accumulated in sediment of the Hudson River in the first place. The groundwater monitoring wells around the containment site will be placed in soils that are naturally comprised of fine grain particles. This type of soil is highly impermeable and provides a high degree of affinity for PCBs. The monitoring wells will be back-filled with clean, well-sorted sand and grout that has a relatively high permeability and low affinity for PCBs, as compared to the natural soils. The sand and grout will permit water to flow relatively easily from the natural clays to the monitor-

ing wells. If PCBs were to flow through the natural clays, they would move into the wells relatively easily. The sand and grout layer around the well will not be thick enough to provide significant removal of PCBs, if they were to penetrate the natural soils, and PCBs would be detected in the monitoring wells.

This question points out an important fact: that PCBs, as well as heavy metals such as lead, zinc and cadmium, are highly insoluable in water and readily adhere to soil particles. PCBs are naturally scrubbed out of water as it passes through the soil, especially fine-grained soil. This is a major reason why PCB-contaminated spoils can be effectively retained in the containment site without danger of groundwater contamination.

III-8. Comment: There is not now one single air or water monitor at that site [New Moreau site]. There will be no more care taken at the proposed site 10 ... (Saunders and Saunders, Greenwich, New York).

Response: The New Moreau Site was constructed by NYSDEC and NYSDOT to encapsulate remnant deposit material and dredge spoils contaminated with PCBs. Extensive air, groundwater and leachate monitoring was conducted as disposal operations took place and after the site was closed. No significant levels of PCBs were found, and the initial findings indicated that it was not necessary to continue monitoring as extensively. Groundwater is still monitored at test wells around the site. Inspection and maintenance of the cap is performed twice a year. Although the site is only several years old, it has served as an effective model encapsulation site.

As described in Appendix A, the proposed containment facility at site 10 would be throughly monitored during the disposal operations and indefinitely after the facility is closed.

III-9. Comment: The Environmental Protection Agency should not approve a plan which would discharge dangerous levels of PCBs into the air (Solomon, Congressman, United States House of Representatives, Washington, D.C.)

Response: EPA does not intend to approve any plan which would endanger public health. Analysis performed during the preparation of the DEIS (Chapter 2, Section II of this supplemental DEIS has determined that, under worst case contaminated sediment disposal and meteorological conditions, ambient air concentrations of PCBs may approach the NYSDOH 24-hour average guideline of 1 ug/cu m at the nearest receptor. To preclude even the possibility of a threat to public health, EPA has

conditioned final approval of the project on the development of satisfactory monitoring and mitigation plans, not only for air but also for surface waters, groundwater and crops.

Mitigation plans for disposal and long-term operation of the containment facility are summarized in Chapter 4 (Section 40) of the DEIS. Contingency and monitoring plans, developed by NYSDEC and approved by EPA, are discussed in detail in Appendix A of this document.

III-10. Comment: Firstly, if the farms and residences in the proposed area become uninhabitable, these properties and businesses should be purchased outright for present (before dumpsite location) value plus yearly inflation increments.

Secondly, if the land and residences continue to be productive and livable, the owner be compensated by one or any combination of the following methods: As in the case of long term capital gains realized from the sale of real property or businesses, that in addition to the present allowable 60 percent exclusion of said gain from taxable income, these affected residents be able to exclude a further percentage from taxable income, i.e. an 80 percent exclusion as versus a 60 percent exclusion of the capital gain. Further, that some form similar to an investment tax credit be implemented whereby the affected parties would be able to take a portion of the lost value of the property or business as an income tax credit over a period of several years against income, or perhaps some form of casualty loss due to the devaluation caused by locating of dumpsites or plants which would render the adjacent properties less valuable. Properties eligible for such consideration would have to be appraised prior to implementation of this project. (Scelzi, Fort Edward, New York).

Response: This issue and the programs developed to protect the community immediately surrounding the containment site from severe economic loss are discussed in the section on financial assurances in Appendix A.

III-11. Comment: It is disconcerting that the potential value of the fishing industry is carefully calculated and receives repeated discussion, while the agricultural industry, by comparison, is discussed quite briefly. The value of agricultural production within a few miles of the site is many times that of the fishing industry, but the EIS certainly does not indicate that.

Now it apparently has been decided that farming may not continue within approximately one third of a mile from the containment site for the duration of the dredging and containment operations.

Should the action alternative be chosen, every measure must be taken to ensure that adverse effects on agriculture are prevented. It is the Farm Bureau's responsibility to carry this out. (Jack Hughes, Associate Public Affairs Director, New York Farm Bureau, Glenmont, New York).

Response: Although the actual value of agricultural production within a few miles of the proposed containment site was not specifically discussed, the potential impact on the surrounding agricultural resources was carefully considered in the DEIS.

EPA recognizes that the agricultural interests surrounding the proposed containment site need to be protected. EPA has recommended a number of mechanisms, including financial assurances, to protect the farming industry from any loss of agricultural production. As part of the project approval, EPA has required NYSDEC to fully develop assurances and protective mechanisms and to submit them for public comment. Consistent with this approval, EPA has published these NYSDEC project modifications as Appendix A of this Supplemental DEIS.

III-12. Comment: This sentence [in the DEIS] states "the majority of soils fall [at the proposed containment site] within agricultural suitability Classes III and IV". These classes should be defined. Is "Land Capability Class" intended?

Based on the soils in the area, the statement that "prime agricultural soils (prime farmlands) are not present" is correct. The Kingsbury silty clay and Vergennes clay loam, however, are considered Farmland of Statewide Importance. (Dodd, State Conservationist, Soil Conservation Service, United States Department of Agriculture, Syracuse, New York).

Response: The soil classes referred to in the DEIS are Land Capability Classes. Classes III and IV are defined by the Soil Conservation Service (USDA, 1975) as follows:

- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

- Class IV soils have severe limitations that reduce the choice of plants, require very careful management, or both.

Farmland of statewide importance is defined as follows:

- Additional farmland of statewide importance--This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Criteria for defining and delineating this land are to be determined by the appropriate State agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and

that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield a prime farmlands if conditions are favorable. In some States, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by State law.

III-13. Comment: We find it very disturbing to talk about distances of 700 meters minimum with state agencies, when on page 4-63, EPA says the minimum distance should be 2,000 meters, over one mile. (McMurray, President, Warren - Washington County Farm Bureau).

Responses: The recommendation in the DEIS to monitor vegetation within 2000 m (6500 ft) of the site was based on a conservative estimate derived from worse case data collected at the Caputo PCB dump site. More recent studies involving uptake of PCBs by plants by Dr. E.H. Buckley of the Boyce-Thompson Institute, Ithaca, New York (under contract by NYSDEC) indicates that monitoring of agricultural crops is necessary only up to 200 m (650 ft) from the site. This is also considered a worse case estimate and will be utilized unless observed data indicate that additional monitoring needs to be performed.

III-14. Comment: It is known that PCB can be taken up by plants. The duration and the role in the plant-animal food cycle is not fully understood. Such facts are vital in understanding the impact of the proposed program on the dairy farming industry in the area (Burkhardt, Fort Edward, New York)

Response: Studies carried out by Dr. E.H. Buckley of the Boyce-Thompson Institute, Ithaca, New York, have documented the rate and degree of uptake of PCBs by various agricultural crops, including corn, alfalfa, red clover and timothy (Sections 4B and 4D of Chapter 3 and Section 4 of Chapter 4 of the DEIS). Dr. Buckley is presently continuing research on PCB uptake by forage crops and other plants. NYSDEC's appended submittal describes further research, monitoring and contingency plans to be carried out during and after disposal operations to ensure protection of agricultural crops used in the dairy industry.

III-15. Comment: The State of New York should provide legal guarantees to compensate landowners in the region for any loss in property value due to the location of the landfill and for any loss which occurs as a result of transporting the PCB material. (Solomon, Congressman, United States House of Representatives, Washington, D.C.).

Response: Financial assurances to compensate landowners for any losses which may result from the proposed project are discussed in Appendix A.

III-16. Comment: Due to the nature of cesium affinity, my estimated value for reaccumulated radionuclides may be off by a factor of 2. But under more expert consideration that matter may be refined. The question raised therefore, is, will the reaccumulation of low-level radioactive waste that may occur, make this a low-level radioactive waste site? Do the permits involved, cover the handling of this type of material? (Coffin, Poughkeepsie, New York).

Response: The cesium that will be associated with PCB-contaminated dredge spoils in the proposed containment site will be found at extremely low concentrations and will not have any public health significance. The radioactive cesium 137 present in sediments of the Hudson River originated from fallout from atmospheric testing of nuclear devices. The deposition of trace amounts of cesium 137 approximately coincided with the discharges and deposition of PCBs in the Hudson River. Cesium 137 that entered the sediments with PCBs also was deposited throughout the land surface of the region and most of the world. Because cesium has a half life of approximately 30 years, most of the cesium is still present in various sedimentary environments as well as terrestrial and marine ecosystems.

Because deposition of cesium 137 coincided with deposition of PCBs, cesium can be used as a tracer for PCBs. Levels of cesium can provide an indication of the levels of PCB present in sediments (Bopp and others, 1981). The test for cesium is much easier and faster than that for PCBs, so that the cesium -PCB relationship may be useful in the various PCB monitoring programs planned by NYSDEC for the dredging project.

Because of the association of cesium 137 with PCBs, trace amounts of cesium 137 will be present in sediments placed in the containment site. The cesium will not have public health significance because it will be present in extremely low concentrations. The cesium will not be differentially leached from the site because cesium, like PCBs, has an affinity for fine-grained particles. This affinity is why the cesium adhered to the Hudson River sediments originally.

The radioactive materials that will be present in the containment site will have no public health significance because:

- They will be present at extremely low levels;

- They will be highly dispersed in the dredge spoils; and
- Their radioactive decay product will be largely absorbed by the clay cap on the site.

An estimate of the amount of radiation that can be expected at the site is contained in Appendix E.

III-17. Comment: These compounds [dioxins and dibenzofurans] seem to be frequently associated with the presence of large amounts of PCB material. They do appear to have been noted with activities, including burn-off of unsecured landfills; e.g. Fort Miller Dump, also the State Office Building at Binghampton, New York. This association raises major questions which have not been addressed in literature I have reviewed. Are dioxins and dibenzofurans products produced by half-life decay? (Coffin, Poughkeepsie, NY).

Response: Trace amounts of polyhalogenated dibenzofurans (PCDFs), an extremely toxic contaminant, have been found to be associated with PCBs. PCDFs can be present in PCBs as a trace contaminant which originated from the PCB manufacturing process. Trace amounts of PCDFs can also form from incomplete combustion of PCBs. PCDFs have been found at PCB landfills exposed to burnoff, in the vicinity of burned transformers or capacitors containing PCBs, in heat exchange systems using PCBs, and in fly ash and flue gases of incinerators. (Rappe, 1979; Appendix A, page A-1 of the DEIS). Dioxins are not usually considered to be associated with PCBs (Rappe, 1979). Although they have been found as trace contaminants in PCBs (Appendix A, page A-10 of the DEIS), they are not likely breakdown products of PCBs.

Traces of PCDFs have been found in the Hudson River, but it is not known if they originated as contaminants from the PCB manufacturing process or if they formed from combustion of PCBs, such as at a dumpsite. (Tofflemire, NYSDEC, July 30, 1981).

There is no evidence to indicate that PCDFs could form from the natural breakdown of PCBs. The formation of PCDFs from PCBs is a high-temperature process. Significant chemical or biological conversion of PCBs to PCDFs under normal environmental conditions is unlikely because PCBs are very stable in the environment and because the chemical structure of PCDFs indicates that the substance is not a likely natural breakdown product.

III-18. Comment: We also urge that the New York State Department of Environmental Conservaton, with the support of the Environmental Protection Agency, assure that the containment site be confined to PCB disposal, and not be used for other forms of wastes which could consume its capacity for the full-scale project. (Hammon, Vice Chairman, Save Our Port, New York, New York)

Response: The propsoed containment site has been chosen, planned and designed exclusively for the disposal of PCB-contaminated sediments from the upper Hudson River region. The terms of a bill passed by the New York State Assembly and Senate in June state that only PCBs dredged from the Hudson River would be buried at the containment facility in Washington County. This bill must also be signed into law by the Governor, and it will effectively limit use of the containment site for disposal of Hudson River PCBs.

IV. MODIFICATIONS

This section contains comments on the overall operational standards, procedures and monitoring for the proposed PCB project. These comments pertain to all aspects of the project, including dredging, disposal and long-term monitoring. The main categories of comments covered in this section are:

- Provisions for public comment on modifications;
- Project surveillance; and
- Long-term monitoring.

IV-1. Comment: New York Farm Bureau is dissatisfied with the provision for public comment on the modifications. Apparently the public review and comment period for the modifications will be the time between the public hearings and the final comment date for the final EIS. This is inadequate because the only real opportunity for altering the modifications must be within a period of time before issuance of the final EIS in order that any changes may be included in it. The value of commenting on the final EIS is questionable as it is unlikely the final EIS would be changed. (Hughes, Associate Public Affairs Director, New York Farm Bureau, Glenmont, New York).

Response: The project modifications, monitoring program and contingency plans were developed by NYSDEC in response to EPA's recommendations in the DEIS. These recommendations by EPA were based on public comment and interaction with other governmental agencies and environmental groups. As a response to public comment, these monitoring and contingency plans have been incorporated into this Supplemental EIS as Appendix

A. There will be a 45-day public review and comment period. Additional comments will be taken into account in the final EIS.

IV-2. Comment: In its development of operational standards and procedures, DEC should have a team of experts overseeing the operation at all times and retain oversight control. Monitoring of the operation should be extremely sensitive to increases of PCB contamination or air, water, plants and aquatic animal life. Strong citizen oversight of the dredging operation must be provided for either through the PCB Settlement Advisory Committee or a separate group or both (Mylod, Executive Director, Hudson River Sloop Clearwater, Inc., Poughkeepsie, New York).

Response: NYSDEC will provide a consultant to oversee the dredging and disposal operations. This consultant will ensure that environmental and health specifications, as well as quality control, are carried out effectively. NYSDEC officials will also be involved with periodic inspection of all aspects of monitoring during operations. The monitoring program is described in Appendix A. Citizen oversight of dredging and disposal operations will be provided by the PCB Settlement Advisory Commitee (SAC) and possibly representatives of the Citizens Advisory Committee (CAC). The DEIS recommended that CAC and SAC consider undertaking an oversight role for the duration of the project, if it receives final approval. A decision on the role of the CAC and its interface with the SAC will be determined from the recommendation contained in the CAC report and will be made part of the NEPA Record of Decision.

IV-3. Comment: Although we are assured that the project, if carried out as intended, will not threaten public health, we nonetheless consider it necessary that DEC consider a range of specialized interests when devising mitigation measures. For down-river drinking water users, alternative supplies or emergency treatment assistance should be investigated. For commercial, sports and subsistence fishermen, notification procedures and financial or other compensation should be investigated. For residents in the immediate dredging or landfill area, temporary relocation procedures should be investigated in the event that volatilization rates exceed the State DOH [Department of Health] recommended limits. For area dairy farmers, compensation or other measures should be investigated in case contaminants impair the marketability of their products. (Whyatt, Scenic Hudson, Inc. and the Hudson River Fishermen's Association).

Response: The monitoring and contingency program developed by NYSDEC contains provisions for all these interests. The program is described in Appendix A.

IV-4. **Comment:** I object to the last paragraph on page 6-10 eliminating long-term monitoring from eligible funding. While I agree that the available funds are probably not sufficient for the dredging and long-term monitoring, and that the monitoring should be funded if at all possible from other sources, I feel that the limitation set forth here is not in conformance with the legislation authorizing the project. This legislation clearly sets up a demonstration project to determine the feasibility of indefinite storage of hazardous waste, and to ascertain the rate of recovery of a contaminated waterway from which the waste has been removed.

Long-term monitoring is an essential part of the authorized project.

Further, I consider long-term monitoring a priority, both to ascertain the effectiveness of the project, as well as to safeguard the health of people in the project area and downstream. (Whyatt, Scenic Hudson, Inc. and the Hudson River Fishermen's Association)

Response: If federal monies were to be used for long-term monitoring (for up to a minimum of 30 years), there would be insufficient funds to undertake dredging. EPA grant funds will be used to monitor the site and the river for a five-year period. As with any 201 Construction Grants project, once the facility has been completed (in this case, the containment facility), it then becomes the responsibility of the grantee, NYSDEC, to fund the long-term operation and maintenance of the facility, including monitoring. NYSDEC has committed itself to such a long-term monitoring effort to ascertain the effectiveness of the project and to protect public health and resources. The monitoring program designed by NYSDEC is described in Appendix A of this document.

V. PROJECT ALTERNATIVES

This section contains comments concerning possible alternatives to the PCB dredging and containment project. Alternatives that were discussed in the comments were:

- No-action;
- Control of riverflows;
- PCB recovery with activated carbon; and
- Detoxification of PCB-contaminated dredge spoils.

These alternatives were discussed in the DEIS, but they were found to be unacceptable because of public health, technological or economic considerations.

V-1. Comment: Proponents claim also that the rate of recovery of the river will be greater with the action alternative. According to the EIS the supply of PCBs above Troy will be exhausted only five years sooner with the action alternative versus the no-action alternative with routine channel dredging. A reasonable question is whether it is fiscally responsible to spend more than $26.7 million to dredge only 30 percent of the PCBs out of the river for a recovery period that is nearly as long as with the no-action alternative. (Hughes, Associate Public Affairs Director, New York Farm Bureau, Glenmont, New York.)

Response: Based on estimates presented in the DEIS (Chapter 2), the supply of PCBs will be largely exhausted in the upper Hudson River by the year 2013 under the no-action alternative, if routine maintenance dredging continues. If routine maintenance dredging is halted, PCBs will not be exhausted until at least 2028. Under the reduced-scale project, the supply will be exhausted by 2008. Although the time difference for exhaustion of PCBs between no-action with maintenance dredging and the reduced-scale project is only 5 years, no-action will have greater adverse impacts. Public exposure to PCBs will be greater because dredge spoil sites from maintenance dredging will have high levels of PCBs. Volatilization of PCBs will be greater, and contamination of fish will persist longer. A much greater amount of PCBs will enter the lower Hudson River and estuary with no-action. If maintenance dredging is halted because of difficulties finding adequate disposal sites for contaminated sediments (see comment V-2), PCBs will not be removed from the river as quickly, and an additional 20 years will be required for the supply of

PCBs to be exhausted under no-action. Already sediments in areas that must be regularly dredged, such as the Albany Turning Basin, have levels of PCBs that could preclude usual spoil disposal practices.

The reduced-scale project will remove an estimated 30 to 35 percent of the total PCBs now present in the river, while the full-scale project would remove an estimated 44 to 49 percent (Chapter 2, Sections 4 and 5 of the DEIS). With either project, a substantial amount of the contaminant would be effectively removed from the river and confined, making it unavailable for further dispersion through the environment by volatilization, transport to the estuary, uncontrolled disposal of dredge spoils from maintenance dredging, incorporation into aquatic and terrestrial ecosystems, and other loss mechanisms.

V-2. Comment: The potential environmental impacts of a series of hot-spot dredging and disposals over many years, as would occur if New York DOT had to deal with each spot as it should, is never addressed. (Cohn, Chief, Planning Division, North Atlantic Division, COE, New York, New York).

Response: The potential problems associated with the series of hot spot dredgings and disposals that would occur under the no-action alternative from routine maintenance dredging were recognized in the DEIS as an added justification for the dredging project. The DEIS (page 5-9 of the Executive Summary) states that removal of PCBs from the upper Hudson River would reduce the risk of conducting environmentally unsound maintenance dredging and upland disposal of PCB-contaminated sediment. On page 4-8, the possibility of having multiple upland disposal sites of PCB-contaminated sediments derived from maintenance dredging was referred to as a significant, long-term, adverse impact of the no-action alternative.

Although disposal of PCB contaminated sediments with concentrations of 50 ug/g (ppm) or greater would be regulated under TSCA, many disposal operations of spoils with lower PCB concentrations would not. In such cases, disposal and monitoring requirements dictated by the State are less stringent than those required under TSCA.

The dredge spoil sites would not be as carefully designed, constructed and monitored, and could create greater risks to public health, compared to the proposed containment facility. In addition, numerous such sites would be required to accommodate spoils from maintenance dredging as shoaling occurred.

V-3. Comment: The primary current environmental threat, as found by the Environmental Impact Statement, is that of PCB hot spots being washed downstream during flooding. Inadequate discussion has been held as to the control of waterflow in the Hudson River; (Congressman, United States House of Representatives, Washington, D.C.).

Response: A discussion of the flood control alternative is contained in the DEIS (Chapter 2, Section 2). The alternative would involve controlling flows from Great Sacandaga Lake at the Conklingville Dam to avert high flow periods in the Hudson River that would resuspend PCB-laden sediments.

Based on a review of the present system of flow controls in the Hudson River, control of major floods over the long term was found not to be a feasible method of controlling resuspension of PCBs. Controlling river flow would conflict with hydroelectric power generation and navigational use of the river. Water levels in Great Sacandaga Lake cannot be permitted to fluctuate too widely because of existing shoreline development and recreational use of the lake. Flow control systems in the upper Hudson may be useful for short-term mitigation of flows, and they will be utilized as much as possible during the dredging operations, as discussed in Appendix A.

V-4. Comment: There are some alternatives, however, that we feel could have received more extensive discussion. Activated Carbon Adsorption (p. 2-12) is described as "very reasonable" when compared to the cost of other alternatives, but is dropped from further consideration because it has never been tested in-river, and because not much is known of its effectiveness or technical feasibility. Perhaps one or more of the "hot-spots" could be removed using this technique to determine if it could reduce the two (2) percent loss to the water column expected with the use of hydraulic dredging (pp. 4-42, 4-43). (Fear, Captain, U.S. Coast Guard Chief of Staff, Third Coast Guard District, Governors Island, New York).

Response: Activated carbon removal of PCBs from the Hudson River sediments would involve applying activated carbon to the river bed, allowing it to absorb PCBs, and then recovering the PCB-laden carbon from the river. NYSDEC and the PCB Settlement Advisory Committee considered this alternative and decided that it was presently technologically and economically infeasible. The process is only in very preliminary stages of development, and at least several years of research would be required to develop a method. In addition to the costs of purchasing, applying to the river bed, and recovering the activated carbon, costs would be incurred in the treatment or controlled disposal of the PCB-laden carbon. Activated carbon removal was studied as a possible method of removing kepone from sediments in the James River, Virginia, but was found to be uneconomical (Tofflemire, NYSDEC, July 30, 1981).

V-5. Comment: The cost estimate should accurately reflect the double costs of both dredging the PCB material and encapsulating it in a landfill, and the cost to remove and destroy the sludge material once a safe method of destroying the PCB sludge is developed.

The disposal site is designed for permanent disposal rather than temporary storage and this appears to be in violation of the EPA regulations which require that PCBs be destroyed by incineration or the new PCBX process. The Solomon Amendment which passed the 96th Congress and was signed into law by the President, states "no pollutant removed pursuant to the dredging shall be placed in any landfill unless the Administrator first determines that the disposal of the pollutants in such landfill would provide a higher standard of protection of the public health, safety, and welfare than disposal of such pollutants by any other method including, but not limited to, incineration or a chemical destruction process." Also, much of the scientific community is in agreement that the Northeastern United States is enviornmentally unsuitable for a secure landfill. The EPA no longer issues permits for such landfills. These enviornmental questions should be answered before any further steps to dredge and dump are taken. (Solomon, Congressman, United States House of Representatives, Washington, D.C.)

Response: At the present time, there is no proven cost-effective method of destroying PCB-contaminated sediments. All known destruction processes are either technologically or economically unfeasible because of the large amount of dredge spoils that would be involved with both the full-and revised-scale projects (Chapter 2, Section 4A of the DEIS). The PCBX process developed by Sun Ohio is only suitable for detoxifying PCB-contaminated oils.

EPA is aware of a soils detoxification process proposed by the Franklin Research Institute, Philadelphia, Pennsylvania. In order for this process to be effectivje, however, the dredge spoils must be dewatered, as will be done in the proposed containment site. If the Franklin process proves effective and is not excessibly costly, the process will be used to detoxify the contaminated dredge spoils prior to final closure of the facility.

V-6. Comment: To put into perspective, how much PCB-contaminated sediments could Wright Malta Corp. handle with their incineration process? What does the Wright Malta Corp. have to say in 1981? (Shapot, CAC, Cold Spring, New York).

Response: The Wright-Malta process for detoxifying PCB-contaminated dredge spoils is a steam gasification process. The spoils are heated in the presence of water, and the combustible gases that are formed are extracted and piped to a second stage combustion chamber of a gas turbine. Theoretically,

the turbine can be used to generate electricity. Wright-Malta says that a research program should be funded to develop the process. (Coffman, Wright-Malta Corporation, March 13, 1981). The process, however, is only in a very preliminary stage of development, and its technological and economic feasibility are totally unproven. For this reason, NYSDEC and the PCB Settlement Advisory Committee decided not to provide full funding to the project.

If the process is developed, contaminated sediments would have to be dredged from the Hudson River, adequately dewatered, and stored until they can be treated. If the process does become feasible in the future, these initial steps will have already been completed by the presently proposed dredging and containment project.

V-7. Comment: Spoil disposal techniques such as the Bench-Scale Steam Gasification Dredge Spoil process, Goodyear's Chemical Degradation process and General Electric's Biological Degradation process are also described as effective in the laboratory but not yet feasible for Hudson River sediments on a large scale (pp. 2-39, 2-40). It should be stated how far away these systems are from practical use and how they are likely to compare with the proposed disposal process in terms of operational effectiveness and environmental impacts. (Fear, Captain, U.S. Coast Guard Chief of Staff, Third Coast Guard District, Governors Island, New York).

Response: The Wright-Malta steam gasification process and other detoxification processes for PCB-contaminated sediments are still in preliminary stages of planning and development. How long it will be before these processes become available for practical use is difficult to determine because their development is highly dependent on available funding for research, projected need for the processes, and other economic incentives, as well as technological developments (see comments V-5 and V-6). Almost all potentially feasible PCB-detoxification procedures require that the containmant be removed from the river, adequately dewatered, and temporarily stored until treatment. Therefore, the present plan for dredging and storage of contaminated sediments is consistent with any PCB-detoxification processes that are developed in the future.

VI. OTHER COMMENTS

A variety of the comments received on the DEIS do not fall into any of the previously discussed categories. These comments generally were concerned with the following subjects:

- Remnant deposit alternatitves;
- Unknown source of PCBs in the upper Hudson River

- Future development of hydroelectric power;
- Coordination of the dredging project with NYSDOT maintenance dredging;
- Natural decay of PCB aroclors; and
- Other public health concerns.

VI-1. Comment: Approximately 7200 lbs per year of PCBs pass over the Troy Dam (DEIS 1981), and 7300 lbs/year volatilize into the atmosphere (MPI 1980). About half of the volatilized PCBs may come from contaminated dumps and spoil sites (MPI 1980). Provisions for these sites have been eliminated in the rescoped project. The effect of this elimination has not been spelled out clearly in the DEIS, and should be more fully explained in the FEIS. The DEIS also states that an unknown source of PCBs may be contributing to the PCB load in the river. No estimate is given about the amount it may be contributing. We believe that a study should be made to locate such a source, should it exist, so that its mitigation may be integrated into the dredging as a whole (Natural Resources Defense Council, Inc. New York, New York).

Response: The EPA recommended project, both full- and reduced-scale, includes provision at the containment site for PCB-contaminated materials from other spoil sites which may be found to be releasing significant amounts of PCBs to the air or groundwater. Under recent settlement between NYSDEC and General Electric, the contaminated dumps are being studied and remedial actions are being taken to prevent these sites from contaminating air or groundwater.

As part of the pre-dredging baseline monitoring program designed by NYSDEC for the dredging project (described in Appendix A), the presently unknown source of PCBs in the upper Hudson River will be identified, and remedial action, such as removal will be undertaken. If a significant action is required within the scope of this project, a separate environmental assessment for this project modification will be issued before dredging is undertaken (see comment VI-2).

VI-2. Comment: I am concerned that if the EIS is published with Table S-1 as currently drafted, DEC will not have the needed flexibility to rescope the project, should rescoping be required once the "mystery source" is identified.

For example, if the source turns out to be the remnant deposits, several of these deposits may need to be removed. If the source turns out to be discarded barrels or dump leachate, clean-up of those problems may become a priority.

I fear that the current EIS could lock DEC into pursuing the reduced scale as outlined on Table S-1, even though a somewhat different project may be more effective. To address the

"mystery source", in such a case, would require the department to seek additional funding, with all the delays that would entail, even if the source were discovered to be a major contributor of PCBs flowing over the Troy Dam.

I recommend that the EIS should be altered to clarify the possibility of rescoping to address removal or mitigation of the "mystery source", and that a process should be provided to facilitate any supplemental assessments such a rescoping may require. (Whyatt, Scenic Hudson, Inc., and the Hudson River Fishermen's Association).

Response: As part of the pre-dredging monitoring program, NYSDEC will conduct a survey to identify the unknown source of PCBs in the upper Hudson River. If the source is determined to be the remnant deposits, the project has the flexibility of being rescoped to remove or mitigate PCB losses from the remnant deposits. Any project modification, however, would need to: pertain to removal of contaminated material from the river; undergo an environmental assessment; and be approved by EPA.

Limited studies already completed by NYSDEC have not indicated that the remnant deposits are a likely source for the unaccountable flow of PCBs in the upper Hudson River.

VI-3. Comment: I understand that the proposed program does not intend to remove PCB Materials from above the old dam. In fact, it is understood that remnant deposits designated as No. 4 and 4a are intended to be left in their present condition. Remnant deposits 4 and 4a are of vital concern to this Corporation since this is the location of the recreation site noted above. (Harold E. Rist, Hudson Heights of Moreau, Inc., Glens Falls, New York).

Response: Remnant deposits 4 and 4a contain lower concentrations of PCBs compared to deposits 3 and 5, based on NYSDEC research (Chapter 2, Section 2 of the DEIS). Remnant deposits 3 and 5 would be capped and further stabilized under the full- and reduced-scale projects.

Based on data from other sites correlating volatilization rates and concentrations of PCBs in sediment and soils, NYSDEC has estimated that PCB levels in the air above remnant deposit 4 and 4a do not exceed the NYSDOH guideline of 1 ug/cu m. As part of the background monitoring program designed by NYSDEC (appendix A), air levels of PCBs at the remnant deposits will be measured to confirm previous estimates. If the PCB levels are found to be excessive, remedial actions will be recommended.

VI-4. Comment: Although Niagara Mohawk's plans for rebuilding the Fort Edward Dam appear to have been dropped for the time being, I think the EIS should include a recommendation that the remnant deposits should be removed or further stabilized (to prevent PCB leaching due to a fluctuating water level) if the dam is ever reconstructed. (Whyatt, Scenic Hudson, Inc., and the Hudson River Fisherman's Association).

Response: The impact of the proposed project on development of hydroelectric power at Fort Edward has been addressed on page 4-34 of the DEIS. Because of public health and environmental considerations, in-place stabilization of remnant deposits was the alternative recommended in the DEIS. If the remnant deposits are discovered to be a significant source of PCBs to the river, however, additional mitigative measures will be taken.

It is not within the scope of this DEIS to address future development of hydroelectric power on the Hudson River. Any future action utilizing the Hudson River which may have an impact on the remnant deposits would have to be evaluated at that time. If such an action would cause a disturbance of the remnant deposits, mitigation measures, such as further stabilization or removal, would have to be considered.

VI-5. Comment: We believe that the DEIS does not give consideration to the impact of the proposed reclamation project upon energy development, particularly under the reduced-scale project. We recommend, therefore, that the Environmental Protection Agency amend the DEIS to consider hydroelectric development in formulating the overall project and in setting priorities for the removal of PCBs from the river. (Vessels, Director, Office of Environmental Planning, State of New York Department of Public Service, Albany, New York).

Response: The Congressional authorization under which the dredging project was initiated authorized EPA to undertake a demonstration/reclamation project for removing and disposing of PCB-contaminated sediments from the Hudson River. Possible electric power generation at Fort Edward was considered in assessing impacts in the DEIS. Future hydroelectric development was not a priority in formulating the overall project design, however, because it was outside the scope of the legislative authorization.

VI-6. Comment: A major shortcoming of this project has been its failure to consider current private and state dredging operations. Procedures should be developed and sufficient capacity retained in the disposal site to at least accommodate those operations to be undertaken concurrently with this project. Added costs could be assessed to the state DOT and private

applicants, who would benefit from not having to design and build their own sites. The environmental impacts would be lessened in having only one heavily monitored and controlled site built to tight specifications. And an attempt at managing upriver activities would have begun. It may not be possible to coordinate all activities, but no attempts have been made, despite numerous comments from this district. Once the site was closed, upon project's completion, no additional material would be placed within. (Cohn, Chief, Planning Division North Atlantic Division, COE, New York, New York).

Response: Under legislation recently passed by the New York State Assembly and Senate (yet to be signed into law by the governor), the proposed containment site would be authorized to accept only those PCB-contaminated sediments from the Hudson River between Lock 2 and the village of Fort Edward. The site could not be used for the disposal of any other hazardous wastes.

Any dredging and disposal operations undertaken by NYSDOT or private applicants would have to be done concurrently with the proposed dredging project, with authorization by NYSDEC, and also meet the legislative criteria described above.

A recommendation of the CAC incorporated into the Executive Summary of this Supplemental DEIS was that NYSDOT develop a comprehensive dredge spoil disposal plan for the upper Hudson River. Such a plan would help to ensure coordination of NYSDOT dredging activities with the proposed project.

VI-7. Comment: New York State's tentative finding that the heavier PCB fractions are not degrading as rapidly as the lighter ones... appears to have ramifications for both fisheries and water supply. These complications should be included in the assessment of impacts. (Rehfus, Services Division, Habitat Protection Branch, National Marine Fisheries Service, Gloucester, Massachusetts).

Response: PCB aroclors discharged into the Hudson River varied in the weights of chlorine contained in the mixtures (pages 1 and 2 of DEIS). The principal forms of PCB discharged were aroclors 1242 and 1016, which are low chlorinated aroclors. Lesser amounts of aroclor 1254, a higher chlorinated aroclor, were also discharged. There is evidence that the low chlorinated aroclors are less stable and subject to slightly greater degradation in the environment than the highly chlorinated aroclors, such as 1254. A decline in PCB levels

in Hudson River fish observed by NYSDEC was probably partly caused by declines in the low chlorinated aroclors. Analysis of fish by NYSDEC in 1980 indicates that levels of 1254 are declining very slowly if at all. The significance of this is that PCBs may exhibit long-term persistence in the water, sediments, and biota, even though initial declines of less stable aroclors may have occurred after PCB discharges by General Electric were halted.

VI-8. Comment: If the DEC and EPA are as concerned about public health safety as they say, why is GE allowed to have an uncovered chemical pool in a neighborhood? (Brown, Fort Edward, New York).

Response: Remedial action for the General Electric dump sites is presently underway under NYSDEC regulatory action. The above comment may refer to a storm water retention pond on General Electric's property.

VI-9. Comment: [Occupants of] ten out of fourteen houses in our neighborhood have either: blood diseases, cancer, respiratory problems, female disorders or miscarriages. Does this ratio merit further research as to the health hazards imposed by PCBs and other chemicals before dredging? (Brown, Fort Edward, New York).

Response: One of the goals of the PCB dredging project is to reduce the amount of unconfined, PCB-contaminated sediments and dredge spoils in the upper Hudson River region. PCB contamination has adverse impacts on the environment and poses a risk to public health and welfare in the region. The analysis presented in the DEIS indicates that the actual dredging operation will have only local, short-term impacts on biota and water quality. There will not be significant long-term adverse impacts on public health from the dredging project, and, in the long term, the project will reduce the amount of PCB contamination in the region.

Any unusually high incidence of diseases in localized areas, especially areas exposed to potentially harmful contaminants, warrants further investigation. Such investigations are the responsibility of the NYSDOH.

VI-10. Comment: The attached document is in response to your 4 May 1981 announcement regarding the DEIS for the Hudson River PCB Reclamation Demonstration Project. It summarizes our comments on Appendix C concerning the review of our PCB modeling work.

In general, we find the review to be both inaccurate and misleading. Based on the information presented in the

attached document, we request that this review (Appendix C of the DEIS) either be removed from the final EIS or revised to reflect our attached comments, but certainly not left as is. (Abood, Partner, Lawler, Matusky and Skelly Engineers, Pearl River, New York).

Response: The sediment and PCB transport model prepared by Lawler, Matusky and Skelly Engineers (LMS) and reviewed in Appendix C of the DEIS provides estimates of PCB loadings from the upper Hudson River to the estuary. The model provided an adequate assessment of PCB transport commensuate with the data, time and budget available. Explanation of the model selection procedure and application is available in a variety of interim reports, memos, and other supporting documents available from LMS. The model was chosen to fit research objectives as well as available data. Although the review of the model presented in the DEIS points out certain weak aspects of the analysis, the model did provide the best available estimates of PCB loadings in the Hudson River.

Federal, State, Local, and Other Sources from Which Comments Have Been Received

Abbreviations Used

Corresponding Metric and English Units

References

List of Preparers

FEDERAL, STATE, LOCAL AND OTHER SOURCES FROM WHICH COMMENTS HAVE BEEN RECEIVED

Federal Agencies:

Army Corps of Engineers
Department of Agriculture, Soil Conservation Service
Department of Health and Human Services
Environmental Protection Agency
Fish and Wildlife Service
National Marine Fisheries Service
United States Coast Guard

United States House of Representatives:

Honorable Gerald Solomon

New York State Assembly:

Honorable Joseph Ferris
Honorable Joan Hague

State and Local Agencies:

City of Albany
City of Poughkeepsie
New York City Department of Ports and Terminals
New York Farm Bureau
New York State Department of Environmental Conservation
New York State Department of Health
New York State Department of Public Service
Port Authority of New York and New Jersey
State of New York Department of Agriculture and Markets
Warren-Washington County Farm Bureau

Citizens Group:

Citizens Advisory Committee to the Dutches County Legislature
Citizen-Environmentalists Against Sludge Encapsulation
Hudson River Clearwater Sloop, Inc.
Hudson River Fishermen's Association
International Union of Operating Engineers Local 251
National Audubon Society
New York Towboat and Harbor Carrier's Association
PCB Citizens Advisory Committee
PCB Settlement Advisory Committee
Save Our Port
Seafarer's International Union
Sierra Club
United New York and New Jersey Sandy Hook Pilots Association

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ABBREVIATIONS USED

CAC	Citizens Advisory Committee
ci	curie
cm	centimeter
COE	United States Army Corps of Engineers
cu ft	cubic foot
cu m	cubic meter
cu yd	cubic yard
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	United States Environmental Protecti
FDA	United States Food and Drug Administ
ft	foot
g	gram
hr	hour
in	Inche
kg	kilogram
km	kilometer
l	liter
LMS	Lawler, Matusky and Skelly Engi
lb	pound
m	meter
mev	million electron volts
mg	milligram
mi	mile
mm	millimeter
MPI	Malcolm Pirnie, Inc.
mrem	millirem
ng	nannogram
NEPA	National Environmental Pol
NIOSH	National Institute for Oc
NYSDEC	New York State Department
NYSDOH	New York State Departmen
NYSDOT	New York State Departmer
	Occupational Safety and
	hlorinated byphen

ABBREVIATIONS USED (continued)

PCDF	polychlorinated dibenzofuran
pci	picocurie
ppb	parts per million
ppt	part per trillion
SAC	PCB Settlement Advisory Committee
sec	second
sq cm	square centimeter
sq m	square meter
TSCA	Toxic Substances Control Act
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
ug	microgram
yr	year

,CORRESPONDING METRIC AND ENGLISH EQUIVALENTS

Celsius (°C)	Farenheit(°F)
centimeter (cm)	inch (in)
cubic meter (cu m)	cubic yard (cu yd) cubic foot (cu ft) gallon (gal)
gram (g)	pound (lb)
hectare (ha)	acre (a)
kilogram (km)	pound (lb)
kilometer (km)	mile (mi)
liter (l)	gallon (gal)
meter (m)	yard (yd) foot (ft)
metric ton (t)	ton (tn)
microgram per gram (ug/g)	part per million (ppm)
microgram per liter (ug/l)	part per billion (ppb)[1]
milligram per liter (mg/l)	part per million (ppm)[1]
millimeter (mm)	inch (in)
nannogram per liter (ng/l)	part per trillion (ppt)[1]

NOTE: 1. an approximate equivalent

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Appendices

APPENDIX A

Response to Executive Summary of

Draft Environmental Impact Statement,

Hudson River PCB Reclamation Project

New York Department of Environmental Conservation, 1981. Response to Executive Summary of Draft Environmental Impact Statement, Hudson River PCB Reclamation Project, Albany, New York.

HUDSON RIVER PCB RECLAMATION PROJECT

RESPONSE TO EXECUTIVE SUMMARY
OF
DRAFT ENVIRONMENTAL IMPACT STATEMENT

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
JUNE, 1981

Introduction

This report has been prepared by the New York State Department of Environmental Conservation (DEC) in response to the Executive Summary of the Draft Environmental Impact Statement prepared by the United States Environmental Protection Agency for the Hudson River PCB Reclamation Project.

The monitoring and contingency plans outlined in this response report are considered by DEC to be a vital and integral portion of this project.

In the event that contingency plans are required to be implemented, these measures will be authorized by the DEC Project Director. The laboratory data to be utilized in impact assessment will be provided by the DEC project laboratory to the Environmental Monitoring Manager of DEC who will advise and make recommendations on a daily basis to the DEC Project Director of the status of ambient environmental parameters. The EPA and New York State Department of Health will be provided with copies of all data collected as part of the environmental monitoring program.

Prior to the dredging, a comprehensive baseline environmental monitoring program will be instituted. This baseline program is outlined in Appendix A of this response report. Sampling procedure, location maps and a detailed description of the Environmental Monitoring Program are contained in Appendix A of the Quality Assurance/Quality Control being developed by DEC as part of this project.

Throughout this document, the term heavy metals or metals has been utilized. These terms are, in all cases, are to include the following elements:

1. Arsenic
2. Cadmium
3. Chromium
4. Copper
5. Lead
6. Mercury
7. Nickel
8. Zinc

Project "Modifications" Recommended by the NEPA-DEIS	Report Section
Dredging, In-River Containment, and Stabilization	
1. Study and make recommendations to determine if maximize in-river containment of hot spots were feasible and cost effective. (This will be studies in detail during the 45-day draft NEPA EIS review period.)	I
2. Cap/in-place stabilization and denial of access of remnant deposits 3 and 5 as an immediate measure.	II
3. Maximize upriver flow regulation at Saganadaga Dam as a flood control measure during the dredging operation.	III
4. Develop operational standards and procedures, mitigating measures monitoring programs, and contingency plans to eliminate excessive volatilization and resuspension of PCB-contaminated sediments to protect workers, residents, agricultural resources, and water supplies.	IV
Disposal	
5. Modify disposal operations at the containment site, including the provision for smaller containment cells, addition of PCB adsorbents and possible cell cover during loading operations to minimize volatilization.	IV
6. Develop operational standards and procedures, contingency plans, and monitoring program surrounding the proposed containment site for the duration of the disposal operations to assure the NYSDOH 1 ug/cu m ambient air guideline is met, as well as the 0.2 ug/g (ppm) standard for crops set by the U.S. Food and Drug Administration.	IV
7. Develop specific contingency plans for additional treatment of the supernatant from dewatering prior to discharge if permit limits (to be established) are exceeded.	V
Long-Term Storage	
8. Development of long-term maintenance and monitoring programs for a minimum of 30 years with periodic program review by EPA and NYSDOH.	IV
9. Contingency plans for (a) long-term leachate collection and treatment, (b) landfill cap maintenance, (c) excessive PCB volatilization or methane generation, and (d) alternate water supply should monitoring indicate failure of containment site.	IV

Project "Modifications" Recommended by the NEPA - DEIS	Report Section
10. The development of grievance and arbitration procedures and the investigation of the feasibility of liability insurance for any claims arising in connection with the public health aspects of the project.	VI
11. Provision for specific funding mechanisms by NYSDEC to assure implementation of long-term contingency plans, operation, maintenance, and monitoring.	VI
12. Redesign of the containment site leachate collection and storage system to improve operations and to avoid clogging and buildup of leachate within the site.	VII
13. Provision for storage of NYSDOT maintenance dredging materials from sites 212, 13, 204 Annex from Washington County only (if removal is deemed necessary), under the condition that the state bear the incremental costs associated with disposal and long-term storage.	IV
Water Quality Monitoring	
14. Develop a long-term monitoring program to evaluate the improvement of the recovery rate of the river and fisheries.	IV
15. Develop a long-term monitoring and maintenance program if in-river containment is implemented to determine leaching of PCBs back into the river.	I
16. Develop a downstream public water supply monitoring program for PCBs and heavy metals to be implemented before, during, and after dredging operations, especially during and shortly after high flows. Contingency plans to provide additional water treatment or alternate water supplies also should be developed.	IV
17. Develop a short-term monitoring program for air quality, water quality, and biota during dredging and disposal operations.	IV
Citizens' Advisory Committee Recommendation	
18. NYSDEC should consider providing assurances that neither the proposed containment site nor the surrounding land acquired by New York State will be used for the future disposal of any hazardous waste generated from either within or outside Washington County.	VIII

I. IN RIVER CONTAINMENT OF HOT SPOTS

1. General

The DEIS recommended maximization of in-river containment of hot spots where feasible. NYSDEC studies show this as a possible alternative to dredging hot spots 8 and 35. This would be accomplished by the construction of a partial perimeter rock dike at each hot spot. The purpose of the diking is to protect the hot spot from scour during low flood flows. This alternative has been evaluated on the basis of its cost and effectiveness in inhibiting the transport of PCBs both to the water column and to the biota. The alignment and a typical section of the partial perimeter diking system is presented on Plates 1 and 2.

2. Rock Diking

The dike itself would consist of a central core of crushed stone sand or other appropriate material covered by a one-foot layer of intermediate sized stone and topped with two feet of riprap. The dikes will have a top width of ten feet and side slopes of 2.5 horizontal on one vertical. The height of the rock dike will be approximately three feet above the normal pool elevation consistent with elevations of two to five year flood occurrences. The dike will extend three feet into the river bed. Bed sediments removed for dike construction would be dredged and transported to the containment site.

The diking must have a rugged structure to withstand flood flows, ice and wave wash from canal traffic. These dikes would require continuing, long-term maintenance in order to retain structural integrity.

3. Hot Spot 8

Hot Spot 8 has the largest volume of the 20 hot spots in the Thompson Island pool. It has a dredge removal volume of 162,500 cu. yds. containing an estimated 18,000 pounds of PCB.

Two alternative dike schemes are presented for hot spot 8. Alternative A consists of a continuous 3,500 ft. long dike bordering 45 percent of this hot spot. Alternative B consists of three small dikes with a combined length of approximately 330 ft. connecting the island at the north end of the hot spot. Thgis island/dike system borders 20 percent of hot spot 8. The alternative diking systems are shown on Plate 1. Under Alternative A the dike would have an average height of 9.5 feet above the bed. Estimates for alternative A were made using the sections done as part of the Hudson River Survey, 1976-1977, by Normandeau Associates, Inc. Under Alternative A, the dike sections would have an average height of 5.5 feet above the bed. Alternative B estimaes were based upon field information gathered by Dr. James Hofflemire of the NYSDEC. Hot Spot 8 would be dredged under the rescoped reclamation project.

Under Alternative A the cost of the diking would be approximately $1,025 per linear foot for a total cost of $3,252,000. The cost to dredge, and transport the entire hot spot has been estimated previously to be $1,947,000 (1981 dollars). This inlcudes treatment of the dredge slurry water before discharge to the Hudson River. Under Alternative 2, the cost of diking would be approximately $590 per linear foot for a total cost of $195,000. This does not include the cost for protection at the dike-island interface. The cost to dredge, transport and treat the remainder of the hot spot would be approximately $1,100,000 (1981 dollars) for a total cost of approximately $1,300,000 for the entire hot spot. A summary of costs is presented in Table 1.

4. Hot Spot 35

Hot Spot 35 has a dredge removal volume of 27,250 cu yds containing an estimated 2,100 pounds of PCB.

The dike evaluated (Plate 2) would be 300 feet long and border 55 percent of this hot spot. The dike would have an average height of six feet above the bed. These estimates were made using a single section done in this area as part of the Hudson River Survey 1976-1977, by Normandeau Associates, Inc. and information gathered through field investigations by Dr. James Tofflemire of the NYSDEC. Dr. Tofflemire's investigations indicate that river depths of ten feet will be encountered if the dike is extended arther than 300 feet.

The cost of diking would be approximately $770 per linear foot for a total cost of $230,000.

The cost to dredge, transport and treat the dredge slurry for the entire hot spot has been estimated previously to range between $338,000 and $560,000 (1981 dollars).

Hot Spot 35 has been identified as containing a significant wetland under the rescoped project and was therefore given a low priority for removal.

5. Previous In-River Containment Evaluations

Previous evaluations have been done on two additional types of in-river hot spot containment. Sheetpiling has been evaluated as an alternative to rock diking and placement of a rock blanket over contaminated areas has also been considered. The costs for single sheetpiling were found to be comperable to the cost of rock diking. The feasibility of this option would require further study. The cost of placing a rock blanket over a contaminated area was estimated at $160,000 per acre, or over $20 million for the Thompson Island hot spots.

6. Cost Summary

A cost summary for both diking and dredging Hot Spots 8 and 35 is presented in the following table.

TABLE 1

COST SUMMARY(1)

Parameter	Area		
	Hot Spot 8		
	Alternative A	Alternative B	Hot Spot 35
Dike - Length	3,170 ft.	330 ft.	300 ft.
- Height (average)	9.5 ft.	5.5 ft.	6.0 ft.
- Base Width (typical)	58 ft.	38 ft.	40.0 ft.
- Volume (total)	53,600 cu yds	3,100 cu yds	3,700 cu yds
- Dike Construction Cost	$3,252,000	$195,000	$230,000
Hot Spot - Removal	162,500 cu yds	162,500 cu yds	27,250 cu yds
- Removal Volume Bordered by Dike	71,000 cu yds	37,000 cu yds	15,000 cu yds
- Average PCB concentration (In-Situ)	99 ug/g	99 ug/g	105 ug/g
- Pounds of PCB (total)	18,800 lbs	18,800 lbs	2,100 lbs
- Pounds of PCB Bordered by Dike	8,200 lbs	4,300 lbs	1,100 lbs
- Complete Removal-Dredging Cost	$1,947,000	$1,947,000	$338,000-$560,000
Unit Cost Comparisons - Diking $/lb PCB Bordered	$ 390	$ 45	$ 205
- Dredging Cost $/lb PCB Removed	$ 105	$ 105	$ 160-$270

(1) All costs are presented in 1981 dollars.

MONS 009378

7. Basis for Diking Hot Spots 8 and 35

The concept of diking Hot Spots 8 and 35 is based upon several assumptions:

- Construction of the dike will significantly reduce the amount of PCB transported from the hot spot to the water column
- The cost of construcitng the dike will be less than the cost of dredging the hot spot
- The dike at Hot Spot 35 will maintain the integrity of the wetland area while constraining further migration of PCBs

Reduction of PCB Transport - Although these dikes would reduce the potential for scour during low flood periods (2 to 5 year flood occurrences), they would do little to reduce scour during high flood periods. The existence of wetlands would tend to support the argument that scour is already minimal in these areas under low flows. In addition, the existing highway embankment now protects the area that would be bordered by the proposed dike.

Cost - Under Alternative A, the cost to construct the diking for hot spot 8 is considerably higher than the dredging cost for this area. The cost of the diking for hot spot 8 under Alternative B is half the cost of dredging per pound of PCB removed. The cost of constructing Alternative B diking and dredging tho remainder of the hot spot would be one third less than dredging the entire hot spot. At hot spot 35, the cost of diking falls within the range of dredging costs. Low water depths would cause some difficulty in access for dredging resulting in an increase in the average pool dredging cost over that given in Table 1.

Wetland Integrity - The construction of a dike will reduce the transfer of water and sediment through the wetland area thereby altering its present equilibrium.

8. Monitoring - The following additions would be made to the project monitoring program if any of the proposed diking measures are implemented.

- Visual inspections of the structural integrity of the diking at regular intervals.
- Monitoring of a series of cross sections across the effected hot spot areas to determine the extent of scour and deposition after the placement of diking.
- Monitoring of the water column at the interface between the affected area and the Hudson River to determine the rate of PCB exchange.

9. Summary

It appears that some partial stabilization measures could be done in areas of shallow water depths for less than the cost of dredging. Significant questions remain, however, concerning the following items.

- The effectiveness of partial stabilization with respect to the transfer of PCB to the water column and aquatic biota during low flows.
- The effectiveness of partial stabilization with respect to scour during floods in excess of the 2 to 5 year flood levels.
- The effects of containment dikes on present river conditions, e.g., stagnant water, silting, effects on wetland characteristics.
- Interference with the navigational channel - the diking of hot spot 8 under Alternative A has the special case of bordering on the navigational channel in some areas.
- The effects of the dikes on local flood and bank stability conditions.

HUDSON RIVER PCB RECLAMATION PROJECT

RESPONSE TO CONCERNS RAISED IN NEPA-EIS

JUNE 1981

Appendix - E.P. TOXICIY TESTS

Two additional E.P. toxicity tests were run by Malcolm Pirnie on two Thompson Island Pool samples labeled Core No. 152 (hot spot 16) and Composite of Core Nos. 15, 84ss and 135ss. The results of the metals tests are listed on Attachment A.

Appendix - ELUTRIATE TESTS

Ten elutriate tests are planned to develop data to generate applicable partition coefficients for samples under various combinations of PCB concentrstoin, grain size and volatile solids content. The testing will consist of the following steps:

- Screening of river bed smaples in terms of grain size and volatile solids
- PCB and metals analysis on the river bed sediment
- Elutriate tests performed on the ten selected samples
- PCB and metals analysis on the elutriate

The elutriate tests will be done in accordance with Appendix A: Elutriate Test Procedure in Ecological Evaluation of Proposed Discharge or Fill Material into Navigable Waters, Dredged Material Research Program, Miscellaneous paper D-76-17, May 1976, Final Report.

The samples have been received by Malcolm Pirnie and the screening of samples has begun. Test results will be forthcoming.

II. REMNANT DEPOSIT REMEDIAL ACTIONS

1. General

The remnant deposits are PCB-contaminated areas adjacent to the Hudson River upstrem of the former Fort Edward Dam. These areas are the remains of 150 years of deposition behind the dam, now exposed as dry land following dam removal in 1973. Much of the deposited material has washed downstream; those areas which remain have been designated remnant deposits.

Under the original NYSDEC proposal (full-scale project) remnant deposit areas 3 and 5 were to be excavated and transported to the upland containment site. Due to funding limitations and after a priority raview of project components, removal of these areas was eliminated under the rescoped project. Top dressing and fencing of both areas was proposed in the NEPA-DEIS for two reasons: volatilization of PCBs from these areas and the frequenting of these areas by local residents for general recreation and dirt biking.

The remnant deposit areas are the most stable of the PCB-contaminated materials in the project area. Bank stabilization completed in 1977 protects these deposits from erosion for up to the 100 year flood flow. Additionally, their remota location and natural inaccessibility provide an effective barrier to human traffic. Air contamination from these areas is not significant as shown by intensive air monitoring at various locations in Fort Edward and Hudson Falls and adjacent to these areas. This monitoring indicates PCB in air levels of less than 0.1 ug/m^3 from these areas and other sources. This falls far balow the 1.0 ug/m^3 safety guidelines set by NYSDOH for residential exposure.

However, the following remedial actions may be taken at remnant deposit areas 3 and 5 to reduce PCB volatilization and further limit and discourge public access:

- An organic top dressing may be placed at remnant deposit areas 3 and 5 to minimize PCB volatilization.
- Existing fencing may be repaired, replaced or extended at area 3 to limit public access.
- Perimeter fencing may be installed at area 5 to limit public access.
- Warning signs may be posted at both area 3 and area 5.

2. Top Dressing

To reduce PCB volatilization a minimum of 12 inches of organic top dressing may be placed on both areas 3 and 5. This organic cover will reduce volatilization in several ways:

- By providing a medium which, due to its organic content, will trap PCBs which are migrating upward
- By providing a barrier between wind and the PCB-contaminated material.
- By providing an added layer of insulation to reduce temperatures at the surface of the contaminated material.

The placement of cover materials such as topsoil, paper mill sludges and manure have previously been effective in minimizing PCB volatilization at the Caputo disposal site near South Glens Falls. Three alternatives which would be effective for a long-term cover at the remnant deposit areas are:

- A minimum of three inches of sawdust covered with a minimum of nine inches of fine grained, organic soil or a soil-manure mixture.
- A 12-inch layer of a fine grained soil-manure mixture.
- A nine-inch layer of a sand and paper mill sludge mixture covered by a minimum of six inches of top dressing.

The final decision on which alternative would be used would depend upon the cost and availability of materials at the time of placement since each is equivalent in its effectiveness.

Under each alternative, the top dressing will be seeded with a perrenial rye grass. This will help prevent erosion and ensure the continued availability of organics in the soil.

Studies done by Dr. E.H. Buckley of the Boyce Thompson Institute indicate that although roots of the grass will pick up small amounts of PCB, the grass will not translocate these PCBs upward.

3. Fencing

Fencing may be utilized in order to further discourage public use of these areas. At remnant deposit area 3 existing fencing on adjacent properties may be repaired, replaced or extended as required in order to limit public access as shown on Figure 4.1. Approximately 2,500 linear feet of fencing will be repaired and an additional 1,200 linear feet of new fencing provided. Complete perimeter fencing will be provided at remnant deposit area 5 because of its close proximity to residential area as shown on Figure 4.1. Area 5 fencing will be approximtely 2,700 linear feet.

4. Warning Signs

Warning sings may be posted to explain the reasons for denial of access and to encourage the public to avoid these areas. These signs would be posted at 200 ft. intervals along the permeters of both areas 3 and 5 as delineated in Figure 4.1. The signs would be 12" by 24" with red lettering on a white background. The following notice will appear:

NOTICE

KEEP OUT

This area contains PCB (Polychlorinated biphenyl)-contaminated materials.

For information contact: New York State Department of Environmental Conservation, Albany

MONS 009384

5. Cost Summary

The cost of the remedial actions taken at remnant deposit areas 3 and 5 are summarized in the following table.

TABLE II-1

COST SUMMARY

	Remnant Deposit Area 3	Remnant Deposit Area 5
Area to be Top Dressed	7 acres	4 acres
Top Dressing	$90,000	$50,000
Fencing	$30,000	$30,000

The cost including miscellaneous items, contingencies, engineering and administration costs, but excluding site access and easement costs equals $250,000.

6. Recommendations

Since evidence exists indications that remnant areas 3 and 5 do not pose a human health risk and because of their isolation, stability and natural inaccessiblity, no action at these sites is recommended at this time under the rescoped project.

III. UPRIVER FLOW REGULATION

The present operating policy for Great Sacandaga Lake, based upon original plans developed during the 1920's as approved by the then-existing New York State Water and Power Commission, provides for a maximum Lake level elevation of 756 ft. during the period May 1 to Labor Day each year; the Lake has been operated under this constraint since 1931. When the Lake is normally full, the elevation is 768 ft.; above this level, shoreline problems occur.

The water between the elevation levels of 756 and 768 is used primarily to regulate river flows in conjunction with that water flowing down the main stem upper Hudson past the Hadley stream gauge. Until 1977, the design flow was a combined 3000 cfs from both the Hudson and Sacandaga River. Since then, the target flow was reduced to 2800 cfs, which level was not achieved until 1980 because of weather conditions. Given the current precipitation expectations, lower flows are project for the next three or more years.

The Hudson River-Black River Regulating District controls the releases in accordance with an operating regimen, which pays particular attention to down river flows for flood and other purposes. This normal regimen is expected to handle without problem the river flows during the dredging operation.

IV. Operational Standards and Procedures Mitigating Measures, Contingency Plans and Environmental Monitoring Program

A goal of the Hudson River PCB Reclamation Project is to maximize the removal of PCB-contaminated sediment from the river system and, at the same time, minimize potential environmental and public health problems. In the development of both mitigating measures and contingency plans, a reasonable estimate of possible impacts must be established. Therefore, the approach that the Department of Environmental Conservation has taken is first, identify areas where problems may occur; second, outline conditions necessary to create these problems; third, develop control measures to prevent these problems from occurring and fourth, develop contingency plans should these problems still occur.

Operational standards and procedures, mitigating measures, and contingency plans have been developed for three areas, which will be addressed individually. These areas are:

1. Dredging, In-River Containment, and Stabilization
2. Disposal
3. Long-term Storage

This section will present these considerations as well as a comprehensive environmental monitoring program including all areas of the ecosystem in the project area.

1. Dredging, In-River Containment and Stabilization

The Department of Environmental Conservation will contact, via first class mail, all residents whose property lies contiguous to riverbank areas to be dredged two (2) weeks prior to the initiation of any dredging or construction related activity. Furthermore, the Department will maintain a photographic

documentation of all riverbank areas which are to be dredged.

a. Air Quality Considerations

Dredging, in-river containment of hot spots, as well as stabilization of remnant areas 3 and 5 have been assessed relative to their impact on PCB volatilization. Estimates of PCB loss potential from each of these activities has been computed to be far less than the recommended National Institute of Occupational Safety and Health (NIOSH) 8-hour exposure level of 1.0 ug/m^3 for worker exposure and, consequently, much less than the New York State Department of Health recommendation of a 24-hour exposure level of 1.0 ug/m^3 for resident exposure.

At the initiation of the construction activities, air samples for PCB will be collected on the dredge and analysed for PCB on a daily basis for a minimum period of two (2) weeks (10 working days). At the termination of this period sample results will be evaluated by DEC, EPA and the New York State Department of Health and compared to concentrations predicted by empirical methods. It should be noted that estimates of exposure for workers engaged in the dredging operation are a maximum of 0.05 ug/m^3, thus well below the NIOSH proposed standard of 1.0 ug/m^3.

Subsequent to the data analysis, it is anticipated that the frequency of air sampling at the dredge will be modified to reflect a reduction in the number of samples. The present DEC commitment is to sample on a bi-weekly basis throughout the dredging activity. It should be recognized that the air sampling program must be flexible, due to the profound effect which meteorology has on dispersion and thus concentrations of PCB in the air. As previously mentioned, air concentrations of PCB predicted at the barge are substantially less than the maximum recommended levels of exposure by NIOSH (0.05 ug/m^3 vs. 1.0 ug/m^3). Based on comparison the mitigation measures which will be implemented in the event that shoreline concentrations exceed 1.0 ug/^{3} are:

1. Maximize dispersion by maximizing the distance between the transport barge and nearest residence (considering wind direction).

Where feasible, the transport barge (assuming clamshell dredging) will be located such that the dispersion, considering wind speed and direction, is a maximum. In the case of near shore dredging, the dredge will be located between the shore and transport barge, assuming stable atmospheric conditions. During the operation of the air sampling equipment the alignment of the dredge and barge will be such that the air samples collected will represent the worst case conditions. This will insure that "worst case" concentrations at the shoreline can be predicted accurately. Due to dispersion, PCB concentrations in the air at nearby residences will not exceed levels at the dredge. Therefore, air monitoring will only be provided at the dredge.

2. Temporarily interupt dredging until meteorological conditions associated with high dispersion resume. Critical air concentrations of PCB are directly associated with meteorological conditions which dictate dispersion.

Under the clamshell dredging alternative dredged material will be transported by barge to a barge unloading area where the material will be transformed to a slurry and transported to the encapsulation site via pipeline. Estimates of PCB volatilization at this site are comparable to those prepared for worker exposure at the dredge site. Air sampling at this location will only be performed if results from the 10 day intensive sampling at the dredge indicate concentrations of PCB greater than 1 ug/m^3. Should this situation occur, a 1 week (5 working day) intensive sampling will be conducted by DEC at the unloading area. Results of this sampling will be reviewed by DEC, EPA and NYS Department of Health. As at the dredge, the probability of air quality problems (greater than 1 ug/m^3 at nearest residance) are considered extremely remote. Should air concentration of PCB exceed

1 ug/m^3 at the unloading area, workers will be required to wear respirators. As this site is in close proximity to the encapsulation site, the determination of the source of PCB concentrations in the air will be extremely difficult, considering the overwhelming influence of the encapsulation site on the local air quality.

For work at the remnant deposits, since no excavation will be performed, air samples will be collected at each area prior to the initiation of work. These samples will be collected as part of the baseline environment for studies outlined in Appendix A of this report. Should PCB levels exceed the NIOSH proposed standard of 1.0 ug/l, workers will be provided with respirators.

b. Water Supply Considerations

The areal extent of the resuspension of PCB-contaminated sediment has been documented on previous Hudson River dredging projects. This information has shown that the dredge plume decreases to ambient PCB and metals in water levels within a maximum distance of one mile from the dredging operation. The nearest water supply intake is located in Waterford, NY, approximately 30 miles downstream of the proposed Thompson Island Pool dredging. It should be noted that the time of travel from Ft. Edward to Waterford, in the flow range of 5000-6000 cfs, is 67-70 hours. Therefore, at average summer flows of approximately 3000 cfs, over three days of retention time are in the river from the point of dredging to the nearest water supply intake. It is not possible for material dredged in this project to remain in suspension for three days in the Hudson River. Therefore, downstream water supplies will not be affected by the dredging activity.

During the second year of dredging several of the hot spots proposed to be dredged, under the rescoped project are approximately 9 miles upstream of the

Should PCB concentrations at Waterford exceed those recommended by the Health Department for finished water, an existing connection with the Troy, New York water supply will be utilized to provide water until such time as finished water concentrations at Waterford return to acceptable levels.

In order to minimize any resuspension of the river bed material, specialized dredging equipment will be utilized for this project. This equipment includes computer-controlled dredge head control equipment as well as sealed clamshell buckets or shrouded hyraulic cutterheads. Another method to prevent inordinate downriver transport will be to limit dredging to periods of relatively stable flow. No dredging will be done under flood flow conditions when excessive sediment transport may occur. A threshold river flow is 20,000 cfs. Based on a period of record from 1931 to 1956 of the Hudson River at Mechanicville, NY, river flow equals or exceeds 20,000 cfs approximately 4% of the time.

2. Disposal

a. Air Quality Considerations

Operation of the site has been evaluated with regard to minimizing the volatilization of PCB. The following design and operation procedures have been developed in accordance with this goal.

1. The site has been designed to incorporate a central dike providing for segregation of dredged material from the two dredging seasons. This design modification has the following advantages:

   a. Reduces the exposed water surface area by approximately 15 acres.

   b. Concentrations of PCB in the dredged material, including overcut, are 98 ug/g the first dredging season and 53 ug/g the second year. Utilizing the two-cell design, the most

concentrated material will be placed in the eastern most cell, maximizing the distance to the nearest sensitive receptor.

c. The two-cell design allows for the placement of a clay cover at an earlier stage than the single cell design, further minimizing losses due to volatilization.

2. As material is placed in the site, it will gradually rise above the water surface until exposed to the atmosphere. As an interim measure to minimize volatilization losses as the material becomes exposed, organic mulch will be applied as a volatilization suppressant. As soon as the spoil has developed sufficient bearing capacity, a temporary cap of 6 inches of soil will be placed on the spoil.

Estimates of volatilization losses from the containment site, as well as estimates of the impact of these losses on the nearest residence (sensitive receptor), have been prepared, considering the most critical set of meterological conditions. Based on these circumstances, studies have predicted that air concentrations of PCB at the site and nearest receptor would be well under the 1 ug/m^3 guideline recommended by the New York State Department of Health.

The estimates of PCB volatilization have been based on previous dredging studies, volatilization tank tests on sediments containing PCB performed by General Electric, elutriate tests, liquid film gas transfer theory, and basic atmospheric dispersion equations. Results of this analysis indicate that non-compliance with established air quality criteria is highly improbable, even under the worst possible meterological conditions. However, operational plans have been developed to control PCB in air concentrations in the event that these approach the recommended Health Department guideline level of 1.0 ug/m^3 (24-hour average). In order to adequately monitor the air quality, the following air sampling scenario has been developed:

Parameter	Location	Frequency*
Micro-Meterology	containment site	continuously
PCB	containment site	daily
PCB	nearest receptor	as directed**

Although estimates of PCB volatilisation indicate that no problems will be encountered during the operation of the containment areas and water treatment plant, contingency plans have been developed in the unlikely event that volatilization becomes significant.

PCB loss, via volatilization, is a function of the concentration of soluble PCB in the containment site lagoon. Control of volatilisation can be attained by controlling the soluble PCB in the containment area. Based on past studies and desorption theory, it has been estimated that the soluble PCB in the containment site would be in the range of 10-20 ug/l. Dispersion analyses indicate that PCB volatilization may cause air levels of the nearest receptor to approach levels recommended by the New York State Department of Health when the soluble PCB in the containment areas is in the range of 28-43 ug/l, in conjunction with critical atmospheric conditions. Therefore, by monitoring soluble PCB in the containment area and the micro-meterology at the site, critical conditions at the site can be predicted.

*For duration of dredging operations up to time of dewatering of treatment units.
**Air sampling for PCB at the nearest sensitive receptor will be performed by DEC a frequency of (1) once per week. It should be recognized that air concentrations at the nearest receptor will be a function of atmospheric stability conditions. Wind speed and direction can effect the location and dispersion of the plume. Therefore, the location and frequency of this remote sampling must be maintained a flexible program and incorporate the micro-meteorology of the site. Possibla sampling locations will be at the nearest receptor in any single wind direction. A continuous record of meteorology near the site will initiate in 1981 and continue throughout the duration of the project. At least a full year of data will be available from this station prior to dredging. This data will be utilized by DEC in the placement of the remote air sampling equipment.

In the unlikely event that measureble quantities of PCB and/or heavy metals are encountered in the water of the monitoring wells, the wells of local residents within 100 m of the site boundary will be sampled for PCB and heavy metals. Should the results of the analyses indicate that these wells contain PCB, NYSDEC would, as an interim measure, immediately supply bottled drinking water and carbon filters for faucets to households within 100 meters of site boundary. Also, an engineering analysis will be conducted to document the aerial extent and magnitude of the problem and to develop and implement remedial measures (e.g. public water supply).

3. Long-term Storage

Long-term maintenance and monitoring programs will be instituted at the containment site, remnant deposits and at any areas selected for in-river containment for a minimum period of 30 years. Periodic reviews of the program by NYSDEC, NYSDOH and USEPA will result in modifications to the original program, in accordance with the output of the monitoring program.

In accordance with the Section 116 (a) of the 1980 Clean Water Act Amendments, the goal of the containment site monitoring program is to demonstrate "the feasibility of indefinite storage in secure landfills of toxic substances." A Federal permit for the site will be required pursuant to the Toxic Substance Control Act (TSCA). A State permit is also required for the construction and operation of a solid waste disposal facility. Both of the aforementioned permits will contain requirements for long-term monitoring. The state of New York is legally bound to comply with the requirements of these permits and is committed to do such.

Parameters which have been identified for the long-term monitoring/ maintenance program are:

1. Leachate Discharge

column of 0.10 ug/l which is about a 20 percent increase over the background levels.

The addition of filtration and activated carbon adsorption systems has been examined to further polish the treatment plant effluent. The capital cost for this installation is approximately $11 million and is, therefore, not considered an economically viable option.

Soluble PCB in the range of 10-20 ug/l may be anticipated with the dredging operation. If conditions of effluent suspended solids exceed permit limits at the water treatment plant, polymer addition has been provided at the inlet of the roughing and storage pond. This will maximize settling and reduce effluent suspended solids, hence reducing effluent PCB. The water treatment plant is designed to remove solids. Soluble PCB and soluble metals will not be removed by this system.

ii. Groundwater

Groundwater will be monitored for PCB and heavy metals as well as water surface elevation at the containment site on a quarterly basis (every 3 months) or in accordance with the provisions of federal and state site permits, whichever is more stringent. Groundwater monitoring wells have been provided around the containment site perimeter both hydraulically upgradient and downgradient of the site. The soils of the site have a permeability of approximately 2.6×10^{-7} cm/sec and are composed primarily of Kingsbury silty clay along with Covington silty clay loam and Vergennes silty clay loam. Theoretical migration of water from the site is estimated to occur at the rate of 8.0 x 10-4 ft. per day. At this rate, it could take 600 years for leachate to travel a distance of 200 ft. to the property line. PCB and heavy metals would adsorb to soils at the site and not migrate with this water. Their movement would be up to 10,000 times slower than that of water.

to determine any gas generation rates.

b. Threshold for Contingency Action - If ambient air levels of gases at the site exceed appicable standards, the contingency action will be initiated.

c. Contingency Action - Valves at gas vents will be closed. Gases will be drawn from the containment cells through the vented gas treatment system.

4. Air Quality

PCB in gases that may be generated within the containment cells will be vented through the gas collection system.

a. Site Operating Procedures - Valves on gas vents will be normally open. PCB contained within gases that may be generated will be vented to the atmosphere. Site air monitoring and periodic sampling at gas vent pipes will be carried out to determine the presence of PCB levels in gas that may be vented.

b. Threshold for Contingency Action - Baseline monitoring studies (outlined in Appendix A of this report) provide for collection of air quality data at the site prior to construction. Ambient air concentrations of PCB on the boundary line of the site after the site is closed will be compared to annual average concentrations prior to site operation. This data will be provided EPA and to the New York State Department of Health for assessment of possible public health concerns. Six (6) air samples will be taken by DEC the first year after site closure, during stable atmospheric conditions. Sampling frequency may be modified after review of this data by NYSDOH.

c. Contingency Action - Valves at gas vents will be closed. PCB-contaminated gases will be drawn from the containment cells through the vented gas treatment system.

2. Groundwater

3. Cell Gas Generation

4. Air Quality

5. Cover Integrity

6. Cover Vegetation

7. Security

8. Drainage

These items are discussed individually below:

1. Leachate Discharge

The cell leachate collection system is described in Chapter Six of the Containment Site Design Report, September 1980. The design leachate discharge is divided in two phases:

- short-term dewatering of dredged material
- long-term percolation through the clay cap

Estimated quantities in these phases are:

	Water Discharge Million Gallons	Average PCB Concentrations	Mass of PCB Discharged
Short-term	55 over an estimated 2 years	6.3 ug/l	5 lbs over 2 years at 10 ug/l
Long-term	1.3 per year	6.3 ug/l	0.1 lbs per year at 10 ug/l

Dilution at river low flows of 3000 cfs are 1:30,000 and 1:600,000 for the above flow rates. At the low flow rates and mass of PCB involved, it is not anticipated that the direct discharge will have any appreciable effects.

a. Site Operating Procedures - Control valves at the leachate system collector wells will be open. Leachate generated in this containment cell will discharge by gravity to a leachate storage tank and then to

6. Cover Vegetation

The design of the containment site is such that minimum maintenance would be required after an initial stabilization period, but this minimum would be essential to ensure the integrity of the site. Maintenance of a health grass - lagoon cover will be provided to control surface erosion and prevent tree growth.

PCB migration upward through the cap will be monitored by periodic sampling of cover vegetation. By providing a gas collection and venting system (reference Design Report, MPI, 1980) the possibility of upward migration of PCB is remote. The use of plants to monitor low level exposure to PCB has been demonstrated by studies carried out by the Boyce Thompson Plant Research Institute of Cornell University.

a. Site Operating Procedures - Surface vegetation will be monitored for PCB on an annual basis.

b. Threshold for Contingency Action - Measurement of PCB in vegetation above FDA limits.

c. Contingency Action - Should threshold concentrations be measured, a detailed study will be conducted to determine the concentration profile of PCB on the site. A layer of highly organic material will be placed on those areas and a detailed investigation will be instituted to determine the source of the problem.

7. Security

a. Site Operating Procedures - Security of the site will be maintained by periodic patrol/inspection by Environmental Conservation Officers.

b. Threshold for Contingency Action - Should it become apparent that vandalism and trespassing are occuring, contingency actions will be

PCB and heavy metals. Also, water elevation in each well will be noted on a monthly basis to assess the groundwater gradient. A well log book will be maintained for each of the six wells. A formal review of well log data by NYSDEC, NYSDOH and USEPA will be conducted. Sampling frequencies may be modified as a result of this action.

b. Threshold for Contengency Action - Monitoring wells will be installed and sampled during the construction phase of the encapsulation site. If post-construction concentrations of ambient groundwater exceed levels measured prior to dredging, contingency plans will be initiated.

c. Contingency Action - Initially all wells utilized for potable water supply within 100 m of the site boundary will be sampled for PCB and heavy metals. As an interim measure provisions for individual activated carbon filtration units and bottled or tanked water will be made in the event that sampling indicates potable water supply contamination attributable to the PCB encapsulation site. Also, an engineering study will be conducted to document the areal extent and magnitude of the problem and to develop and implement long term remedial measures (e.g. public water supply).

3. Cell Gas Generation

The potential for gas generation in the containment cells is minimal because of the low overall level of organic material present in the contained material. A gas collection system is provided, however, in order to avoid any possible gas accumulation and resultant uplift and rupture of the cover system.

a. Site Operating Procedures - Valves on gas vents will be normally open. Any gas generated will be vented to the atmosphere. Site air monitoring and periodic sampling at gas vent pipes will be carried out

4. Environmental Monitoring Program

Introduction

Organization

Work Plans

A. Air and Plant Sampling Study and Related Site 10 Monitoring

B. Coring Fathometry and Precision Dredging Monitoring

C. Sediment and Water Transport of PCB and Water Supply Monitoring

D. Near Dredge Water Sampling Plan

E. Wetlands Mapping, Photography and Changes

F. Monitor Sediment Erosion and Burial

G. Fish Sampling Study

H. Macroinvertibrate Sampling Study

J. Study of PCB Release from Hudson River Sediments

PCB Sampling Analysis and Data Flow Summary

Quality Control and Assurance

5. Cover Integrity

The containment cell cap system consists of three layers of selected material--18 in. of highly impermeable clay, 8 in. of sand and gravel drainage layer, and a top layer of 10 in. of top dressing material for establishment of turf. The cover will be graded to prevent ponding of water and maximize surface runoff and minimize the potential for erosion. Details of the cap and the system of paved surface water collection ditches are given in Chapter of the Containment Site Design Report, September, 1980.

a. Site Operating Procedures - All site grassed areas, including the containment cell caps, will be mowed periodically during the growing season to prevent growth of woody plants, permit inspection of cap integrity, and to facilitate inspection and repair. Fertilization and reseeding of areas will take place as necessary.

b. Threshold for Contingency Action - Any scour areas, cracks, animal burrows or settlement areas discovered in the periodic inspections will be noted, mapped and marked. Repairs will be scheduled within 30 days and prior to onset of the winter season.

c. Contingency Action - Repair of scour, cracks and settlement areas will be made with top dressing or clay materials as appropriate. All disturbed areas will be fertilized, seeded and mulched. All repairs will be logged, mapped and be given special inspections until fully reestablished with protective turf. Photographic and other records will be kept as part of the site operating records.

Trapping and relocation of burrowing animals will be carried out as necessary.

summarized sampling plan showing sample media, laboratories and data management and quality control. Studies on this project's effects beyond 5 years, are considered long-term monitoring, not to be funded by the EPA grant.

initiated.

c. Contingency Action - Daily patrol/inspection will be requested from the N.Y. State Police in conjunction the E.C.O. patrols.

Repairs to facility from vandalism will be repaired by the Department.

8. Drainage

The site drainage system will be inspected concurrently with the sampling of the monitoring wells.

a. Site Operating Procedures - Drainage system will be maintained in operable condition.

b. Threshold for Contingency Action - Vegetative growth in drainage channel, debris impeding the flow or breakdown of channel lines will necessitate contingency plans.

c. Contingency Action - Channels will be cleared of debris or vegetation as required to maintain hydraulic capacity. The use of herbicides may be required to control vegetation. Repairs to channel lines will be the responsibility of DEC.

A. Air and Plant Sampling Study and Related Site 10 Monitoring

Introduction

PCB volatilization increases with the PCB concentration in the sediment or water, with the turbulence level in the water and with the temperature. Dispersion and increased wind speed tends to lessen the air concentration of PCB while increasing total emissions. The monitoring plan is based on the probability of having measurable environmental effects based on previous study data and calculations. A probability table on likely PCB air sources follows. Several items need explanation. There are 8 dams from Troy to Ft. Edward. The highest PCB water concentrations are likely to be at the Thompson Island, Lock 6 and Lock 5 dams. Two studies of gas transfer were made at the Lock 6 dam by USGS, indicating gas transfer rates 10 to 20 times higher than for typical pooled river areas. Calculations by Malcolm Pirnie, Inc. indicated that air emissions from barges or dredges would be insignificant, <.05 ug/m^3 PCB. Due to low turbulence conditions in the quiet river water areas, it is expected that air concentrations will be less than 0.05 ug/m^3.

From the Malcolm Pirnie, Inc. 4/7/81 analysis, under worst condition of E stability the Site 10 air concentration would be 0.3 ug/m^3 while at the nearest house it would be 0.2 ug/m^3. Thus, air monitoring for PCB over a central area in the lagoon system, surrounded by water and downwind of the influent pipe turbulent zone, would give higher PCB levels than at the houses 220-500m away.

The primary air and plant monitoring will be carried out by the Boyce Thompson Institute of Cornell University. However, the NYSDEC, Bureau of Water Research will conduct the sampling on Site 10 during dredging while the Division of Air Resources will analyze the meterology and dispersion data. A description of the progam and Boyce Thompson Institute's 1981 contract proposal follows.

Introduction

Over the past several years there has been several million dollars of research, monitoring and engineering studies relating to PCB in the Hudson River that were authorized by the PCB Settlement Advisory Committee. The purpose of this Monitoring and Research Plan (MRP) is to measure the true effect of the remedial measures on the environment. Thus the MRP is designed to document how well the project achieves its projected benefits and prevents or causes any secondary adverse impacts. The area covered includes both the upper Hudson (Ft. Edward to Troy) and lower Hudson (Troy to New York City). Some studies, such as fish and water monitoring, are designed for a 5 year duration to show true dredging affects. Others are designed for the 1-2 yrs immediately surrounding the dredging event. Both the 1-2 year studies and the 5 year studies are needed to show the effects of the project on the environment. Longer term studies similar to the current program will be maintained as appropriate.

MRP Development and Management

The MRP was developed by NYSDEC staff along with the scientific subcommittee of the PCB Settlement Advisory Committee in November 1980. This program will be carried out by the NYSDEC, in consultation with the PCB Settlement Advisory Committee, the NYS Department of Health and EPA Region II.

Organisation and Index

On the following table the various monitoring and research tasks are indexed. For each task there follows a more detailed description of the work for that task. Those budget items listed under the Step 1 Grant are for pre-dredging monitoring. Then there follows detailed workplans, a

3. Also, air and plant samples will be taken in the summer and fall in the vicinity of Lock 6 dam to assess the loss of PCB by river volatilization. This is to assure that PCB air concentrations at the dam site do not exceed 1 ug/m^3 during dredging and to document any increase in PCB in crops along the river near the dams.

4. Air and plant samples will be taken over remnant deposits 3, 4 and 5 which represent low level PCB sources. For paragraphs 3 and 4 plant samples will be analyzed by Raltech and air samples by Cornell University. A Raltech sample load of 200 to 250 samples per year are planned. The purpose of the remnant deposit sampling is to assess if air concentrations could ever be expected to exceed 1 ug/m^3.

5. Grass samples will be taken from dredging material sites at Buoy 212, SA 13 and the new Moreau landfill to determine the PCB level in typical grass grown on a capped disposal site.

1982-83 During Dredging Plant and Air Related Monitoring

Paragraphs 1, 2 and 3 above will be repeated during the dredging years. The farm plots in paragraph 1 may be reduced from 4 to 2. Forage crop sampling near Site 10 will increase to document any contaminated areas while sampling in paragraphs 1, 4 and 5 above will decrease. It is not expected that plants more than 700 meters from Site 10 will be affected. Approximately 250 plant samples for Raltech, per year are planned.

The weather station will be moved to Site 10 and a continuous air monitoring station established where high PCB concentrations are expected. There will be continuous air sampling during the dredging season. A new sample will be collected every 24 hours. Other samplers, mobile samplers, will be moved upwind, downwind or to nearby houses, as needed, to verify dispersion predictions in periodic studies. The DEC lab will have the capability of

Research and Monitoring Plan Index

Agency	Study Task	Estimated Budget Total	Time Frame
DEC, Bureau of Water Research,	Coring, fathometry precision dredging monitoring	$ 480,000	2 1/2 yrs, 1981-82, 83
DEC, Bureau of Water Research,	Monitor sediment erosion and burial	----	5 yrs
DEC, and Boyce Thompson Institute	Air Monitoring for PCB and weather trends	10,000	5 yrs
DEC, Bureau of Water Research	Site 10 operation and return flow, and near dredge monitoring	50,000*	2 yrs, 1982-83
DEC, Bureau of Water Research	Site 10 ground water and sampling and water balance	40,000	5 yrs
DEC, Bureau of Water Research,	Annual technical seminars and reports and photographs		5 yrs
DEC, Bureau of Water Research,	Project Laboratory for sediment, water and air analyses	350,000	2 1/2 yrs, 1981, 1982-83
DEC, Bureau of Env. Protection,	A. Long-term fish PCB trends	350,000	5 yrs
NYS Dept. of Health/DEC	A. Long-term macroinvertebrate trends		5 yrs
	B. Near dredge macroinvertebrate trends	50,000	2 yrs, 1982-83
USGS, Albany,	Water and sediment PCB transport, water supplies	250,000	5 yrs
Boyce Thompson Institute,	Plant PCB trends, Air PCB trends	450,000	5 yrs
DEC, Bureau of Water Research and Boyce Thompson Institute	Wetlands mapping, photography and changes	Included above	3 yrs, 1981, 1982-83
Univ. of Michigan,	Rates of PCB desorption & erosion from bottom sediments, of modeling	50,000	2 yrs, 1981-82

A-31

HQNS 009607

The DEC laboratory is anticipating about 200 Site 10 water PCB analyses during the dredging season. Heavy metals will be analyzed on Site 10 return flow samples as prescribed in the site discharge permit.

In summary, all data on the sediment, water, air and weather conditions from Site 10 will be entered daily into the project data system. This data will be used for real time operational controls of the system to assure that PCB escape from the Site will be minimized and always less than the established standards.

1984 Monitoring of Air and Plants After Dredging and Site 10 Capping

It is anticipated that plant and air sampling around Site 10 and Lock 6 dam would be continued for one year after dredging is completed to confirm that plant and air PCB levels return to pre-project levels.

Gas collection will be provided for the containment site as described earlier. The rate of gas flow will be recorded continuously and PCB concentration will be measured as dictated by the NYS Air Quality permit for the site. It is anticipated that the flow of the gas and its PCB concentration will be low enough to permit discharge to the atmosphere. If this is not the case, the gas will be treated thru an activated carbon column prior to discharge.

Approximately 5 grass samples from the site 10 cap will be analyzed for PCB for each of the 2 years after site closure. Several grass samples for PCB will also be taken from remnant deposit areas 3 and 5.

1981 - Background Monitoring

1. Since there is, currently, no access available to Site 10 property for monitoring studies, background data will be collected at areas bordering the site. Four farms around the Site 10 have been selected for plant - air monitoring plots. On these four surrounding farms, there will be experimental plant plots and one air sampling station. This sampling will document background air PCB values and plant PCB concentrations for a variety of species before dredging. There will be a weather station continuously gathering data for wind speed and direction (direction fluctuation 6), relative humidity, solar radiation, air temperature, and precipitation. Various plant species will be analyzed for PCB and bi-weekly air samples for PCB will be correlated with the plant and weather data. The summer and fall 1981 weather data near Site 10 will be correlated with the Albany and Glens Falls air data. Predications will be made of worst case meteorological conditions for the 1982 or 1983 dredging season. From this data matrix of contaminated plants, background plants, weather data and PCB emission estimates from Site 10, Boyce Thompson will calculate probable land areas where plant PCB levels will be increased. This data will be utilized to determine the aerial extent.

2. In addition, agricultural crops and vegetation, in a 4 mile square area centering on Site 10, will be sampled twice on a 4 X 4 grid pattern during the summer and fall, to determine background levels for comparison with PCB levels during and after dredging operations. The samples will be analyzed for PCB by Haltech Laboratory. Aerial photographs of the crops will be periodically taken.

B. Coring, Fathometry, and Precision Dredging Monitoring

NYSDEC, Bureau of Water Research & Malcolm Pirine, Inc.

Introduction

The proposed program will measure the efficiency of removal o contaminated layer and mass of PCB removed, measure changes in bot and geometry and depths of dredging cuts, and improve the efficie dredging process as it procedes.

Coring and Fathometry

Coring will take place on a 100 ft. grid in and near hot sp will generate 1 core/10,000 sq. ft. before dredging and 1 core/ dredging. With four core sections before dredging and two aft spots, this will generate 3,000 core sections for analysis for or first dredging season. The coring will be done sufficient operation in a given hot spot to insure that accurate hot spo to direct the dredging operation. Detailed location maps of will be prepared.

In initial hot spots designated for detailed study, co planned to measure the precise percent PCB actually removed

The dredging overlaps and cutting patterns would be and the study repeated to get the maximum economic efficie Thus about 5,000 core sections are planned for analysis f season (Thompson Island Pool). To do this volume of sed effective and timely analytical technique is required.

Studies at NYS Department of Health, Radiological NYSDEC of DEC and Dr. Bopp of Lamont Doherty Geological a good correlation between PCB, Cs^{137} and Pb for the M sets, the correlation coefficient varies from 0.6

analyzing 250 air samples over the dredging season with a 2 day turn-around time. Dredging lagoon water temperature and effluent PCB will be measured daily. If PCB air concentrations are likely to approach 1 ug/m^3, dredging will be stopped and activated carbon added to the lagoon water. Frequent updated predictions of this event will be made on the basis of worst case expected data.

Sediment coring and analysis will give the sediment PCB levels before they are dredged. It is anticipated that up to 5,000 samples will be analyzed per dredging year when post dredging sampling is also included. The dredging lagoon influent percent solids and flow will be measured by a recording meter on the pipeline. By measuring the sediment removed from the river, the nature of the sediment entering the lagoon can be calculated. This will be confirmed by periodic sampling studies conducted on the lagoon influent pipe discharge and on the pumpout station sediment mixtures. This approach has been selected because sampling of a dredging discharge pipe can be a difficult and imprecise operation. The final lagoon effluent PCB will also be monitored daily via automatic compositing samplers operating on a 24-hour cycle. A special sampler to minimize volatilization losses will be used. Since the lagoon system retention time is several weeks, soluble PCB will be measured less frequently, typically once or twice per week. The effluent from the main containment site will also be sampled continuously as prescribed in the site discharge permit. During the warm months of July and August the analysis of the containment site effluent could approach a daily cycle. Monitoring of the containment site system during the cooler, less critical months will provide more precise parameters for monitoring and operations.

Additional Work.

It is anticipated that a number of additional uses for the coring, fathometry and precision ranging equipment will be found during the project. Included are: (1) precoring work to confirm PCB hot spot boundaires; (2) probing of sediment depths and rock outcrops especially in the lock 6 to lock 5 pool; (3) surveying dredging boundry lines around wetlands; (4) noting changes in river bed geometry after floods, etc.

Probability Summary Relative to Plant and Air Monitoring

	On Site 10			-700m Site 10			+700m Site 10			Lock 6 Dam Area			Remnant Deposits 3 and 5		
	P	D	A	P	D	A	P	D	A	P	D	A	P	D	A
Crops exceed .2 ppm	N	NA	N	N	L	N	N	N	N	L	L	NL	NA	NA	N
Air exceeds 1.0 ug/m^3	I	N	N	I	N	I	I	I	I	N	N	N	N	N	I

	-700M Remnant Deposits			Hot Spots in River Barges & Dredges		
	P	D	A	P	D	A
Crops exceed .2 ppm	L - area 5	L - area 5	N	NA	NA	NA
Air exceeds 1.0 ug/m^3	N	N	I	I	I	I

I=Almost Impossible, N=Not likely, L=Likely, V=Very likely, NA=Not applicable or no crops, P=present conditions

D= During Dredging, A=After Site 10 and remnant capping.

United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
P.O. BOX 744
ALBANY, NEW YORK 12201

ALBANY SUBDISTRICT

October 24, 1980

T. J. Tofflemire
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233

Dear Dr. Tofflemire:

The following estimate is made for the number of Hudson River samples that will be taken for PCB analysis in FY81.

Station Location	Number of Samples
Glens Falls	5
Rogers Island Channel	25-30
Rogers Island Canal	25-30
Schuylerville	10-15
Stillwater	25-30
Waterford	25-30
Estuary	25
Total	approximately 150

Ten samples will be taken at Stillwater for comparison of analytical results from the USGS and N.Y. Department of Health laboratories.

In addition, a special study that includes a total of 23 samples at Rogers Island, Bakers Falls and 2 tag-line transects between these stations will be conducted in the Fall of 1980.

Daily sediment collections will continue at Stillwater and Waterford.

For the District Chief:

Very truly yours,

Roy A. Schroeder

Roy A. Schroeder
Hydrologist

RAS/skw

MONS 009414

vs log C_s137 or Pb. The data table follows. It is important to note that one Pb will be done by x-ray flourescence and C_s137 by a dual channel gamma ray counter with alithium-germanian detector. Both instruments can analyze samples in less than 30 min. C_s137 came from atomic bomb fallout about the same time period as the G.E. PCB discharges. The upper Hudson River lead came primarily from one discharger, Hercules Chemical just upstream of the G.E. PCB discharge.

Fathometry equipment will also be used primarily to monitor the depth of the dredging cuts removed in the hot spots. it is planned that transects across all hot spot areas will be done on 50 sq.ft. intervals before and, immediately, after dredging. This will necessitate about 250 transects in the Thompson Island Pool. Electronic ranging equipment such as the Motorola Mini-Ranger with a Hewlett Packard mini-computer will be used. This equipment makes possible automatic recording and plotting of exact river locations and depths.

Precision Dredging Monitoring

Precision dredging monitoring and control are essential to provide a maximum removal of PCB-contaminated sediment with a minimum of losses. Each dredge will be equipped with electronic ranging to record the dredge head movements. For the clamshell dredge the RT antenna will be located on top of the dredge boom directly over the bucket. The x and y grid coordinates for each bucket grab will be recorded on tape. There will also be a CRT screen tied to the system on each dredge cab. There will be a preplanned optimum clamshell biting pattern recorded on tape. Thus, displayed for the dredge operator will be a grid pattern of dots where each clamshell bits should be taken and a circle indicating the instantaneous location of the bucket relative to the ideal pattern. Each time a clamshell bite is made, an x will be entered on the screen at the actual location of the bite.

EFFECTIVENESS OF DREDGING

IN LOWERING PCB CONCENTRATIONS IN THE HUDSON RIVER

PROBLEM

PCB's were discharged from 2 industrial outfalls on the upper Hudson River near Ft. Edward, New York from about 1950 to 1976. Subsequent erosion and transport downstream has resulted in serious contamination of both the upper river system and the estuary. Although contaminant concentrations of the river remain much higher than those of the estuary, the major economic impact is manifested in loss of the commercial fishing industry in the estuary.

The towns of Waterford (upper river) and Poughkeepsie (estuary) obtain their public water supplies from the Hudson River. Treatment is required to ensure PCB levels in drinking water are below the limit of 0.1 µg/L set by the New York State Health Department. New York City has expressed interest at various times in the past in the use of Hudson River water for its water supply. The town of Behtlehem in the Albany area has expressed a similar interest. Hence, PCB levels in the Hudson River system are of interest to these communities as well as to those already using the resource.

The New York State Department of Environmental Conservation, as the lead agency in attempts to clean up the river, has received 26.7 million dollars to remove contaminated sediments (so-called "hot spots") form the upper river. Dredging will commence in 1982. In addition, General Electric will remove PCB contaminated material from 7 landfills in the Upper Hudson basin. And finally, an expressed desire by Niagara Mohawk to rebuild a hydroelectric plant on the river may result in financial commitments by the utility to remove remnant deposits stored on the banks of the river.

C. Sediment and Water Transport of PCB dn Water Supply Monitoring

USGS and NYSDEC, Bureau of Water Research

Introduction

The main river water sampling over the 5 yr period is included in the attached USGS proposal. In addition, USGS maintains daily flow gauging at a number of points and suspanded sediment measurements at 2 points along the Hudson River.

APPROACH

1. Concentrations during and after dredging will be compared with baseline concentrations (FY 77-82) under comparable flow conditions. Discharge will be obtained from established water-stage recorders at Ft. Edward, Stillwater, and Waterford and a wire-weight gage at Schuylerville. About 150 samples from 5 stations, one of which is a background station, on the upper Hudson and 25 samples from 5 stations in the estuary will be analyzed for total PCB concentration. About 15 samples will also be analyzed for dissolved PCB's to confirm earlier results which showed PCB's to be dissolved at low flow and attached to suspended material at high flow.

2. PCB concentration has been found to be inversely proportional to discharge (except at very high flow) at 4 stations in the upper Hudson. The regression relationship between these variables will be calculated at each station with slope of the line giving daily transport past each station. The station at Schuylerville will be particularly important because it is immediately downstream from much of the most highly contaminated sediments and should therefore show the most obvious drop in daily PCB load as dredging commences.

   A minor but significant portion of PCB's transported annually are delivered by resuspension of substantial quantities of bottom material during flood discharges which typically accompany the spring snowmelt. The amount transported will be obtained from PCB concentration multiplied by discharge with daily suspended sediment data (at Stillwater and Waterford) used to estimate PCB concentrations during periods of a flood event for which PCB data are not available.

3. The approach applied in item #2 above at the lowermost riverine station, Waterford, will be assumed to give the PCB load to the estuary. In addition, PCB concentration will be measured 5 times a year (mostly during the summer) at 5 already established stations in the estuary to document the downstream decrease in PCB levels.

United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
P.O. BOX 744
ALBANY, NEW YORK 12201

ALBANY SUBDISTRICT

March 6, 1981

Italo Carcich
Bureau of Water Research
50 Wolf Road
Albany, New York 12233

Dear Mr. Carcich:

The enclosed document is a copy of a project proposal being submitted by this office to our Headquarters for their evaluation. If approved, the study would extend cooperative funding for investigation of PCB's in the Hudson River through the 1985 water-year with a final summary report to be prepared in 1986.

The proposal should be considered a working document at this time. Perhaps we can have a meeting soon to discuss any changes and recommendations you have.

For the District Chief:

Very truly yours,

Perry G. Olcott
Chief, Albany Subdistrict

RAS/skw
Enclosure

MONS 009419

There is a need to know how effective dredging will be in lowering PCB concentrations of the Hudson River. Pre-dredging baseline information on PCB concentrations has been obtained since 1977 under a project (NY 76-046) funded cooperatively by the New York State Department of Environmental Conservation and the U.S. Geological Survey. This proposal requests an extension of that study with the objective of determining the effectiveness of clean-up efforts.

OBJECTIVES

1. To determine whether clean-up efforts lower concentrations of PCB's in the Hudson River.
2. To determine relative importance of various reaches of the Upper Hudson in contributing PCB's to the river water.
3. To estimate loads of PCB's delivered by the upper Hudson to the estuarine Hudson.
4. To monitor effects on municipal water supplies during dredging.
5. To determine changes in isomeric composition of PCB's in river water near the source of the original discharge.
6. To maintain an appropriate quality control program.

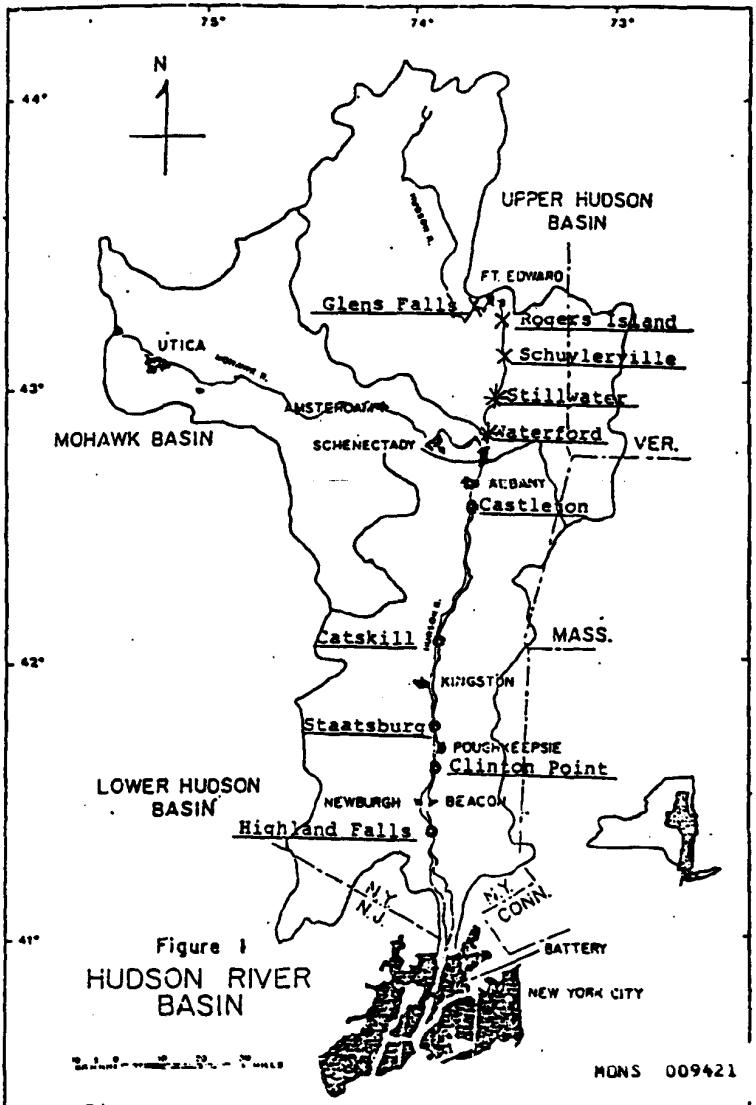

Figure 1

HUDSON RIVER BASIN

8. Wetlands Mapping, Photography and Changes

NYSDEC Various Units and Boyce Thompson Institute

Introduction

Where possible, the reduced scope hot spot dredging project has been designed to avoid dredging all wetlands rated as valuable. Nevertheless, a small portion of some of the wetlands adjacent to deep water hot spots and subject to scour will be dredged. A cooperative program with the Boyce Thompson Institute and DEC staff is planned to map and delineate the exact boundry between the deep hot spots and wetlands to be dredged based on water depths and plant species observed. DEC's fathometry and electronic ranging equipment will be used for this purpose. Vegetation in the hot spot wetlands below lock 6 has been sampled and found to be contaminated with PCBs. Aerial photographs can be taken just before the dredging and a year after the dredging to allow an accurate comparison of any changes or loss of wetlands due to the dredging.

4. Water from the raw-water intake at the Waterford Municipal Water Treatment Plant will be analyzed for PCB concentration about 10 times a year, both during and after dredging. Sampling at the plant will coincide with sampling of the river from the Waterford bridge. Dual sampling will answer objections raised by the Regional office in 1978 when it was concluded that concentration from the bridge is identical to concentration at the intake pipe although no samples were actually taken at the pipe.
5. Results of a special study conducted last fall indicate PCB's change isomeric composition to a less volatile mixture (personal communication, L. Lowe) within the first few miles below their original source. The project chief will travel to the Central Lab in Atlanta to personally check previously obtained chromatograms for differences in isomeric composition. In addition, previously reported zero values from the background station at Glens Falls and treated water from the Waterford public water supply will be checked for low levels of PCB's. These efforts will require consultation with a specialist in the Central Lab.
6. About 10 percent of samples sent to the Central Lab will be duplicates. Ten splits from Stillwater will be analyzed by the New York State Department of Health Lab. Standards of PCB in hexane and in water will be analyzed by both labs on a periodic basis, 3 or 4 times a year.

REPORT PLANS

Results will be published in the District's Annual Report and/or the Water Resources Investigations-NTIS series. An interpretive report comparing pre- versus post-dredging PCB levels will be published in Water, Air and Soil Pollution. In addition, a report comparing PCB concentrations in drinking water, raw water, and the river at Waterford will be published in an appropriate scientific journal.

MONS 009423

D. Near Dredge Water Sampling Plan

NYSDEC, Bureau of Water Research

It has been found from five years of dredging monitoring work covering five different projects in the Hudson that:

1. The amount of solids and PCB lost to the water column is generally less than 2 percent of the mass dredged
2. The suspended solids and PCB increases in the water column two miles or more downstream of the dredge have not been significantly different than background values upstream of the dredge.
3. The return flow from the spoils lagoon represents the largest potential loss of PCB and solids from the dredging process. This can easily be minimized by treatment and closely monitored.
4. The worst case condition is likely at a low flow.

Routine sampling upstream and downstream of dredges by the Corps of Engineers also seldom shows any significant difference. Thus the approach to be used involves periodic, intensive sampling studies downstream of the dredge with sensitive underwater transmissometer or flow-thru turbidimeters. Turbidity readings and suspended solids analyses will be done along with PCB. PCB water samples will be taken by USGS depth integrating water samples such as the DH 76-204 with reliance washed glass ample bottles. There will be three of these intensive sampling studies during a dredging season: one immediately after dredging starts up, one during low flow and one during typical flow conditions. Thirty PCB samples are planned. Helicopter aerial photography will be conducted during one of those runs to aid in defining the plume. The sampling data will be analyzed by a one dimensional advective transport model considering both desorption and settling developed by Dr. Mark Brown.

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Robert Mitchel

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Note:

BUDGET

	FY'82*	FY'83	FY'84	FY'85	FY'86**
Salaries and benefits	34,600	76,900	84,400	92,800	38,300
Travel	1,250	2,750	3,000	3,300	
Contracts (to collect daily sediment at 2 stations)	1,750	3,850	4,000	4,400	
Equipment replacement, repair and supplies	1,000	2,200	2,400	2,600	
Computer charges	750	1,650	1,800	2,000	5,000
Sediment analyses (daily at 2 stations)	2,750	6,050	6,500	7,000	
Lab analyses (170-200 PCB analyses per year)	10,000	22,000	24,200	26,600	4,000
District common services	12,100	26,800	29,400	32,200	13,300
Washington technical services	6,400	14,100	15,400	16,900	6,000
TOTAL	70,600	156,300	171,100	187,800	66,600

* Charges for first half of fiscal year made to NY 77-046

** For completion of final summary report and analysis of samples collected late summer and early fall of 1985.

G. Hudson River Fish Sampling

Since 1977 the NYSDEC has carried out an intensive program of fish flesh monitoring for PCB in the Hudson River. This has yielded an extenstive data base as well as a basis for scientific conclusions regarding the impact of PCB on the Hudson River fishery as presented in NYSDEC Technical Report 80-2 "Trends of Several Known Chemical Contaminants in Fish from New York State Waters."

Attached is a summary of the continuation of this program through the duration of the project.

F. Monitor Sediment Erosion and Burial

NYSDEC, Bureau of Water Research

Iron pipes have been driven in as erosion reference markers at various river locations. Survey and pipes were also driven in area 1 and in area 4 of the remnant deposits. These will be surveyed every year by DEC for sediment elevation changes. In addition, three surveyed pipes installed by NYS Electric and Gas around hot spot 37 north of lock 3 are monitored annually. It is anticipated that similar erosion pipes will be installed below lock 6 power plant, above lock 5 power plant, and above lock 2 power plant by the power developers involved. It is planned that the precise fathometry and electronic ranging equipment will be used by DEC just before dredging, just after dredging and two years after dredging to determine any changes in river bottom elevations. The equipment will reproduce horizontal accuracy of 2 ft. and vertical accuracy of 0.2ft.

1981-1985 HUDSON RIVER SAMPLING SCHEME

LOCATION	SPECIES	DESIRED NUMBERS	DESIRED COLLECTION DATE ± 2 WKS	DESIRED SIZES AVE (RANGE) mm	REMARKS
Peekskill	StB	30	Peak run	As avail.	—
	Am eel	30	—	As avail.	-at discretion of Region 3 personnel
T.Z. Brdg	AS	30	Peak run	As avail.	15♂♂; 15♀♀
	StB	30	Early run	As avail.	—
		30	Late run	As avail.	-collect not less than 3 wks later nor more than 1 month
	WP	30	Fall	As avail.	
	Am eel	30	—	As avail.	-collect during shad run
	White catfish	20	—	As avail.	-time of collection at discretion of collector
G.W. Brdg	StB	30	Early run	As avail.	—
		30	Late run	As avail.	-collect not less than 3 wks later nor more than 1 month
Unspecified	YP	?	—	—	-As available during sampling of other species
	StB	?	—	—	-As available through law enforcement actions
	Tomcod	20	Dec., Jan.	As avail.	—

FISH FLESH CONTAMINATION

PROJECT TITLE

Monitoring PCB Contamination Levels in Hudson River Fish Flesh

PRINCIPAL INVESTIGATOR

Dr. Ronald J. Sloan, Senior Scientist
Bureau of Environmental Protection
Department of Environmental Conservation
50 Wolf Road - Room 526
Albany, New York 12233
Phone: (518) 457-6178

DATE PROJECT INITIATED

April 1977

PLANNED COMPLETION

March 1986

FUNDING

Unspecified amount by NYS-DEC for collection of fish and administration of program.
- $350,000 - Contract to
Raltech Scientific Services
3301 Kinsman Boulevard
Madison, Wisconsin
for laboratory analyses.

DESCRIPTION OF PROJECT

The major objective of the project is to monitor trends of PCB in fish flesh using the most important commercial and sport fish species of the Hudson by analyzing the concentrations of three Aroclor mixtures (1016, 1221, 1254). This objective includes identifying changes in PCB concentration as a result of dredging operations. Seven sampling stations have been established since 1977. From the George Washington Bridge to Poughkeepsie, four areas were selected to sample anadromous species such as striped bass and American shad. Three stations from Catskill to Stillwater were established to sample resident species such as largemouth bass, white perch and goldfish. Other locations have been sampled as the need arose. The 1985 sampling will be the last major year of collection, the emphasis will be on evaluating trends of PCB contamination. The current sampling protocol and a copy of the contract for PCB analyses are attached.

a. Macroinvertebrate Sampling Study

1. SUMMARY OF PROPOSED WORK FOR WHICH SUPPORT IS REQUESTED

The major objective of this work is to develop and apply a sensitive biological technique for monitoring the levels of PCBs in the Upper Hudson River during "hot-spot" dredging, when highly contaminated sediments will be removed from the river. In order to accomplish this, methods will be developed to expose uncontaminated organisms in the water column both above and below the dredge site. During the dredging, test organisms will be exposed and harvested every two weeks then weighed and their tissues extracted. The extracts will be delivered to the New York State Department of Environmental Conservation for analysis.

Macroinvertebrates are ideally suited for this work because they rapidly concentrate PCBs in their tissues at levels far greater than the concentration in the ambient water. Prior to the commencement of dredging, various candidate organisms will be evaluated based on availability, survival in exposure cages, rate of uptake and bioconcentration capabilities. During dredging, exposures will be made above the dredging site, at a fixed distance below the dredging site and at a fixed station (Route 29 bridge in Schuylerville) to determine any increased input to the river below the dredging sites.

The information generated from this work not only will provide specific answers regarding any increases in the PCB content of the Hudson River but hopefully also will yield a monitoring strategy that can be used to assess the severity and distribution of organic compounds in other fresh water systems.

2. INTRODUCTION

During the early part of the 1980's parts of the Upper Hudson River between Lock 7 (Ft. Edward) and Lock 5 (Northumberland) will be dredged

1981-85 HUDSON RIVER SAMPLING SCHEME

LOCATION	SPECIES	DESIRED NUMBERS	DESIRED COLLECTION DATE ± 2 WKS	DESIRED SIZES AVE (RANGE) mm	REMARKS
Above Feeder Dam	Pksd	75	9/20	—	-age 1+ for Pksd
	Pksd	75	9/20	—	-ages 2+,3+,4+
Stillwater	YP	30	6/23	213(193-261)	—
	BB	30	6/21	251(178-315)	—
	LmB	30	6/16	325(203-384)	—
	Goldfish	30	6/22	274(234-328)	—
	Pksd	75	9/20	—	-age 1+ for Pksd
	Pksd	75	—	—	-ages 2+,3+,4+
Albany/Troy	BB	30	6/6	292(193-338)	—
	WP	30	6/15	197(152-277)	—
	Awife/blb herring	40	Peak run	As avail.	-Species to be submitted dependent upon catch
	Pksd	75	9/20	—	-age 1+ for Pksd
	Pksd	75	9/20	—	-ages 2+,3+,4+
Catskill	WP	20	—	—	-at discretion of Region 4 personnel
	LmB	20	—	—	—
	YP	20	5/18	206(163-264)	—
	Redbreast sunfish	20	6/21	166(140-185)	—
	Awife/blb herring	40	Peak run	As avail.	-Species to be submitted dependent upon catch
Kingston/ Saugerties	Awife/blb herring	40	Peak run	As avail.	-to be submitted dependent upon catch
Poughkeepsie	StB	30	Peak run	As avail.	—
	Am eel	30	—	As avail.	-at discretion of Region 3 personnel
Newburgh	Pksd	75	9/20	—	-age 1+ for Pksd
	Pksd	75	9/20	—	-ages 2+,3+,4+

contamination found in field-collected organisms will have been accumulated close to the collection site and over a relatively short period of time. Field collected macroinvertebrates already have been used for monitoring the levels of PCBs in various waterways including the Upper Mississippi River (Mauck and Olson 1977), Raritan Bay (Stainken and Rollwagan 1979) and the Upper Hudson River (Simpson, unpublished data). Because fish are longer lived and more mobile, concentrations of contaminants found in their tissues may not reflect the contaminant burden at the time and location where the organisms were collected.

Analysis of macroinvertebrate tissues also offers advantages over water samples. Macroinvertebrates rapidly bioconcentrate certain organic contaminants (including PCBs) to levels many thousands of times greater than levels in the surrounding water. Because the concentrations are higher, the organisms are more easily and accurately analysed than water samples. The results also indicate a direct biological impact by the substances in question.

Results from static bioassays indicate that bioconcentration factors vary considerable between different species, but many fall in the range of from 27,000 to 100,000 (bioconcentration factor = concentration in the organism/concentration in the surrounding water) (Mayer, Mehrle and Sanders 1977; Nebeker and Puglisi 1974; Sanders and Chandler 1972; Stalling and Mayer 1972). Uptake rates also vary considerably: some species reach equilibrium with the surrounding water after only two days while other organisms (such as crayfish) do not reach equilibrium even after 28 days (Stalling and Mayer 1972). Small organisms with thin cuticles probably have more rapid uptake rates than larger organisms

ATTACHMENT II

COLLECTION PROCEDURE

A. Following data are to be taken on each fish collected:

1. Date collected.
2. Species identification (please be explicit enough to enable assigning genus and species)
3. Total length and weight.
4. Method of collection (gill net, hook and line, etc.)
5. Sample location (Waterway and nearest prominent identifiable landmark).
6. Sex - fish may be cut enough to allow sexing but do not eviscerate.
7. Tag number (each specimen to be individually tagged with jaw tag).

The original of all collection record and continuity of evidence forms shall accompany delivery of fish to the lab. A copy shall be directed to Ron Sloan. All necessary forms will be supplied by the Bureau of Environmental Protection.

B. Each fish to be wrapped in a plastic bag. The Bureau of Environmental Protection will supply the bags.

C. Groups of fish, by species, to be placed in one large plastic bag per sampling location. The Bureau of Environmental Protection will supply the larger bags.

D. Do not eviscerate.

E. All fish must be kept at temperature below 45°F immediately following data processing. Freeze as soon as possible.

F. Prior to any delivery of fish, coordinate delivery with and send copies of the collection records and continuity of evidence forms to:

Ron Sloan
Bureau of Environmental Protection
Room 526
50 Wolf Road
Albany, NY 12233
Telephone: (518)457-1769

Samples will then be directed to:

Analytical facility and personnel noted on specific project descriptions.

The prime candidate for use is the midge Chironomus riparius Meigen. This organism is easily cultured in large numbers in the laboratory (Biever 1965) and other species in the genus have been shown to rapidly bioconcentrate organic hydrocarbons (Derr and Zabik 1974). In fact, Derr and Zabik (1974) found that larvae of Chironomus tentans accumulate DDE at the same rate whether alive or dead.

A laboratory colony of midges will be established and field tests conducted to determine the organism's suitability as a test species. Individuals will be harvested from the laboratory stock, placed in exposure cages and placed in the river for periods of 1, 2, 3, 4 and 7 days. Upon removal, the organisms will be examined to determine mortality rate, then placed on ice and returned to the laboratory. In the lab, the organisms will be weighed, freeze dried, reweighed and then extracted using the Sohxlet method. The extracts (ready for injection into a gas chromatograph) will be submitted to the New York State Department of Environmental Conservation for analysis.

The analytical results will be used to construct an uptake rate curve, plotting concentration against time. Additional exposures will be made to refine the uptake curve and to determine the length of time necessary for the organisms achieve a relatively stable body burden of PCBs. During the methods development phase of this project, results must be obtained from the analytical laboratory within two weeks from the time the extracts are submitted, so that follow-up exposures can be planned and performed. The final uptake rate curve will be used to determine the length of exposure to be used during the actual monitoring. Additionally it will indicate the levels accumulated by the test organisms prior to the initiation of dredging, thereby serving as baseline data.

If problems are encountered in using midges as the test organism (e.g. high mortality in exposure cages, inconsistent uptake rates, etc.) the usefullness

to remove sediments that are highly contaminated with PCBs (polychlorinated biphenyls). In preparation for this work, special attempts have been made to select dredging methods that will minimize the release of PCBs into the river during the actual dredging. Hopefully the removal of these "hot spots" will lead to subsequent reductions in the levels of PCBs in the sediments, water and biota of the Hudson River.

In order to assess the short- and long-term effects of the dredging on the river, sampling programs have been developed for monitoring the levels of PCBs in the water, sediments, fish and macroinvertebrates before, during and after the dredging activities. This proposal describes the role of macroinvertebrates in the overall monitoring strategy.

3. BACKGROUND

Macroinvertebrates are an important component of aquatic ecosystems, occupying the intermediate position (in terms of both size and energy flow) between microorganisms (bacteria, algae and zooplankton) and vertebrates. The many kinds of freshwater macroinvertebrates include aquatic insects and other arthropods, snails, clams and various worms. Because they are relatively immobile (compared with fish) and are sensitive to changes in water chemistry, they often are used in biological monitoring programs to assess the relative health of surface waters (Gaufin 1973; Goodnight 1973). In disrupted (or polluted) habitats, the severity and general type of stress involved usually can be determined by analysing the structure and composition of the indigenous macroinvertebrate community.

These organisms also have the potential for being an important component of toxic substance monitoring programs. Most organisms are relatively immobile and have life cycles of one year or less. Consequently, any

the dredging and the final site will monitor the levels of PCBs being released downstream. The length of exposure will be determined during methods development (see above) but is expected to be between 4 and 7 days. Exposed organisms will be placed on ice and returned to the laboratory, then weighed, freeze dried and reweighed. They will then be extracted (as time permits) with hexane using the Sohxlet method and the extracts submitted to the New York State Department of Environmental Conservation for analysis.

While the dredge is in operation (approximately six months each year) exposures will be made every two weeks. This will result in approximately 84 samples for analysis for each six month dredging period (14 samples/ month X 6 months).

d. Financial support requested

$77,077. This will provide 1½ man-years of service by an Assistant Research Scientist (GS-14), 8 man-months of service by a Laboratory Technician (GS-9), travel expenses, supplies and overhead to be paid to Health Research, Inc. (see proposed budget, pp. 11-13).

e. Work assignments

1. Principal Investigator - Dr. Karl W. Simpson

   a. Oversee, review and approve efforts and decisions of co-investigator

   b. Edit and review reports

2. Co-investigator - to be appointed

   a. Evaluate suitability of midge larvae as test organism

   b. Design and oversee construction of exposure apparatus

   c. Supervise and participate in field and laboratory work (sample collection and extraction)

   d. Prepare reports describing results and their significance

3. Laboratory technician - to be appointed

   a. Assist in construction and maintenance of exposure apparatus

with thicker, less permeable cuticles.

Due to the rapid uptake rates and high bioconcentration factors of macroinvertebrates, it is possible to place uncontaminated specimens in the water column for a few days in order to monitor levels of contamination at different times and locations. Clams have been used for monitoring organic hydrocarbon contamination in both freshwater and marine habitats (Arimoto and Feng 1980; Bedford, Roelofs and Zabik 1968; Butler 1979).

4. SHORT TERM MONITORING.

a. Objective

To develop and apply a sensitive biological technique for monitoring levels of PCBs in the Upper Hudson River during hot-spot dredging.

b. Background

Since some macroinvertebrates rapidly bioconcentrate PCBs (see pp. 3-4) uncontaminated organisms will be placed in cages for several days and allowed to absorb PCBs from the water column. This work involves both development of methods and their implementation (actual monitoring).

c. Detailed work plan

1. Methods development - Prior to commencement of dredging the precise methods to be employed will be developed. This will include preliminary testing of the test organism and the design and construction of cages to be used for the field exposures.

The test organism should meet the following criteria: 1) should be easily obtainable in large quantities whenever a test is to be performed; 2) should have high survival rate in the test cages; 3) should have rapid uptake rate; and 4) should have a high bioconcentration factor that is relatively consistent during different exposures.

II. Long-term effects

A. Objective - To determine if removal of contaminated sediments reduces levels of PCB's in the biota of the Hudson River (DEC program no. A-4).

B. Background - One activity of the New York State Biological Monitoring Project is the collection and analysis of caddisfly larvae (from the Upper Hudson) and artificial substrate residues (from the upper and lower rivers) for PCB content. Data are available for each year beginning in 1976 (1978 for the caddisflies) and provide a good historical base for monitoring future trends. A continuation of this work would provide the desired information.

C. Work plan
1. Artificial substrates
   a. Install samplers at 16 station (Hudson Falls to Haverstraw Bay) in May of each year (see attached map)
   b. Harvest samplers an install fresh samplers at 5-week intervals in June, July, and August.
   c. Make final harvest and remove samplers in late September/ early October.
2. Caddisfly larvae
   a. Collect caddisfly larvae from 5 riffles in Upper Hudson River in May, June, July, August and September (concurrent with collection of artificial substrate sampling).
   b. Identify to species and submit for analysis.

D. Number of samples generated
1. Artificial substrates
   1 sample/station X 16 stations + 3 replicates (quality control) X 4 harvests/ year = 76 samples/year

2. Caddisfly larvae
   2 samples/station X 5 stations X 5 collections/year = 50 samples/year

3. Total samples : 76 multiplates + 50 caddisflies = 126/ year

E. Manpower required

3-man field crew/ survey X 5 surveys X 5 days/survey = 75 man-days/year

of other organisms will be evaluated. Alternate test organisms include freshwater clams, net-spinning caddisflies (Trichoptera:Hydropsychidae) and freshwater shrimp (Amphipoda:Gammaridae). These organisms have been rejected as the prime test organism for the following reasons:

Clams

- Are relatively large and probably have slow uptake rate; exposure would have to be for several weeks.
- May "shut down" (stop filtering water) in the presence of irritants such as silt and PCBs released by dredging; filtering rates may differ at control and test site.

Caddisfly larvae

- Cannot be maintained easily in the laboratory; test organisms would have to be field-collected from uncontaminated streams; due to life history patterns, sufficient biomass may not always be available.
- Require current speed for survival; consequently survival in slow-moving areas (where dredging will be done) may be very low.

Scuds

- Do not reproduce as rapidly as midges in laboratory colonies.
- Body weight is relatively low, requiring large numbers in each test cage.

2. Implementation of methods (actual monitoring)- During dredging, uncontaminated organisms will be obtained from the laboratory stock and a portion of them retained and preserved for control purposes. They will be extracted and analysed to assure that they are uncontaminated when placed in the field. The remaining organisms will be divided into six groups of approximately 200 mg each and each group placed in an exposure cage. Two cages will be placed at each of three sites: approximately 500 meters upstream of the dredge site, about 500 meters downstream of the dredge site, and at the Route 29 bridge in Schuylerville. The first two sites will reveal any difference in PCB burden caused by

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b. Assist with field work

c. Assist with laboratory work (weighing and extraction of samples)

5. ADDITIONAL WORK (long-term monitoring)

As part of the ongoing biological stream surveillance program the long-term effects of PCB dredging activities on the biota of the Upper Hudson River will be studied. Since 1977, net-spinning caddisfly larvae (Trichoptera: Hydropsychidae) have been collected during the summer months from 5 sites in the Upper Hudson River (Hudson Falls, Ft. Edward, Thompson Island, Stillwater and Waterford) and their tissues analysed for PCB content (Figure 1). This program was initiated to help monitor the temporal and spatial changes of PCB contamination in the upper river. These activities will be continued unmodified. The long-term impact of dredging can be evaluated by comparing post-dredging concentrations in these organisms (1982-1985) with pre-dredging values (1977-1981).

During each year from 1982-1985, net-spinning caddisflies will be collected in June, July, August and September at the five sites shown on Figure 1 and their tissues analysed for PCB content. Results from stations 1 and 2 will show levels of PCBs in areas unaffected by the dredging and the results compared with historical data (1977-1981) to determine the consistency of background contamination. The remaining stations are either in (station 3) or downstream from (stations 4 and 5) the areas to be dredged. If dredging does reduce the burden of PCBs to the biota of the river, concentrations at the last 3 sites should decline after the dredging is completed.

No funds are requested for this portion of the monitoring program. The work will be performed as part of the routine activities of the Biological Stream Monitoring Project.

particles in water, i.e. a much lower surface area per unit vol
mobility with the associated greater likelihood of bacterial co
closer proximity to high organic deposits derived from underly
effects of bioturbation.

These limitations have led to microcosm designs utilizin
allow release rate estimates from a more realistically struc
interface. Sediments used in these experiments have been ei
(Halter and Johnson 1977) or contaminated natural sediments
and Bowers 1981). Results from these studies (Table 1) in
concentrations within a given method correlates with relea
the method itself partially dictates results independant
densities. Partition coefficients from the "shake in th
generally range from 10^2 to 10^3, while microcosm estimat
at 10^4-10^5.

The flow through microcosm experiments are partic
they, more than any other laboratory approach, simulat
sediments. Two flow rate dependent mechanisms have b
most of the PCBs released from river sediments. At
slowly through desorption, while at high flow rates
particles into the water column accounts for most P
(Malcolm Pirnie Inc. 1980). Field data from the Mi
this hypothesis (Hetling et al. 1978). River wate
highest during periods of low and high flow with
occurring at intermediate rates.

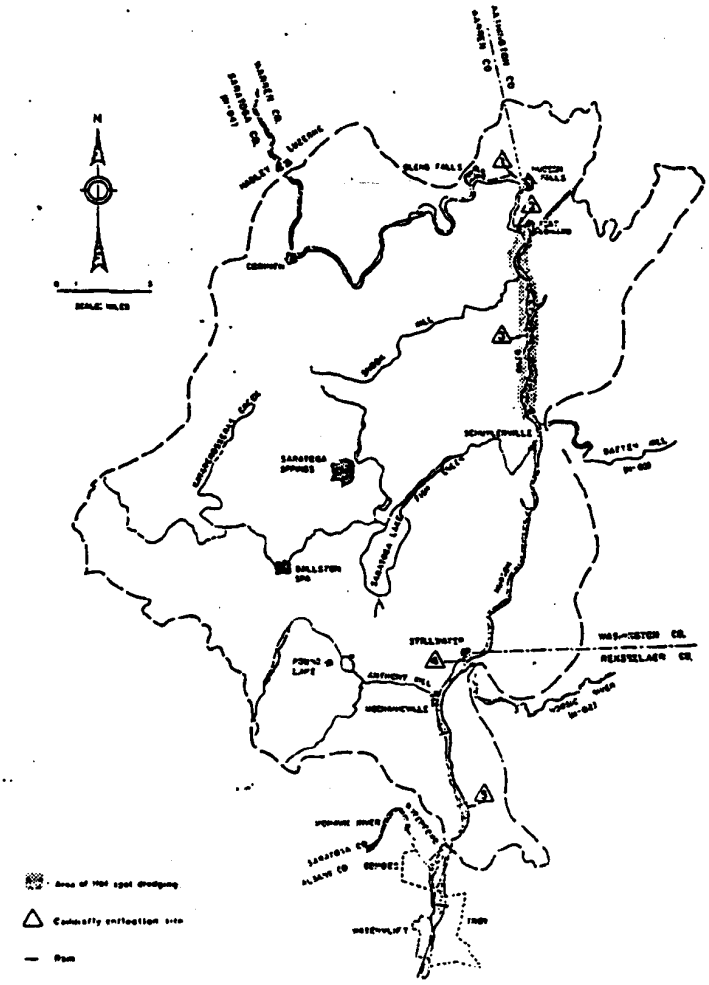


Figure 1. Collection sites for long-term biomonitoring of PCBs.

MONS 009444

Three changes are envisioned for the present system. First to preserve the physical condition of the sediment samples as they occur in the river, samples will be collected with a box type corer. The test chamber will then be built to accomodate this sample size. Secondly, the currently utilized pump will be replaced by one capable of accurate and precise flow rate control. Finally, the complete system will be maintained under controlled lighting and temperature during the course of the studies.

Testing the first three hypotheses will utilize the same experimental design. Replicate flow through trials will be performed at approximately six flow velocities to define the functional relationship between PCB release and flow rate. Conducted at 16–18°C and under constant low-flourescent light the experiments will run for twenty four hours. PCBs analyzed from the water column will be partitioned into soluble and particulate fractions. Thus at low flow rates, when desorption could be the dominant release mechanism, the soluble PCB fraction should constitute the majority of PCBs in the water column. When sediment particles are swept off the sediment interface at high flow rates, the particulate bound fraction should dominate.

Assessing the effects of sediment quality will also follow the same experimental conditions with release rates versus flow rates defined for four different sediment types. Three sediment types will be collected from "hot spots" (>50ug g^{-1}) near the discharge sources (Reach 8; Tofflemire 1979) and one sediment type from a downstream location near the Troy Dam. The "hot spot" samples will be of the silt, muck and sand with wood chips types because of their known capacity to contain high PCB concentrations in the river (Tofflemire 1979). Either a silty or muck type sample will be used from the downstream sampling station. In conjunction with the release experiments, the four

J. Study of PCB Release from Hudson River Sediments

BACKGROUND

Polychlorinated biphenyls have contaminated the Hudson River ecosystem for the past twenty five years. This was principally due to discharges from electric capacitor factories located at Fort Edward and Hudson Falls. Today a forty mile interval of the river from the Troy Dam near Albany to Fort Edward is one of the most PCB burdened freshwater systems in North America.

When entering aquatic systems, PCBs (due to their low solubility in water and their high octanol:water partition coefficients) usually become strongly sorbed onto suspended particles, especially those high in organic content (National Research Council 1979). Thus bottom sediments such as the "hot spots" in the Hudson River initially form an important immobilizing sink for PCBs. Once in the sediments PCBs are desorbed at low rates, resuspended and distributed by physical disturbance of the sediments, or redistributed by bioturbation (Halter and Johnson 1977). With a known PCB affinity for the organic fraction in suspended solids (Hatling et al. 1978; Dexter and Pavlou 1978), Halter and Johnson (1977) suggested a variety of sediment types having different proportions of organic matter be assessed for differential release rates. Benthic macroinvertebrates, which rapidly accumulate PCBs (Hansen et al. 1976), also may translocate PCBs through their foraging and burrowing patterns. However, bioturbation effects on release rates are presently unknown.

Although most research has focused upon sorption of PCBs onto particles, several studies have estimated release rates from lake or river sediments. Several employ the "shake in the tube" method where PCB laden sediments are mixed with measured amounts of water in a centrifuge tube. After a period of vigorous shaking, the sediments are spun down and the water analyzed. However, the sediment water interface has many features quite different from suspended

PLAN OF WORK

1. Determination of sampling stations.
2. Sample collection with box type corer.
3. Sediment analysis, classification and PCB determinations.
4. "Pilot" trials with the redesigned system.
5. Experiments defining release rate curves.
6. Comparison of sediments.
7. Testing of temperature effects.
8. Incorporating the findings into a transport model.
9. Calibration and verification of transport models.

OBJECTIVES

Based on the above observations our research objectives are to test the following hypotheses using our own microcosm design.

1. When flow rates increase from zero, PCB concentrations are initially inversely correlated to flow rate and at some relatively intermediate flow velocity this correlation becomes positive.
2. At low flow rates desorption is the principal release mechanism.
3. During high flow rate conditions sediment erosion, with most PCBs particulately bound, produce high PCB concentrations in the water column.
4. The functional relationship between PCB desorption rates and flow velocity will differ between sediment types.
5. Temperature will significantly alter release rates at low flow velocities.
6. Our empirical release rate estimates when used in a modeling framework will favorably compare with the USGS data.

METHODS

Our basic experimental method will be a flow through type laboratory microcosm, presently being applied to lake and river sediments (Fig. 1, Rice and Bowers 1981). In this chamber water is pumped over a 1 to 2 cm layer of natural PCB ladened sediment. The magnitude and rate of PCB release is then estimated by changes in PCB concentrations in the water leaving the chamber. The water is first filtered through a glass fiber filter for estimating particulately sorbed PCBs and then passed through polyurethane foam plugs to capture soluble PCBs (Veith et al. 1977). Precautions regarding PCBs entering the chamber, water turbulence over the sediments and PCB adsorption onto the chamber walls are observed.

PCB Sampling, Analysis and Data Flow Summary

Introduction

The sampling for PCB is outlined in three flow charts; (1) pre-dredging, (2) during dredging and (3) post-dredging. These outlines to give an overview of the environmental monitoring program, data analysis and contingency plan implementation.

sediment types will be analyzed with regard to grain size and organic carbon content. Also PCB depth profiles of the four samples will be performed including relative isomeric changes with depth.

Testing for temperature effects upon sediment release rates, we will utilize a silty sediment from a near source sampling station at a low flow rate. All of the trials will be run in triplicate. Each experiment will follow a three temperature pattern. The first twenty four hour period will run at 18-20°C to be followed by another twenty four hour period at 10°-12°C. Then a final period will run at the initial temperature.

Throughout the data set PCBs will be measured in two forms. All of the data will first be reported as the Aroclor derivatives 1232, 1242 (1016) and 1254. These derivatives will be determined from at least three GC peaks for each Aroclor using packed column gas chromatographic results. Approximately ten per cent of the water samples and all of the sediments will be analyzed on a capillary column GC. Data output from this methodology will permit the assessment of PCB "weathering" where PCB isomer proportions are known.

Statistical testing will follow general parametric techniques. The shape of the PCB release rate curves will be defined by polynomial regression equations. Data sets requiring comparative testing will employ common analysis of variance protocols.

The output from the experiments will be used to describe the release and transport of PCBs from the sediment of the river. The existing Lawler, Matusky and Skelly (L.M.S.) model (1978) for this river describe transport solely on the basis of sediment transport. The model framework we plan to apply will be the Hydroscience (1978) adaptation of the L.M.S. model with the modification of adding a component for the dissolved release of PCBs directly from the sediment.

PRE-DREDGING ENVI. TAL MONITORING PROGRAM

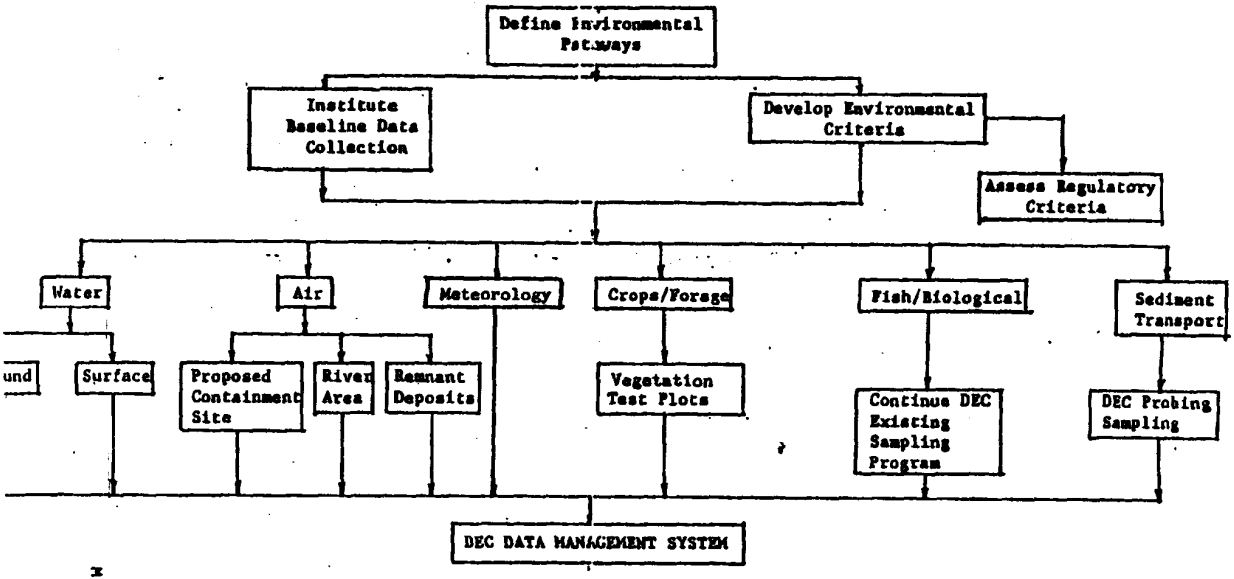
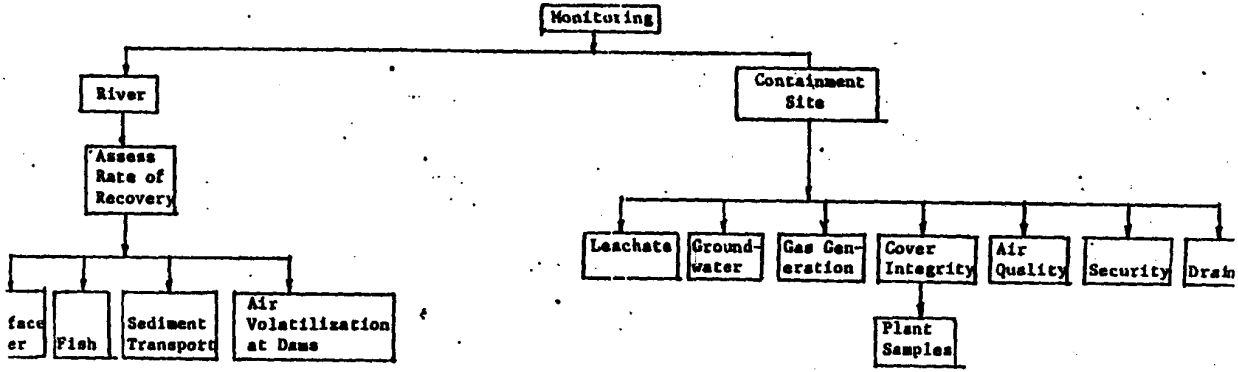


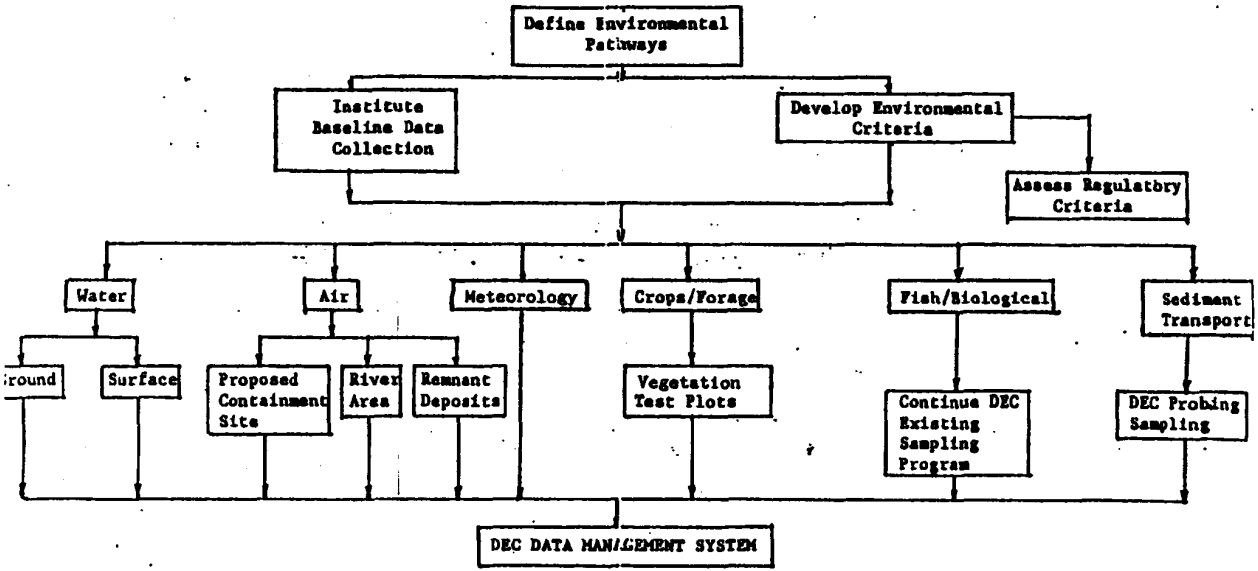
TABLE 1. Comparison of PCB desorption from sediments.

Method	Sediment PCB Concentration (g/kg)	Water PCB Concentration (g/L)	Sediment: Water Partition Coefficient	Author
Static, continuous shaking in centrifuge tube, 2 hr duration	1000.0 (1254)	1.0	1.0×10^3	Wildish et al. 1980
Static, continuous shaking in test tube, 24 hr duration	233.0 (1254) 177.0 (1242) 7.0 (1254)	0.15 0.14 0.02	1.6×10^3 1.3×10^3 3.5×10^2	Fulk et al. 1975
Method Microcosm, flow through 6 days	116000.0 (1016)	0.45	2.6×10^5	Veith 1976
Static in 2.8L jars, mixing. 1-24 hrs., settling. 5-180 hrs.	10000.0 to 300000.0	2.0 to 6.0	10^3-10^5	Tofflemire 1976
Microcosm Static, 8 days	100000.0 (1254)	1.7	5.9×10^4	Halter & Johnson (1977)
Flow-through, 16 hr	100000.0 (1254)	0.11	9.1×10^5	
Microcosm Static, 7 days	495.4 (1242) 144.4 (1254)	11.8×10^{-3} 12.2×10^{-3}	4.2×10^4 1.2×10^4	Bice & Bowers 1981
Flow through 0.7 hr	495.4 (1242) 144.4 (1254)	4.0×10^{-5} 2.0×10^{-5}	1.2×10^7 7.2×10^6	
		2.0×10^{-5} 1.0×10^{-5}	2.5×10^7 1.4×10^7	

POST-DREDGING ENVIRONMENTAL MONITORING PROGRAM



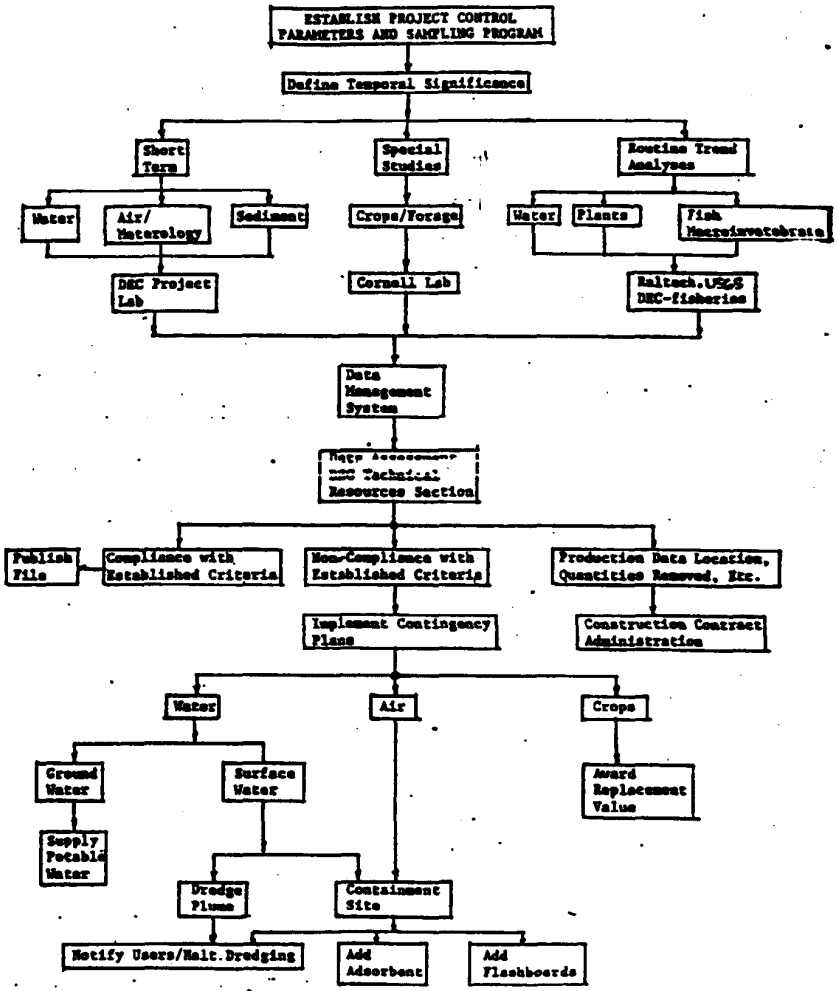
PRE-DREDGING ENVIRONMENTAL MONITORING PROGRAM



Quality Assurance/Quality Control

A quality assurance/quality control document is being prepared in accordance with the EPA document "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans " (QAMS-005/80). To insure a complete and acceptable document is prepared, private contract labs, NYSDEC labs and NYSDOH labs doing work or planning to do work on the project have been contacted for their input. The project staff is currently waiting for replies from the appropriate laboratories. An integrated, complete quality assurance/quality control document will be forwarded to EPA for approval.

DURING-DREDGING ENVIRONMENTAL MONITORING
and CONTINGENCY PLAN NETWORK



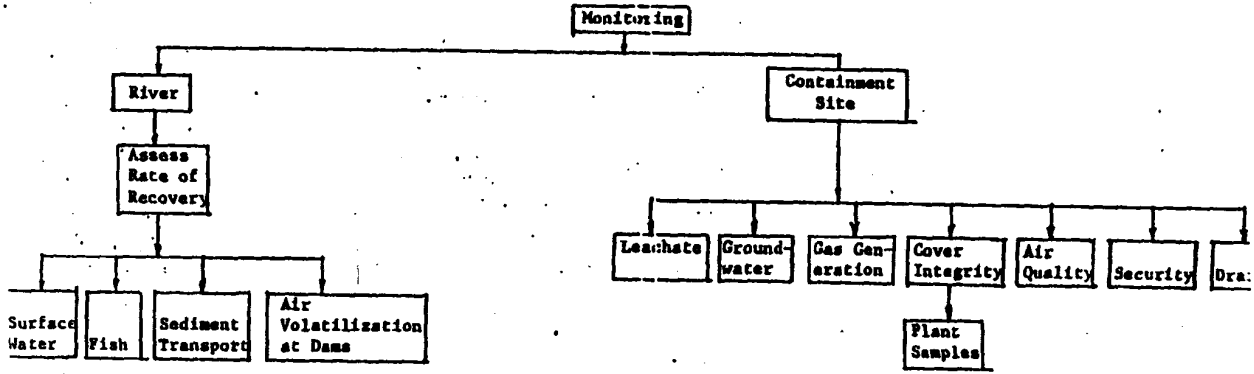
MONS 009456

with the same rules of law as applied to actions in the supreme court against individuals or corporations, provided the claimant complies with the limitations of this article." There is an annual appropriation to cover the actual awards to claimants and the projected awards of pending claims. In the state budget for the fiscal year 1980-81 (Chapter 50 of the Laws of 1980) there is an annual apropriation of $9 million for such claims. In the current state budget for fiscal year 1981-82 (Chapter 50 of the laws of 1981) there is an annual appropriation of $12.5 million for such claims. In addition the procedure in New York State is that supplemental and deficiency budgets are passed to cover any additional expenses that arise during the fiscal year.

In addition it is noted that the annual budget of New York State is currently over $16 billion and is based on the taxing power of the State. Consequently, even if the state were not exempt from the closure, post-closure and liability requirements of the RCRA regulations it could easily meet the liability requirements for sudden and non-sudden occurrences of $4 million per occurrence, and an annual aggregate of at least $8 million, that are set forth in Parts 264.147 and 265.147 of the RCRA regulations.

There are no procedures for grievance or arbitration of claims in connection with the public health aspects of the PCB reclamation project. As stated previously, The Court of Claims Act not only waives immunity by the State, but also provides the procedures by which claims can be processed. There is no direct or indirect authority in that statute providing for informal resolution of claims against the state. Specific statutes, such as Article 11 of the Navigation Law (concerning oil spill prevention, control, and compensation), would have to be enacted instituting an arbitration procedure for claims such as found in Part 3 of Article 12. Such enactment of arbitration procedures for possible future claims is not advisable given the existing

POST-DREDGING ENVIRONMENTAL MONITORING PROGRAM



hazardous waste facility for purposes of compliance with the closure, post-closure and liability financial requirements if the state assumes legal responsibility (which is the case here since New York State is the owner and operator). As noted above, New York State has adequate financial resources in the annual appropriation for judgements from the court of claims, and in annual tax revenues of $16 billion, sufficient to assure financial responsiblity.

Liability insurance for any claims arising in connection with the public health aspects of the project is consequently not necessary for any potential claims resulting from sudden releasee. In addition state law prohibits "personal injurty liability insurance" for non-sudden releases of pollutants or contaminants (Insurance law §46.13). One exception to this is insurance "ourchased to satisfy the financial responsibility requirements of any Federal law" but RSCA does not contain any financial responsiblity requirements for this project. RCRA on the other hand, has financial responsibility requirements, but RCRA does not apply to this facility.

The forth modification requested under 'Long-term Storage" is provision for specific funding mechanisms by NYSDEC to assure implementation of long-term contingency plan, operation, maintenance and monitoring. A serious obstacle to this is § 41 of the State Finance Law which prohibits any State official from binding the State in excess of appropriations. In the absence of an appropriation to cover the entire post-closure period, which is unlikely, no binding assurance of the availability of such funds can be given. However, as discussed above, the resources of the state are more than adequate to assure that such funding is available. Consequently, there should be no requirement, such as found under Section 264.145 concerning financial assurances for post-closure monitoring and maintenance, that the state be subjected to establishment of either a post-closure trust fund, a surety bond guaranteeing

VI. Liability and Financial Assurances

In assessing the necessity and function of the financial assurance recommendations in the DEIS, the following should be considered:

(1) New York State has waived its immunity from liability, is a self-insurer for purposes of such claims and there are existing state procedures to ajudicate such claims in the Court of Claims.

(2) There is no authority for an arbitration procedure for such claims for injury to public health and legislation would be necessary to require such arbitration procedures.

(3) The PCB Reclamation Project is being reviewed by EPA under the Toxic Substance Control Act (TSCA) which contains no financial responsibility requirements for the owners and operators of chemical waste landfills. However, the financial responsiblity requirements of the Resource Conservation Recovery Act (RCRA) provide guidance on the nature of financial assurances that could be part of the PCB project. However under RCRA regulations, federal and state governments are exempted from the financial responsiblity requirements for closure, post-closure and liability.

(4) Nevertheless, the state can meet the financial requirements of RCRA because of its general resources, and more specifically because of its taxing power and appropriations for claims.

Last century New York State waived immunity from site with reference to such casues of actions (torts) by its citizens for injuries due to governmental activities. The current law for filing and processing claims against the state is the Court of Claims Act and its-attendant rules. That act, in Section 8, states that "the State hereby waives its immunity from liability and action and hereby assumes liability and consents to have the same determined in accordance

VII. LEACHATE AND GAS COLLECTION SYSTEMS

A. Leachate Collection System

1. General

During approximately two years after closure of a containment cell, an initial dewatering of excess water will take place at an average rate of 50 gallons per minute (gpm). At the estimated rate of leakage through the cell cap of 1.25 inches of water per year, the total long-term leachate flow from both cells of the "rescoped" project will average one gpm.

2. Leachate Collection System Design

The leachate collection system is shown on Plate No. 13 of the Site Design Report, September 1980. Essentially, it consists of the following components:

- Sloped bottom of containment area
- Gravel filled collection trenches, wrapped with filter fabric
- Perforated drainage piping in the collection trenches
- Collection and sampling wells on the containment area perimeter, connected to the drainage piping
- Piping system connecting the drainage system to a discharge point at the Hudson
- Flow metering and monitoring system

The leachate collecting system will be valved. Discharge to Hudson will take place if leachate quantities and concentration observed are in compliance with the conditions of the site discharge permit. If the leachate contingency plan described in Section IV will be implemented.

The use of filter fabric with the relatively sandy dredged material as sampled in the Thompson Island Pool and as anticipated in the lower river pools is a sound technique. Filter fabric will function as well as

court of claims procedures to process claims against the state, and would probably be resisted on general principles by the legislature. In addition, such a proposal would require legislative enactment which is unlikely this late in the session.

Since the PCB Reclamation Project is seeking approval under the requirements for TSCA, there is no requirement that the project meet the technical financial responsiblity requirements set forth under the RCRA statute and the regulations. Assuming, however, that the closure and post-closure requirements for this project could be substantially the same as those for a hazardous waste disposal facility under the RCRA regulations (for example, the 30 year post-closure obligation of 40 CFR 265.145 is similar to the obligation of development of longterm maintenance and monitoring progrms for a minimum of thirty years for this project) then the RCRA regulations on financial responsibility, Subpart H of Parts 264 and 265, provide guidance on the financial requirements that should or can be imposed on New York State for the PCB Reclamation Project. In such a case both federal and state government are exempted from the financial requiremtne of RCRA (40 CFR 264.140(c); 40 CFR 265.140(c)) and consequently no additional financial assuances should be required from New York State for this project.

The reasoning behind such an exemption is specifically stated in the supplementary information section to the promulgated regulations in the Federal Register of May 19, 1980. In that commentary, on page 33198, it states "the agency agrees that State and Federally owned facilities will always have adequate resources to conduct closure and post-closure care activities properly. Therefore, an exemption for these facilities has been incorporated in a new "Applicability section." Carrying this principal further, 40 CFR 264.150 and 265.149 allow a state to substitute for an owner and operator of a

In general, methane gases generated in a landfill tend to rise. If this occurs, the additional pressure could cause the clay cap to breach. Also, pockets of gases may be formed in areas of higher organics, become trapped and moved laterally through the fill.

To prevent any breach of the cap and any controlled release of gas, a gas collection system will be installed under the containment area cover as shown on Plate 3.

2. Gas Collection System

The gas collection system will consist of the following components:

- A network of gravel-filled collection tranches placed under the clay cap centered along the final ridge line of the clover.
- Perforated piping placed in the collection trenches.
- Gravel-filled wells connected to the collection piping and extending 20 feet into the fill.
- Perforated piping placed in the wells.
- Valved gas vents extending above the cover at each of the wells.
- Piping system connections from the vents to possible treatment apparatus.

The gas collection system will be valved. Sampling points will be provided at each of the vents and gas pressure and generation will be monitored regularly. As gas is generated, samples will be taken and tested. If the gas does not contain appreciable amounts of PCB, the valves will be left open. If testing indicates that treatment is required, piping will be installed from specific vents to the treatment apparatus. The gas will then be pumped through a carbon adsorbent and tested at the point of discharge. The gas will then either be recycled through treatment or, if found to be acceptable, released.

payment into a post-closure trust fund, a surety bond guaranteeing performance of post-closure care, a post-closure letter of credit or a combination of any of the above financial mechanisms.

Consequently, the status of New York State as a self insurer, for purposes of claims, and the annual tax revenues of the state should provide more than adequate assurance of financial responsiblity to carry out post-closure requirements and to honor all valid claims.

VIII. OTHER SITE USES

In the encapsulation site screening process, potential sites were judged solely upon their suitability for the disposal of PCB-contaminated dredge spoil from the Upper Hudson River. The materials originally proposed to be placed into the site by the NYSDEC included 40 "hot spots" areas, remnant deposit areas 3 and 5 and possibly NYSDOT disposal areas Buoy 212 and Special Area 13 and Buoy 204 annex. Site permit applications have requested approval for the disposal of these materials only.

At the present time, only materials determined to be a part of the re-scoped Hudson River PCB Reclamation Project will be placed in the site. The remaining materials specified in the permit applications may be encapsulated at the site at a later date if funding is secured.

It is not the intent of the NYSDEC to dispose of other than PCB-contaminated dredge sediment material from the Upper Hudson River in this site. Legislation providing for this sole use has been approved by the New York State Assembly with the strong support of the New York State Department of Environmental Conservation.

graded aggregate filter. When ease and dependability of construction are considered, fabric filters have a better overall performance.

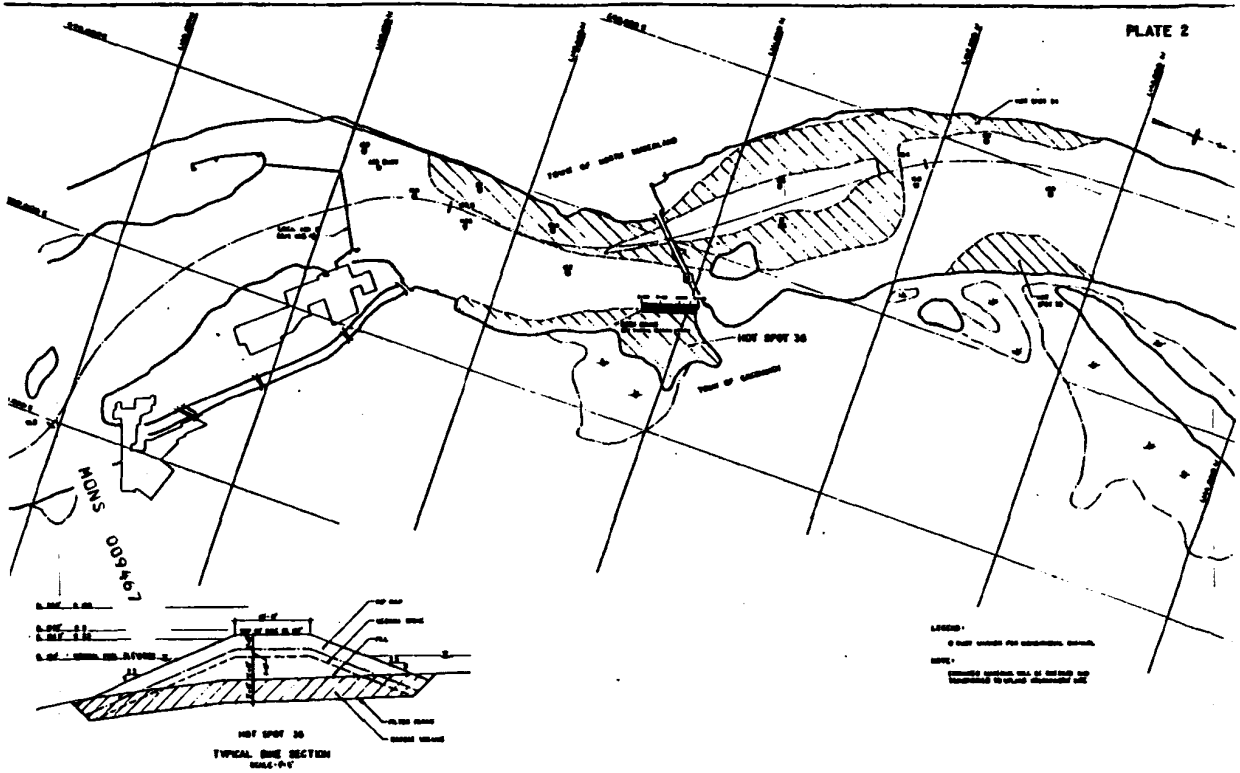
Performance of the leachate collection system is dependent on the nature of dredged material in contact with the drain, particularly on the proportion of fine grained material contained. Provision has been made in the design of the collection system so as to prevent or minimize clogging, but if the dredged material contains a large proportion of fine grained material clogging may eventually occur in some portions of the leachate collection system. However, a key point is that the leachate collection system offers a much easier pathway out of the containment area than percolation through the clay bottom. If there are sufficient fines to clog the collection system, they will also affectively seal the interface between the dredged material and the clay bottom, thus preventing any leachate escape at all. In that contingency it would be necessary to remove leachate through vertical wells located on the site.

E. Gas Collection and Control

1. General

In ordinary sanitary landfills receiving municipal solid wastes, gases are generated as the result of the decomposition of organic materials. The dredged material contains an average of only five percent organics, but in some areas may contain as much as 30 percent organics. Therefore, although the amount of gas generation expected is much less than that at an ordinary solid waste landfill, the processes of waste volatilisation, biological degradation and chemical reaction may generate gases. The actual production of gas will depend not only upon the amount of organic matter, but the temperature, moisture content and pH of the fill.

PLATE 2



MALCOLM PIRNIE INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

HUDSON RIVER PCB RECLAMATION PROJECT

CONCEPTUAL DESIGN

HOT SPOT 36
IN-RIVER CONTAINMENT

3. Air Monitoring

As part of the containment site monitoring, a continuous air monitoring program will be implemented as prescribed in the site air quality permit. This will provide quality data on any gases released from the site.

4. Construction Sequence

In order to minimize PCB volatilization from the containment areas during the dredging process, a six-inch temporary cover of either clean dredged material or an organic mixture will be placed as soon as possible over the fill area. The gas collection system will then be installed before placement of the clay cap and final cover.

After bringing the fill to final grade, the collection trenches will be dug and the gravel collection piping placed. Where specified, borings will be made to allow for the gas collection well. The surface vents will be set in place after the clay cap and final cover are placed and worked to final line and grade.

5. Gas Collection System Costs

The cost of the gas collection system including collector trenches, collector wells, gas vents and contingencies is approximately $1,500 acre. For the two proposed containment cells, the easterly with approximately 23 acres and the westerly with 14 acres this amounts to approximately $56,000. The cost of treatment apparatus is not included. Need for treatment will depend upon the results of the initial testing.

Appendix A

Baseline Environmental Sampling Hudson River PCB Reclamation Project

Parameter	Location*/Description	Analysis	Responsible Party	FREQ	Total # of Samples
Air	1/Hafner farm or Site 10	PCB	Boyce Thompson for 1981-1982 yr contract	weekly w/ duplicates	100
	4/Remnant deposits			periodic in warm weather	16
	5/Remnant deposits			"	16
	6/Remnant deposits			"	16
	7/Lock C Dam			"	12
	6/Remnant deposits				16
	New Methods			As necessary	50
Plants	PCB	—	Same as above	2/yr	
	A,B,C,D Plant Plots				300
	E, Ft. Miller Plant Plot				50
	Natural Plants 4x4				100
	" Lock b				20
	" Dredged sites				15
	" Remnant deposits				25
Micro Meterology	Site 10	Air temp. wind dir. wind speed dir. fluctuation dew point, precipitation	DEC and Boyce Thompson	continuous Sept., Oct., Nov., 1981 Restart 1982	
Surface Water	River (see map and monitoring plan)	PCB susp. solids	USGS	River flow dependent	150
	Water Supplies	PCB, susp. solids, metals	USGS	"	26

*Location corresponds to attached map

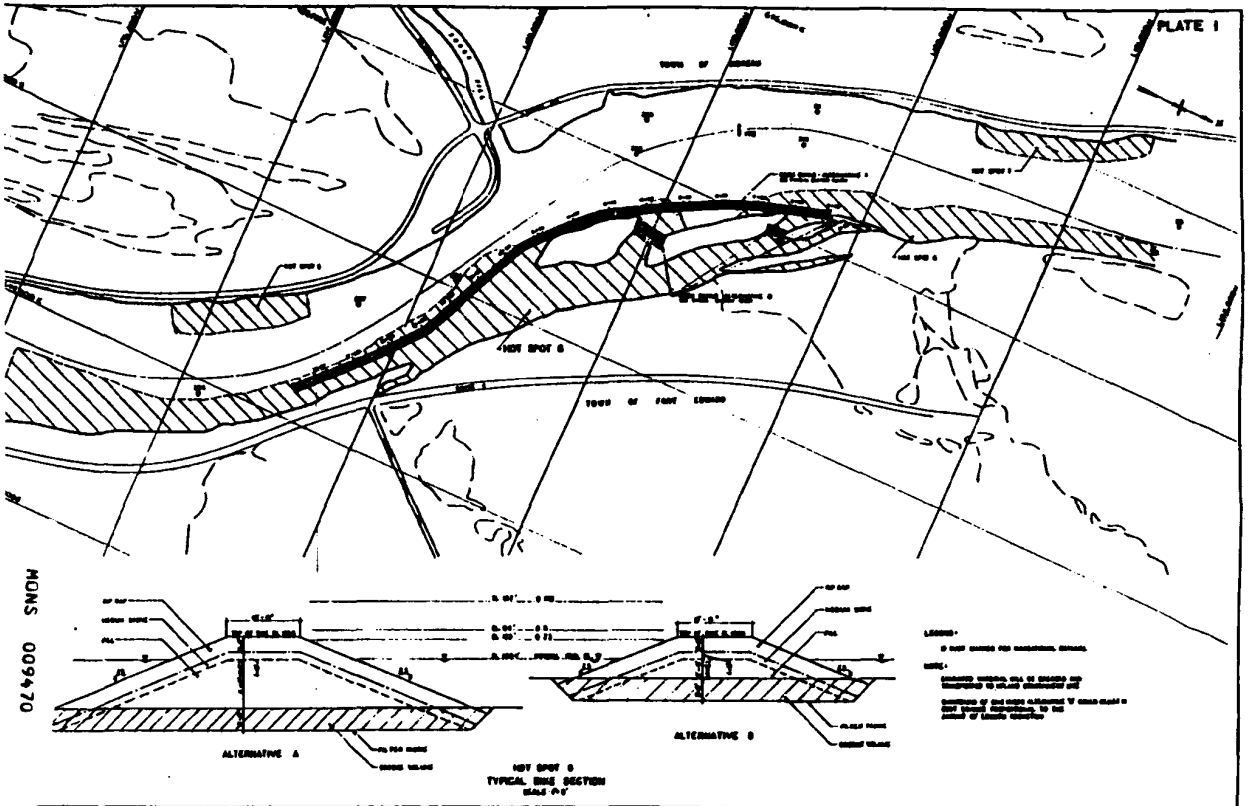


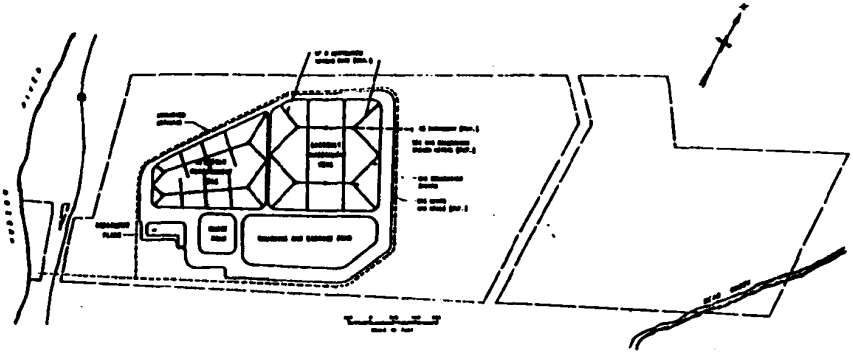
PLATE 1
HOT SPOT 8
ALTERNATIVE A
ALTERNATIVE B
HOT SPOT 8
TYPICAL DIKE SECTION
MONS 009470
MALCOLM PIRNIE, INC.
NEW YORK STATE DEPARTMENT OF
HUDSON RIVER PCB RECLAMATION PROJECT
CONCEPTUAL DESIGN
HOT SPOT 8
IN-RIVER CONTAINMENT

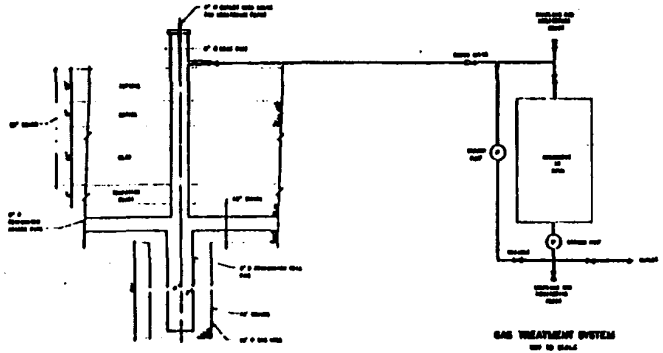
To: .....

From: .....

Subject: .....

PLATE 3





DETAIL
GAS COLLECTION SYSTEM

GAS TREATMENT SYSTEM

MONS 009472

COLM PITNE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GAS COLLECTION SYSTEM

MALCOLM PIRNIE, INC.

Inter-Office Correspondence

To: Richard Thomas Date: 4/23/81

From: Brian Wood

Subject: Hudson River Sediment EP Toxicity Analyses

Tabulated below are the results of the organics analyses on hot spots 27 and 28. Units are milligrams per liter.

Parameter	Hot Spot 27	Hot Spot 28	EPA Max. Limit
Endrin	<0.001	<0.001	0.02
Lindane	<0.01	<0.01	0.4
Methoxychlor	<1.0	<1.0	10.0
Toxaphene	<0.05	<0.05	0.5
2, 4-D	<1.0	<1.0	10.0
2, 4, 5-TP	<0.1	<0.1	1.0

Appendix A Con't

Baseline Environmental Sampling Hudson River PCB Reclamation Project

Parameter	Location*/Description	Analysis	Responsible Party	FREQ	Total # of Samples
Ground Water	Buoy 212, SA 13 6 wells	PCB	USGS	1/mo	60
	Site 10, 6 wells	PCB	USGS	1/mo	60
Sediment	Hot Spots	PCB Total Solids	**Syracuse Research Corp.	as needed	150
Fish	See map and monitoring plan	PCB, Lipids	DEC	1-2/yr	600
Macroinvertebrates	See map and monitoring plan	PCB, Lipids	NYSDOH,DEC	4/yr	126

*Location corresponds to attached map

** No EPA funds involved

Previous transmittals giving results of EP toxicity tests are a) MPI memo of 3/20/81 (C-33A), b) MPI memo of 3/31/81 (C-33B), c) MPI memo of 4/23/81 (C-33C), d) MPI memo of 6/11/81 (C-33D).

Very truly yours,

MALCOLM PIRNIE, INC.

RF Thomas

Richard F. Thomas
Project Manager

RFT:hkh

cc: Mr. Maher

SECRETARY TO JEFF SCHMITT RM. 519 (457-1254)

MALCOLM PIRNIE, INC.

Inter-Office Correspondence

(518) 457-1088
Job # 266-22-1100

TO: JEFF SCHMITT RM 5
457-1254
Date: 3/31/81

To: R. Thomas

From: B. Wood

Subject: Hudson River Sediment Core Analysis
Job # 266-22-1100

Two core samples were received 3/26, the samples were labeled "hot spot 27" and "hot spot 28". Per your instructions, the samples were analyzed for E. P. Toxicity and total metals. Results are tabulated below. E. P. extract units below are milligrams per liter, total metals are micrograms per gram, dry weight.

	CORE 27		CORE 28	
	E.P.EXTRACT	TOTAL	E.P.EXTRACT	TOTAL
As	0.04	3.4	<0.005	3.5
Ba	<0.1	20.5	<0.1	24.0
Cd	<0.01	0.32	<0.01	0.56
Cr	<0.05	11.9	<0.05	17.6
Pb	<0.1	20.9	<0.1	26.5
Ag	<0.01	0.45	<0.01	0.80
Se	<0.005	0.10	<0.005	<0.10
Hg	<0.0005		<0.0005	

MONS 009476

Hudson River Reclamation Project
Stage 1 Cultural Resource Survey for Site 10

Abstract

A cultural resource survey was conducted at the proposed PCB containment site (site 10) in the town of Fort Edward, Washington County New York for the purpose of identifying historic and/or prehistoric resources that could be impacted by the proposed action. This Stage 1 survey included a literature review, sensitivity model for predicting areas likely to contain previously undiscovered resources, and systematic field investigation. As a result of this study, thirteen (13) cultural resources were identified in the proposed project area.

A Stage 2 cultural resource survey is recommended for the purpose of evaluating the potential eligibility of selected resources for listing on the National Register of Historic Places. These resources include two (2) prehistoric sites and an old barn complex. It is recommended that impact be avoided to the west bank of the Dead Creek, an archeologically sensitive zone. Also, mitigating measures will be developed to minimize potential impact to the Old Champlain Canal, a property listed on the National Register.

APPENDIX B

Stage 1 Cultural Resource Survey for

Site 10, Hudson River Reclamation

Project, Abstract

New York State Department of Environmental Conservation, 1981. Stage 1 Cultural Resources Survey for Site 10, Hudson River Reclamation Project, Abstract, Albany, New York.

Hudson River Reclamation Project
Stage 1 Cultural Resource Survey for Site 10

Abstract

A cultural resource survey was conducted at the proposed PCB containment site (site 10) in the town of Fort Edward, Washington County New York for the purpose of identifying historic and/or prehistoric resources that could be impacted by the proposed action. This Stage 1 survey included a literature review, sensitivity model for predicting areas likely to contain previously undiscovered resources, and systematic field investigation. As a result of this study, thirteen (13) cultural resources were identified in the proposed project area.

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APPENDIX C

PCB Settlement Agreement Between

the New York State Department of

Environmental Conservation and

General Electric Company, September 8, 1976

New York Department of Environmental Conservation, 1976. PCB Settlement Agreement between the New York State Department of Environmental Conservation and General Electic Company, Albany, New York.

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

IN THE MATTER OF ALLEGED VIOLATIONS OF
SS 17-0501, 17-0511 and 11-0503 OF THE
ENVIRONMENTAL CONSERVATION LAW OF THE
STATE OF NEW YORK BY:

File No. 2833

GENERAL ELECTRIC COMPANY,

Respondent.

AGREEMENT

The following is the agreement made between the Department of Environmental Conservation (Department) and General Electric Company (General Electric) on September 8, 1976 to settle this proceeding:

(1) This agreement is based upon the mutual conviction that it is in the public interest to terminate this proceeding and voluntarily undertake forthwith the cooperative programs provided for in this agreement without further delay.

(2) This proceeding was commenced on September 8, 1975 and hearings began before Abraham D. Sofaer, Esq., the duly designated hearing officer, on October 6, 1975. An interim opinion was rendered by the Hearing Officer on February 9, 1976. Hearings resumed on April 19, 1976 and the record is now complete. All parties have briefed the issues and the briefs have been submitted to the Hearing Officer.

(3) (a) As its full share of a comprehensive program of at least $7,000,000 to deal with PCBs in the Hudson River and related environmental concerns, General Electric will within sixty (60) days of the date of this Agreement contribute $3,000,000 in a lump sum to the Department and in addition, General Electric will perform $1,000,000 in research, making the benefits of the research available to the Department, as specified in Exhibit 1. The Department will participate in the comprehensive program in an amount comparable to General Electric's cash contribution by the expenditure of funds legally available to it and in conjunction with its mandated duties.

(b) General Electric's $3,000,000 contribution shall be used by the Department, in its discretion, as General Electric's share of a program of at least $6,000,000 to: (i) monitor the presence and levels of PCBs which have been discharged in Hudson River waters in water, sediments and biota; (ii) further investigate the need for remedial action concerning PCBs present in the Hudson River; (iii) implement remedial action, if necessary to protect public health and resources, concerning PCBs present in the Hudson River; (iv) aid in developing a program to regulate the storage and discharge of substances hazardous to the environment if sufficient moneys are available after implementing remedial action concerning PCBs.

(c) The Commissioner of Environmental Conservation (Commissioner) will establish an advisory committee consisting of independent experts, governmental, and private interests which will, at regular meetings, review and make public recommendations to the Commissioner concerning the scope, content, progress and results of the programs, studies and expenditures for which provision is made in paragraph 3(b). In addition, the Department will furnish the advisory committee with any interim report(s) and final report(s) of the research described in Exhibit 1. The advisory committee will continue to function throughout the comprehensive program concerning PCBs and related environmental concerns.

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provided, however, that if General Electric can demonstrate that by the operation of the facilities described in the Crawford and Russell Report, and all reasonable modifications thereto, such effluent levels cannot be achieved, then General Electric will be permitted to discharge such average and maximum amount of PCBs as are achievable by the operation of said facilities, but, in any event, no greater than a daily maximum discharge of 0.11 pounds (fifty (50) grams) of PCBs into the waters of the Hudson River.

(b) The goal of the Department and the Natural Resources Defense Council, Inc. is the complete elimination of all PCB discharges.

(c) General Electric will continue to review PCB treatment systems and install such system(s) at its Capacitor Manufacturing Facilities as may be necessary to comply with the requirements of Sections 301 and 307 of the Federal Water Pollution Control Act Amendments of 1972.

(7) General Electric will continue its daily monitoring of the total amount of discharges of PCBs reaching the Hudson River from all point sources or discharge outlets at its Capacitor Manufacturing Facilities. The general conditions for General Electric's program are as follows: (i) hourly samples are composited for each discharge for each twenty-four (24) hour period in proportion to flow; (ii) the results of the analysis for PCBs in each composite daily sample for each week are submitted to the Department and the United States Environmental Protection Agency, Region II, within one (1) week of the close of each calendar month.

(8) Within thirty (30) days of the date of this agreement, General Electric will submit to the Department final plans and specifications for waste treatment and discharge control facilities described in the engineering report prepared by Crawford and Russell, Inc., dated February 20, 1976 and an addendum thereto dated April 7, 1976 (the "Crawford and Russell Report") and after approval of the final plans and specifications which will be issued within sixty (60) days after submission install and cause said facilities to be operational within five (5) months of such approval.

(9) The Department reserves the right by legal procedures for modification of General Electric's SPDES or NPDES permits, and pursuant to applicable provisions of law, to require that General Electric achieve more stringent limitations on the discharge of PCBs or take any additional action to further reduce the discharges of PCBs from any point source at its premises and facilities located at Hudson Falls and Fort Edward, New York.

(10) The provisions of this agreement or the order for which it provides, shall not constitute or be construed as an adjudication or finding on any issue of fact or law, or evidence or admissions by any party with respect to any issue in this proceeding, or be construed as, or operate as, an admission that General Electric has violated any law or regulation or otherwise committed a breach of duty at any time, and shall not constitute, in this proceeding or any other proceeding or litigation or otherwise, any evidence or implication of any such violation or breach of duty. No amount of the settlement contribution by General Electric constitutes a fine or penalty.

(11) (a) General Electric's acceptance of the provisions, terms and conditions of this agreement shall be in full and complete satisfaction and release of each and every claim, demand, remedy or action whatsoever against General Electric, its officers, directors, employees or agents which was or might have been alleged or encompassed within the original or amended complaint in this proceeding, or which the Department may have, relating to or arising from General Electric's direct or indirect discharges of PCBs reaching the waters of the Hudson River from General Electric's premises in Hudson Falls and Fort Edward, New York, including future discharges permitted by this agreement or the order for which the agreement provides.

(b) This release shall inure only to the benefit of General Electric, its officers, directors, employees, agents, successors and assigns, at law or in equity, with respect to the aforesaid matters.

MONS 009485

(c) Nothing herein shall be construed as barring, diminishing, adjudicating or in any way affecting any legal or equitable rights or claims, actions, suits, causes of action or demands whatsoever that the Department will have against anyone other than General Electric, its officers, directors, employees and agents.

(12) The right of the Department under law to enforce the terms of this agreement shall not be affected by any release contained herein.

(13) An Order in the usual form and containing all of the provisions of paragraphs 5, 6, 7, 8 and 9 of this agreement should be entered in final and complete disposition on the merits of this proceeding. It is hereby stipulated that the Hearing Officer may recommend and the Commissioner of Environmental Conservation may issue the Order.

(14) This agreement, together with its exhibits, constitute the entire agreement between the Department and General Electric concerning the rights and obligations herein provided.

The parties hereto have executed this settlement agreement this 8th day of September, 1976.

GENERAL ELECTRIC COMPANY

BY _____
John F. Welch, Vice President and
Group Executive

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

BY _____
Peter A. A. Berle, Commissioner

MONS 009487

EXHIBIT I

General Electric grants to the Department of Environmental Conservation the non-exclusive right to use the results of the following research:

A. General Electric will conduct research, itself or by contract, on the environmental compatability of its substitute non-PCB dielectric capacitor fluids. The research expenditures will be not less than $400,000 of which $400,000 shall be applied to the General Electric $1,000,000 research commitment set forth in paragraph 3(a) of the foregoing agreement.

The research shall consist of chemical and biological tests selected by General Electric from the following:

Acute Oral Toxicity (rats)
Acute Dermal Toxicity (rats)
Skin & Eye Irritation (rabbit)
Acute Toxicity (fresh water fish)
Subacute Toxicity (fish)
Water Solubility
Partition Coefficients
28 Day Rate Feeding
Ames Test - screening test for carcinogenity
Acute Toxicity (birds)
Bioaccumulation (fish)
Biodegradation (CRD)
Acute Inhalation (rats)
Soil Migration
Vaporization Rate
Soil Biodegradation
Soil Organism Toxicity
Acute Toxicity (marine)
Toxicity to Fish Eggs & Fry
River Die-away
90 Day Rate Feeding
Decomposition Products
Subacute Toxicity Tests
Chronic Feeding Studies

B. General Electric, itself or by contract, will conduct research and pilot plant studies to be approved prior to being undertaken by the Commissioner after his consultation with the advisory committee on the removal or treatment of PCBs in supernatant liquids and sediments from Hudson River sludge dredged by the Department and delivered by it to the General Electric premises at Fort Edward. The expenditures for research and pilot plant shall be $400,000, all of which shall be applied to the General Electric $1,000,000

research commitment set forth in paragraph 3(a) of the foregoing agreement. The research and pilot plant studies shall consist of tests of physical, chemical and biological means for the removal and treatment of PCBs.

C. General Electric will conduct research, itself or by contract, as specified by the Commissioner of the effect on the environment of not more than three (3) substances which may be hazardous to the environment and which are to be selected by the Commissioner after his consultation with the advisory committee.

The research expenditures will total $200,000, all of which shall be applied to the General Electric $1,000,000 research commitment set forth in paragraph 3(a) of the foregoing agreement. The research shall consist of chemical and biological tests selected by the Commissioner.

The term "expenditures" shall mean amounts paid for independent contractors, equipment, supplies, standard consulting fees to other G. E. components and actual salary cost plus normal overhead and margins.

MONS 009489

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

IN THE MATTER OF ALLEGED VIOLATIONS OF §§17-0501, 17-0511 and 11-0503 OF THE ENVIRONMENTAL CONSERVATION LAW OF THE STATE OF NEW YORK BY

GENERAL ELECTRIC COMPANY,

Respondent

FINAL ORDER

RECITALS

1. This proceeding was commenced by the Department of Environmental Conservation (Department) on September 8, 1975 by service of a notice of hearing and verified complaint upon Respondent, alleging Respondent's violations of ECL Sections 17-0501, 17-0511 and 11-0503 by reason of its discharges of PCBs into the Hudson River. The Respondent filed a verified answer denying the alleged violations.

2. The New York State Department of Commerce ("Commerce"), Associated Industries of New York Inc. ("Associated") and the Natural Resources Defense Council Inc., the Hudson River Fisherman's Association, Inc., the Hudson River Sloop Restoration, Inc. and the Federated Conservationists of Westchester County, Inc. (collectively "NRDC") were permitted to intervene as parties.

3. The hearings in this proceeding commenced on October 6, 1975 before Abraham D. Sofaer, a duly designated hearing officer. The Department appeared by Philip H. Gitlen, Esq., its counsel; the Respondent appeared by Bond, Schoeneck & King, its attorneys, N. Earle Evans, Jr., Esq., Anthony R. Pittarelli, Esq., John F. Repko, Esq., and Arthur V. Puccini, Esq. of counsel;

Commerce appeared by J. Bruce McDonald, Esq., its former counsel and Michael Curley, Esq., its present counsel; Associated appeared by Costello, Cooney and Fearon, its attorneys, Donald L. Nicholas, Esq., of counsel; and NRDC appeared by Sarah Chasis, Esq. and Rosemary Nichols, Esq., its counsel.

5. An interim opinion was rendered by the Hearing Officer on February 9, 1976. Hearings resumed on April 19, 1976, and the record is now complete. All parties have briefed the issues and the briefs have been submitted to the Hearing Officer.

6. Respondent and the Department have entered into a settlement agreement dated September 8, 1976, in which it was agreed that this order may be made.

7. The Hearing Officer has found that the settlement agreement and this order are in the public interest and has recommended that they be executed by the Commissioner of Environmental Conservation.

NOW, after full consideration and upon all of the proceedings and being duly advised, it is ORDERED that:

I. On and after the date of this Order, the discharges of PCBs into the Hudson River from Respondent's premises and facilities located in Hudson Falls and Fort Edward, New York, which cause or contribute to the contravention of the water quality standards adopted for and assigned to the waters receiving Respondent's discharges, shall constitute violations of this Order as well as violations of the Environmental Conservation Law of the State of New York and the rules and regulations promulgated under it; provided, however, that no action or proceeding for penalties or for any remedy or relief whatsoever, for any such violations shall be instituted by the Department for so long as Respondent adheres to and complies with the provisions, terms and conditions of this Order and proceeds w' [illegible]

its water pollution abatement program in accordance with the provisions, terms and conditions of Schedule A which is attached and incorporated by reference. The Department reserves the right, however, by legal procedures for modification of General Electric's SPDES or NPDES permit and pursuant to applicable provisions of law, to require that General Electric achieve more stringent limitations on the discharge of PCBs, or take any additional action to further reduce the discharges of PCBs from any point source at its premises and facilities located at Hudson Falls and Fort Edward, New York.

II. All reports and submissions required by this Order shall be made to the Director of the Division of Pure Waters of the Department in Albany, New York. All time limits set forth in Schedule A shall commence on the date the conformed copy of this Order is served upon Respondent.

III. To insure compliance with this Order, duly authorized representatives of the Department shall be permitted access to Respondent's premises and facilities for the purpose of inspecting them and for the purpose of making or requiring such tests as may be deemed necessary, including sampling of discharges and receiving waters, to determine the status of compliance with the provisions, terms and conditions of this Order.

IV. Respondent shall not suffer any penalty under any of the provisions of this Order, or be subject to any proceedings or actions for any remedy or relief, if it cannot comply with any requirements of the Order because of an act of God, war, strike, riot, catastrophe, or other condition as to which negligence or willful misconduct on the part of the Respondent was not the proximate cause, provided that the Respondent shall notify the Commissioner in writing within a reasonable time after it obtains knowledge of the facts and requests an appropriate extension or modification of this Order.

V. The provisions, terms and conditions of deemed to bind Respondent, its officers, directors, a successors, and assigns and all persons, firms and co or for it.

VI. By this order, this proceeding is fin terminated on the merits.

Dated: Albany, New York
September 8 ,1976

PETER A. A.
New York Sta
Environmenta

TO: GENERAL ELECTRIC COMPANY
Electronic Components
Business Division
Electronics Park
Syracuse, New York 13201

MONS 009493

SCHEDULE A

1. Respondent, after the date of this Order, shall not discharge a monthly average greater than four hundred fifty-four (454) grams (one (1) pound) of PCBs per day reaching the waters of the Hudson River from all point sources or discharge outlets from its facilities and premises located in Hudson Falls and Fort Edward, New York.

2. Respondent shall, within sixty (60) days after the wastewater treatment facilities described in the Crawford and Russell Report (as hereinafter defined) are installed and made operational, achieve a monthly average discharge of no greater than 0.0022 pounds (one (1) gram) of PCBs per day and a daily maximum discharge no greater than 0.022 pounds (ten (10) grams) of PCBs per day reaching the waters of the Hudson River from all point sources or discharge outlets from its facilities and premises located in Hudson Falls and Fort Edward, New York provided, however, that if Respondent can demonstrate that by the operation of the facilities described in the Crawford and Russell Report, and all reasonable modifications thereto, such effluent levels cannot be achieved, then Respondent shall be permitted to discharge such average and maximum amount of PCBs as are achievable by the operation of said facilities, but, in any event, no greater than a daily maximum discharge of fifty (50) grams of PCBs into the waters of the Hudson River.

3. Respondent shall continue its daily monitoring of the total amount of discharges of PCBs reaching the Hudson River from all point sources or discharge outlets at its premises and facilities located in Hudson Falls and Fort Edward, New York. The general conditions for Respondent's program shall be as follows: (i) hourly samples shall be composited for each discharge for each twenty-four (24) hour period in proportion to flow; (ii) the results of the analysis for PCBs in each composite daily sample for each week shall be submitted to the Department and the United States Environmental Protection Agency, Region II, within one week of the close of each calendar month.

4. Within thirty (30) days of the date of this Order, Respondent shall submit to the Department final plans and specifications for waste treatment and discharge control facilities described in the engineering report prepared by Crawford and Russell, Inc., dated February 20, 1976, and an addendum thereto dated April 7, 1976 (the "Crawford and Russell Report") and after approval of the final plans and specifications install and cause said facilities to be operational within five (5) months of such approval.

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Dated: ATT
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STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

IN THE MATTER OF ALLEGED VIOLATIONS OF §§17-0501, 17-0511 and 11-0503 OF THE ENVIRONMENTAL CONSERVATION LAW OF THE STATE OF NEW YORK BY:

File No. 2833

GENERAL ELECTRIC COMPANY,

Respondent

STIPULATION

IT IS HEREBY STIPULATED by and between the Attorneys for the Respondent and the Counsel for the New York State Department of Environmental Conservation that sufficient facts exist in all of the proceedings to date herein upon which the proposed Order attached hereto may be predicated and that such Order may be made, filed and entered by the Commissioner of Environmental Conservation of the State of New York.

BOND, SCHOENECK & KING
Attorneys for Respondent
General Electric Company

By _____

Dated: September 8 ,1976

Dated: Albany, New York
September 8 ,1976

_____
PHILIP H. GITLEN, Assistant Counsel
New York State Department of
Environmental Conservation

APPENDIX D

Federally Listed or Proposed Endangered or Threatened Species in the Hudson River, Hudson River PCB Reclamation Demonstration Project

Chupp, Norman R. (written communication) July 20, 1981. Letter from Norman R. Chupp, Area Manager, United States Department of the Interior, Fish and Wildlife Service. Harrisburg Area Office, Harrisburg, Pennsylvania, to Stephen Arella, Chief, Environmental Impacts Branch, U.S. Environmental Protection Agency, New York, New York.

Peterson, Allen E. Jr., (written communication) July 24, 1981. Letter from Allen E. Peterson, Jr., Regional Director, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Services, Gloucester, Massachusetts, to Stephen Arella, Chief Environmental Impacts Branch, U.S. Environmental Protection Agency, NY, NY.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
HARRISBURG AREA OFFICE
100 Chestnut Street, Room 310
Harrisburg, Pennsylvania 17101

JUL 20 1981

Mr. Stephen Y. Arella, Chief
Environmental Impacts Branch
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Dear Mr. Arella:

This responds to your letter of July 17, 1981, requesting information on the presence of federally listed or proposed endangered or threatened species within the impact area of the proposed Hudson River PCB Reclamation Demonstration Project, New York.

Except for occasional transient species, no federally listed or proposed species under our jurisdiction are known to exist in the project impact area. Therefore, no further Section 7 consultation under the Endangered Species Act is required with the Fish and Wildlife Service (FWS). Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered species under our jurisdiction. It does not address other FWS concerns under the Fish and Wildlife Coordination Act or other legislation.

A compilation of federally listed endangered and threatened species in New York is enclosed for your information. Please note that the osprey is not listed. Because the shortnose sturgeon is not under our jurisdiction, requests for information should be directed to: Mr. Douglas W. Beach, National Marine Fisheries Service, 7 Pleasant Street, Gloucester, Massachusetts 01930.

Sincerely,

Norman R. Chupp
Area Manager

Enclosure

MONS 009499

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Federal Building
14 Elm Street
Gloucester, Massachusetts 01930

JUL 24 1981

Mr. Stephen Arella
Chief, Environmental Impacts Branch
U.S. Environmental Protection Agency
Room #400
26 Federal Plaza
New York, New York 10278

Dear Mr. Arella:

This is in response to your July 16, 1981, request for evaluation of the adequacy of statements made in your Draft Environmental Impact Statement (DEIS) on the potential effects of the Hudson River PCB Reclamation Demonstration Project on the endangered shortnose sturgeon (Acipenser brevirostrum).

We have reviewed the DEIS and agree that shortnose sturgeon currently encounter, and are likely to accumulate high levels of chemical pollutants, including PCB's, from the Hudson River. We also concur with the statement in your letter that shortnose sturgeon will ultimately benefit from the proposed action, provided dredging does not take place at a time and location where either adults spawn or larval and juvenile stages congregate to feed.

The current knowledge of habitat usage by shortnose sturgeon in the Hudson River indicates that these essential areas are all located below the "hot spots" identified for dredging in the DEIS. Therefore, we believe that the proposed project will have no adverse effect on shortnose sturgeon in the Hudson River and that further formal Section 7 consultation on this matter is unnecessary at this time. Should project plans change or new information become available on the temporal and spatial distribution of the species that would alter the basis for our decision, consultation should be continued.

Sincerely,

Marvin F. Bowman

for Allen E. Peterson, Jr.
Regional Director

MONS 009500

APPENDIX E

Concentration and Public Health Significance of Cesium 137 in the Proposed PCB Containment Facility

The material in Appendix E was prepared by WAPORA, Inc.

APPENDIX E

CONCENTRATION AND PUBLIC HEALTH SIGNIFICANCE OF CESIUM 137 IN THE PROPOSED PCB CONTAINMENT FACILITY

The trace amounts of radioactive fallout products that will be present in the containment site will not have any public health significance. The radioactive materials will be present at extremely low concentrations and will be dispersed in the contained sediments. In addition, radioactive emissions that are produced will be largely absorbed by the clay cap on the site. This can be shown by estimating the amount of cesium that will be present at the site and the amount and type of radiation that will be emitted.

The amount of cesium that would be present in the site under the reduced scale program can be roughly estimated as follows:

a. Volume of sediment on the site = 0.5×10^6 cu yds

Sediments will be dredged to approximately 3 ft deep, but cesium 137 is generally found at sediment depths of less than 2 ft. Only the volume of material actually containing cesium 137 need be considered (Sanders, PCB Settlement Advisory Committee, June 26, 1981).

b. Mass of Sediment per unit volume = 0.8×10^6 g/cu yd

This is based on a specific gravity of 2.56 for quartz (SiO_2), which is the main type of material comprising the dredge spoils. Because the volume estimates are for wet sediment, the water content of the sediment must be taken into account, and the actual mass is much less (65 lbs/cu ft) (Sanders, PCB Settlement Advisory Committee, June 26, 1981).

c. Approximate concentration of cesium 137 = 0.3 picocuries (pci) per gram

A mean value of 0.3 pci per gram of sediment is a reasonable estimate of the concentration of cesium present, based on previous analyses (Sanders, PCB Settlement Advisory Committee , June 26, 1981).

d. Thus, the amount of cesium 137 that would be placed in the containment site is:

$$0.3 \text{ pci/g} \times 0.8 \times 10^{6} \text{ g/cu yd} \times 0.5 \times 10^{6} \text{ cu yd} =$$
$$1.2 \times 10^{11} \text{ pci} = 0.12 \text{ curies (ci)}$$

The public health significance of 0.12 ci of cesium 137 in the containment site can be shown as follows:

a. Radioactive decay of cesium 137

Cesium 137 has a half-life of approximately 30 years and decays yielding:

1. beta particles with maximum energy of 1.176 million electron volts (mev) (7 percent of the time) and 0.514 mev (93 percent of the time).

2. two moderate energy electrons

3. gamma ray with eneray of 0.662 mev (85 percent of the time).

b. Estimate of the exposure of surrounding area to the radioactive decay products of cesium 137

For ease of computations, all the activity will be assumed to be concentrated at a single point, closest to the nearest house. Actually, the activity will be spread throughout the site, thus reducing the exposure. The

average background exposure due to natural radioactivity is 125 millirems (mrem)/year (yr), with a range of 100 to 250 mrem/yr (United States Department of Health, Education and Welfare [USDHEW, 1970]).

1. Beta Particles - As a conservative estimate, only the highest energy particle (1.176 mev) will be considered, even though it is generated only 7 percent of the time. The range for beta of this energy would be 460 mg/sq cm (USDHEW, 1970). The density of air is 1.293×10^{-3} g/cu cm. The distance (d_a) the particles would travel in air is:

$$d_a = 460 \text{ mg/sq cm} \times 1/1.293 \text{ mg/cu cm} = 356 \text{ cm or } 3.6 \text{ m}$$

Since the cesium is found in the sediments with a density of approximately 2.56 g/cu cm, the distance (d_s) that the particles would travel in the sediment is :

$$d_s = 460 \text{ mg/cu cm} \times \frac{1}{2.56 \times 10^3 \text{ mg/cu cm}} = 0.18 \text{ cm}$$

Thus, the beta particles will not be able to penetrate the clay cap and be emitted from the containment site. Similarly, the moderate energy electrons would also be confined to the site, posing no public health concern.

2. Gamma Emission - For an unshielded point source, using the $\sqrt{\ }$ constant method, the dose rate (DR) is given by equation (1) (USDHEW, 1970):

(1) $DR = \sqrt{\ } A/r^2$

where $\sqrt{\ }$ is the ray constant which equals 3.3 $\frac{R \ m^2}{hr \ ci}$,