

MANAGEMENT OF TOXIC CONTAMINATION

PROBLEMS

*Unsafe seafood
Adverse impacts on port operations
Damage to commercial and recreational fisheries
Damage to other coastal species*

SOURCES

*Municipal discharges
Direct/indirect industrial discharges
Combined sewer overflows
Storm water
Contaminated sediments
Atmospheric deposition
Chemical/oil spills
Tributary inputs
Solid/hazardous waste sites
Other non-point sources*

VISION

To establish and maintain a healthy and productive Harbor/Bight ecosystem with full beneficial uses.

GOALS

*To restore and maintain a healthy and productive Harbor/Bight ecosystem, with no adverse ecological effects due to toxic contamination.
To ensure fish, crustacea, and shellfish caught in the Harbor/Bight are safe for unrestricted human consumption.
To ensure that dredged sediments in the Harbor are safe for unrestricted ocean disposal.*

OBJECTIVES

To reduce continuing inputs of toxic chemicals to the Harbor/Bight system:

- T-1 Reduce municipal discharges of chemicals of concern.*
- T-2 Reduce industrial discharges of chemicals of concern.*
- T-3 Minimize the discharge of toxic chemicals from CSOs, storm water, and non-point sources (see section on Rainfall-Induced Discharges).*
- T-4 Reduce air emissions of chemicals of concern.*
- T-5 Remediate identified solid and hazardous waste sites.*
- T-6 Track-down and clean-up other sources of chemicals of concern.*
- T-7 Improve chemical/oil spill response and prevention.*
- T-8 Focus pollution prevention activities on chemicals of concern.*

To remediate selected contaminated sediments:

- T-9 Identify and remediate selected contaminated sediments.*

To minimize human health risks due to the consumption of fish, crustacea, and shellfish caught in the Harbor/Bight:

- T-10 Establish consistent methodology to assess risks and improve communication of fish advisories.*

To better understand the toxic contamination problem and take additional management actions as more is learned:

- T-11 Review and develop criteria for copper and other priority chemicals.*
- T-12 Assess ambient levels, loadings, and effects of chemicals.*
- T-13 Develop mass balances for metals and organic chemicals.*

THE PROBLEMS

Overview

Toxic contaminants include both man-made and naturally occurring substances that can cause adverse ecosystem or human health effects when exceeding certain concentrations.

Prior to the passage of the Clean Water Act (CWA) in 1972, pollution of the Harbor/Bight was worse than today, based in part on the largely uncontrolled release of toxic substances to the environment. Since then, significant progress has been made in abating toxic and other forms of contamination. For example, as a result of major investments in wastewater treatment infrastructure, discharges of raw sewage during dry weather periods have been virtually eliminated, and most municipal and industrial wastewater treatment plants are in compliance with technology-based effluent limits. Also, under laws other than the CWA, certain toxic substances have been banned or reduced.

Despite these improvements, there is still a toxic contamination problem in the Harbor/Bight. HEP has characterized this problem in two ways:

First, there is direct evidence, from field and laboratory studies, of the adverse effects of toxic contamination on the Harbor/Bight ecosystem, as explained below. This is an **ecosystem** or **effects-based** approach to characterizing toxic contamination.

Second, levels of a number of chemicals in the water, sediments, and tissues of edible fish, crustacea, and shellfish in the Harbor/Bight exceed the criteria and standards developed by government agencies to protect marine life, wildlife, and human health. This **chemical-specific** approach, as detailed in the following text box, is the principal basis for regulating chemical contamination.

Toxic contamination also interferes with dredging and dredged material disposal in the Harbor/Bight because the sediments have accumulated contaminants from discharges of toxic chemicals.

THE SIGNIFICANCE OF CRITERIA AND STANDARDS

Numeric criteria and standards, including water quality criteria and standards, fish tissue action levels and advisory levels, sediment quality criteria, and other criteria are designed as surrogates for direct measurement of adverse pollution effects.

Criteria and standards designed to protect marine life indicate the maximum concentration of a substance considered safe to protect sensitive marine organisms from adverse toxic effects. For example, at concentrations of a substance exceeding criteria or standards, sensitive organisms may not be able to reproduce successfully, or may be killed by exposure to the water or sediments.

Concentrations of a substance exceeding criteria or standards designed to protect wildlife or human health indicate unacceptable health risks to wildlife or humans consuming fish, shellfish, or crustacea caught in the waterbody. These criteria and standards are usually designed to be compared with concentrations measured in the tissues of edible species, but may be extrapolated to water or sediments. For example, some USEPA water quality criteria are based on protection of humans from a 10^{-6} (one in a million) lifetime risk of cancer due to consumption of seafood.

In general, toxic contamination is worse in the Harbor than in the Bight. Within the Harbor, Newark Bay, its tributaries, and the Kills have the most contamination. Contamination is worse in inner Harbor areas and tributaries Harbor-wide, than in the open-water areas.

Ecosystem Approach

Although specific indicators of the adverse ecological effects of toxic chemicals exhibit the variability typical of all environmental indicators, there is significant evidence of current and past problems in the Harbor/Bight:

- È Sediments in much of the Harbor and some areas of the Bight are toxic to a variety of organisms in laboratory tests.
- È Ambient waters of the Harbor are sometimes toxic to sensitive organisms in laboratory tests.
- È In the Harbor/Bight region, reproductive impairment in fish-eating birds has historically been caused by DDT, a pesticide. Other effects, which have not been conclusively shown to be caused by toxic contamination, but are believed to be consistent with toxic contamination, occur in the Harbor and/or Bight. For example, some bird species nesting in the Kills have had decreased reproductive success in recent years; and some fish in the Harbor/Bight have exhibited fin rot (observed in winter flounder), certain types of tumors (many tomcod develop liver cancer), developmental abnormalities, behavioral impairments, and altered life histories (observed in mummichogs).
- È Preliminary observations suggest that the community of bottom-dwelling organisms (benthos) is degraded in areas of the Harbor. This may be due to toxic contamination and/or other stressors such as hypoxia.

However, effects of toxic contamination on the Harbor/Bight ecosystem are not well understood.

One difficulty with using the ecosystem approach to control chemical contamination is that a linkage must be established between the observed effect and the level of contamination. Where this has been established, HEP's Plan includes actions to address the contamination. Other HEP actions call for ongoing studies to better characterize toxic effects and the chemicals responsible for such effects. Even in the absence of firm linkages between observed effects and levels of contamination, the ecosystem approach is an indispensable check on the effectiveness of the chemical-specific approach, which lacks some numeric criteria and does not consider mixtures of chemicals. Restoring and maintaining a healthy ecosystem, with no adverse effects due to toxic substances, is the ultimate measure of success.

Chemical-Specific Approach

Perhaps the most tangible result of toxic contamination in the Harbor/Bight is that some fish, crustacea, and shellfish caught in these waters are considered unsafe for human consumption:

- È New York and New Jersey have advised people to limit or avoid the consumption of several species of fish and crustacea caught in waters of the Harbor/Bight and, in some cases, have prohibited the sale, consumption, and/or harvesting of fish, crustacea, and shellfish due to toxic contamination, especially PCBs and dioxin. A complete list of New York and New Jersey fishing advisories for the Estuary is provided in "The State of the Harbor and Bight", Figures 3 and 4.
- È New York has closed its commercial fishery for striped bass in the Harbor, and in parts of the Bight, due to concerns about PCB contamination.

HEP has worked to define specific chemicals of concern in water, biota tissue, and/or sediments of the Harbor/Bight. An initial list of chemicals of concern, developed using historical data, included approximately 50 chemicals. HEP has revised this list by reviewing available new data, considering data quality, the scope and magnitude of criteria exceedances, and whether data are representative of current conditions. The revised list of chemicals of concern is shown in Table 6(t); HEP believes these chemicals are problems for the following reasons:

Metals

Mercury

- Exceeds the water quality standard virtually Harbor-wide.
- Expected to exceed state advisory levels in fish tissue.
- Levels in sediments exceed the NOAA Effects Range - Median Value (i.e., the level expected to cause adverse effects in biota) at sampling sites throughout the Harbor; and exceed this level by ten times or more at sampling sites in the Hackensack River, Arthur Kill, and Newark Bay.

Table 6(t). Chemicals of Concern in the NY-NJ Harbor Estuary and Bight¹

CHEMICAL NAME	MEDIUM:		
	WATER	BIOTA	SEDIMENTS
Metals:			
Arsenic		"	
Cadmium		"	
Copper	#		
Mercury	!		"
PCBs	!	!	"
Dioxin		!	"
PAHs	!	"	"
Pesticides:			
DDT & metabolites		"	
chlordane		!	
dieldrin		"	
heptachlor		"	
heptachlor epoxide		"	
hexachlorobenzene		"	
gamma-BHC		"	
Volatile organic compounds:			
tetrachloroethylene	!		

- " = Exceedances of unenforceable criteria (i.e., published USEPA criteria or other criteria or screening values such as USEPA fish tissue concentrations and NOAA Effects Range Values).
- ! = Exceedances of enforceable standards (i.e., state water quality standards, New York State water quality guidance values, USEPA Toxics Rule criteria, and U.S. FDA action levels and state advisory levels for fish tissue).
- # = Predicted by mathematical modeling to sometimes exceed enforceable standards.

¹ It is important to note that inclusion of a chemical in this table, while indicating that management attention is necessary, does not reflect the scope and magnitude of criteria exceedances; data may not be complete for all media. Also the technical validity of some criteria are questionable. See text for further details.

Copper

- Predicted to sometimes exceed the chronic water quality standard in portions of the Harbor (see Table 7(t)).

Cadmium

- Levels have caused New York State to advise limited consumption of 1) blue claw crabs caught in the Hudson River from Troy Dam, south to the Lower Bay, and 2) hepatopancreas ("tomalley") of lobsters caught throughout the Harbor.

Arsenic

- Levels in mussel tissue exceed the tissue concentration on which USEPA water quality criteria for human health protection are based, by roughly 1,000-10,000 times, at several sampling sites throughout the Harbor. (Note: USEPA is reviewing the validity of this water quality criterion.)

PCBs

- Advisories exist on the consumption of roughly 16 edible species in the Harbor and/or Bight, and commercial fishing ban is in place on striped bass.
- Levels in sediments exceed the NOAA Effects Range - Median Value at sampling sites throughout the Harbor; exceed this level by five times or more at sampling sites in the Newark Bay, Passaic River, Arthur Kill, and Raritan Bay; and exceed New York State sediment quality guidance values.
- Levels in water in tributaries to the Harbor have been found to exceed the water quality standard for protection of human health by roughly 1,000 times.

Dioxin

- New Jersey advises against consuming any fish, crustacea, or shellfish caught in the tidal Passaic River; also prohibits sale or consumption of several species throughout Newark Bay Complex due to dioxin contamination.
- Levels in tissues of at least eight edible species sometimes exceed the New York State advisory level in other areas of the Harbor.
- Levels in sediments in portions of the Newark Bay Complex limit options for disposal of contaminated dredged materials.

- Levels in sediments exceed New York State sediment quality guidance values at sampling sites throughout the Harbor.

PAHs

- Levels of total PAH and several individual PAHs at sediment sampling sites in many inner Harbor areas and tributaries exceed the NOAA Effects Range - Median Value, often by five to ten times or more; attributed to discharges of petroleum and related materials.
- Recent NOAA studies found a moderate positive correlation among levels of PAHs in Harbor/Bight sediments and toxic responses in a variety of laboratory test organisms.
- Levels of several PAHs in mussel tissue at several sampling sites throughout the Harbor sometimes exceed tissue concentrations on which USEPA water quality criteria for human health protection are based.
- Levels of four PAHs -- benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and benzo(k)fluoranthene -- sometimes exceed water quality standards in Jamaica Bay.

Pesticides

- In various edible species, tissue levels of all the pesticides shown in Table 6(t) greatly exceed tissue concentrations on which USEPA water quality criteria for human health protection are based.

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- Levels in striped bass and American eel sometimes exceed FDA advisory levels at locations throughout the Harbor.

VOCs

tetrachloroethylene (Perc)

- Levels sometimes exceed the New York State water quality guidance value for protection of human health at many locations in the Harbor.

HEP expects that management actions will be required to control loadings of these chemicals to the system, remediate selected contaminated sediments, and/or protect the public from unacceptable health risks due to consumption of contaminated seafood. Results of additional studies, including some HEP studies, will be

available soon, and HEP will use this information to further revise and update the list of chemicals of concern. Other limitations on our ability to draw conclusions regarding chemicals of concern are the lack of criteria and doubts about the technical validity of criteria. In particular, regulatory criteria for sediment quality have not been established nationally, or for the Harbor or Bight. However, USEPA has recently proposed national sediment quality criteria for five substances.

HEP has focused significant effort on a better understanding of water quality problems due to metals. Section 304 (l) of the Clean Water Act of 1987 requires the development of Individual Control Strategies (i.e., water quality-based permit limits) for substances which exceed water quality standards due to point source discharges. For the Harbor, 304 (l) investigations were conducted under the auspices of HEP. Based on indications, from the historical data base, that levels of metals were exceeding water quality criteria due to point sources, HEP supported studies to characterize the levels of the following metals in waters of the Harbor/Bight: copper, mercury, lead, nickel, zinc, cadmium, silver, and arsenic. Water samples were analyzed using "clean" trace metal techniques. Results of these studies indicated significantly lower metal concentrations compared to the historical data. Differences were attributed, in large part, to sample contamination within the earlier data base and the differing laboratory procedures used to collect the two sets of data. Exceedances of water quality criteria were found only for mercury. Subsequent water quality modeling analyses predicted exceedances of chronic water quality criteria for three additional metals: copper, nickel, and lead. For nickel and lead, the predicted exceedances were based on

numeric criteria expressed in terms of total recoverable metal, established under the National Toxics Rule. After the modeling analyses were completed, however, USEPA amended the National Toxics Rule. The result of this action was the promulgation of water quality criteria in New Jersey based on dissolved metal. Thus, exceedances of nickel and lead criteria need to be reassessed. This is being done under a second phase (Phase II) of monitoring and modeling studies.

The data and modeled predictions enabled HEP to assess criteria exceedances on a waterbody-specific scale (Table 7(t)). USEPA and the States of New York and New Jersey, under the auspices of HEP, are using this information to develop total maximum daily loads (TMDLs)¹, and waste load allocations (WLAs) and load allocations (LAs), for the water quality limiting metals, as discussed below.

Table 7(t). Waterbodies Needing TMDLs

Waterbody	Copper	Mercury
Hudson River (MP 50 to 0)		X
Inner Harbor (Battery to Narrows)		X
Outer Harbor (Narrows to Ocean)		X
Arthur Kill/Kill Van Kull	X	X
East R./Harlem R.		X
Jamaica Bay		X
Raritan River/Bay	X	X
Hackensack River	X	X
Passaic River	X	X
Newark Bay	X	X

¹ A TMDL is the maximum allowable loading of a pollutant to a waterbody that will meet water quality standards. WLAs and LAs represent the portions of the TMDL allocated to the point and non-point source loads, respectively.

For copper, the analyses shown in Tables 6(t) and 7(t) are based on a proposed site-specific chronic criterion of 5.6 µg/l dissolved copper, developed under the auspices of HEP.

In New York and New Jersey, discharge requirements for municipal and direct industrial discharges include both chemical-specific and Whole Effluent Toxicity (WET) limitations. Chemical-specific limitations are imposed to provide compliance with corresponding chemical numeric criteria. WET limitations are imposed to preclude significant acute toxicity in the discharges after allowable mixing with receiving waters. The WET limitations address the effects of mixtures of chemicals in discharges.

SOURCES CONTRIBUTING TO THE PROBLEMS

Metals

The studies mentioned above have improved our understanding of the loads of metals to the Harbor/Bight and their sources. In order to develop TMDLs/WLAs/LAs for those metals which exceed water quality criteria, the data collected were used to generate mass balances, derived from a steady-state toxics model. The mass balances relate loadings of metals from all sources to the levels of these metals in water and sediment. Loadings for all the metals, except mercury, are fairly well established (Figure 5). Loadings of the metals in the Harbor complex are shown for conditions of high and low riverine flow. Because of the large amount of dilution attributed to fresh water inflows from the Hudson River and other tributaries, low flow conditions in these rivers become the critical condition for establishment of TMDLs for metals. Harbor-wide, important sources of metals, other than mercury, are: municipal and industrial point sources, atmospheric deposition, tributaries, storm water, and CSOs. In the New Jersey tributaries to the Harbor, however, the Phase I TMDL model indicates that CSOs and storm water contribute a greater load of most of the metals than municipal and industrial point sources. This must be confirmed through a Phase II TMDL monitoring and modeling effort (see Action T-1.1 below). Phase II efforts will also reassess criteria exceedances for

nickel and lead based on criteria for dissolved metal, and develop TMDLs as necessary.

Loads for mercury require further analysis. In developing the mass balances for mercury, it was determined that most of the load is from a source not identified during the HEP monitoring effort (Figure 5). USEPA believes much of this source is attributable to atmospheric deposition. A longer term effort, including further monitoring to assess mercury partitioning and fate, reassess loads, and develop appropriate models, will be required to fully understand mercury loadings.

NYCDEP has documented decreasing trends in loadings of several metals from its sewage treatment plants from 1985 to 1993. Over this period, decreases in effluent loadings of metals including cadmium (88%) and nickel (84%) are likely attributable primarily to implementation of the industrial pretreatment program (IPP). Decreases over this period in effluent loadings of other metals, including copper (79%), lead (81%), and zinc (68%), are likely attributable both to implementation of IPP and corrosion control in the City's water supply system. Similar decreases have been documented Harbor-wide and are likely attributable, in part, to implementation of IPP and other actions in New York and New Jersey. The observed decreases may also be attributable, in part, to implementation of "clean" trace metal techniques (i.e., sampling and analytical procedures in which extreme care is used to minimize sample contamination), which began in 1991. In particular, mercury and arsenic had the most significant decreases in loading and variability when comparing data from the post-1991 period with earlier periods.

It is noteworthy that, in response to HEP concerns, the eleven municipal sewerage authorities in New Jersey which discharge to the Harbor joined to form the New Jersey Harbor Dischargers Group (NJHDG). NJHDG is conducting the studies necessary to support development of Phase II TMDLs. NJHDG is working cooperatively to support implementation of several actions in this Plan, including "Track-down and Clean-up" (see Action T-1.2 below), and development of a

Figure 5. Sources of Several Metals to the Harbor under Conditions of High and Low Riverine Flow

system-wide eutrophication model (see Action N-4.1 below).

Organic Chemicals

HEP has sponsored studies to estimate pollutant loads, including loads of toxic organic chemicals, to the Harbor/Bight using existing data. These studies concluded that, except for PCBs, existing data are insufficient to assess the relative importance of various source categories, even on a basin-wide scale. As shown in Figure 6, the relative significance of current sources of total PCBs to the Harbor was estimated as tributary inputs (50%), municipal point sources (22%), storm water (15%), CSOs (10%), atmospheric deposition (3%), and landfill

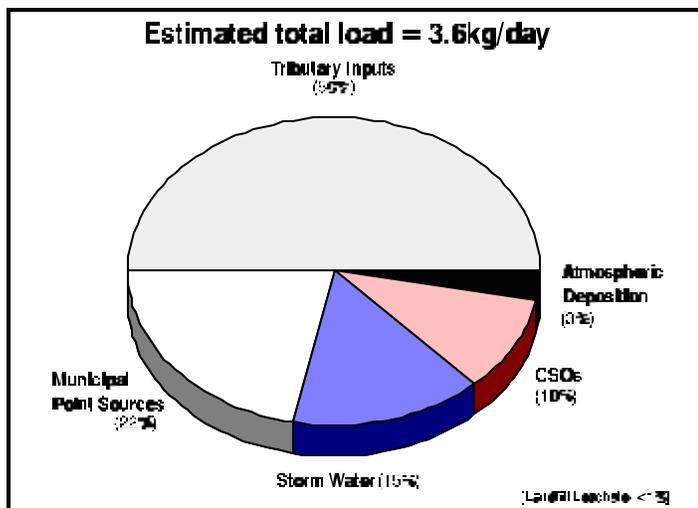


Figure 6. Estimated Sources of PCBs to the Harbor

leachate (< 1%). The data were considered inadequate to assess loads on smaller scales.

A preliminary mass balance and food chain model for PCBs indicated that continuing discharges of PCBs to the lower estuary are significant in causing PCB levels in striped bass to exceed the FDA standard. However, the estimates of continuing PCB loadings used in the model were based on limited data. Therefore, USEPA recently conducted a screening-level analysis of PCB levels in STP discharges to the Harbor. Twenty-four-hour composite effluent samples were collected during dry weather at five STPs discharging to the Harbor, representing about half the average STP discharge volume to the Harbor. Composite wet weather

influent samples were also collected during single storm events at four of these STPs. Water samples were taken at four major tributaries to the Harbor. Total PCB concentrations in the STP effluent ranged from roughly 10 to 100 parts per trillion; total PCB concentrations in STP wet weather influent ranged from roughly 55 to 400 parts per trillion; and total PCB concentrations in the tributaries ranged from roughly 12 to 25 parts per trillion.

The study confirmed that STPs currently discharge PCBs at levels consistent with the earlier estimates. This information supports the need to address continuing discharges of PCBs and to improve the mass balance. As the next step in addressing continuing discharges of PCBs, USEPA, using Clean Water Act Section 308 letters, required municipal dischargers in the Harbor area to identify the levels of PCBs being discharged (see Action T-1.2 below). HEP has begun a modeling effort to improve the mass balance (see Action T-13.3 below).

Sources of other chemicals to the Harbor/Bight are understood only qualitatively. The most significant source of dioxin in causing exceedances of criteria may be sediment flux. In particular, there is a "hot spot" in the lower Passaic River due to past discharges. However, possible continuing discharges of dioxin in the Harbor area must be further investigated. Our current knowledge indicates numerous potential sources of dioxin (including incinerators, other high-temperature industrial processes, other chemical industry sources, and the wood and paper industry). Recent studies which analyze the mixtures of various congeners of dioxin present in sediments of the Newark Bay Complex also indicate multiple sources.

To begin assessing continuing discharges of dioxin, USEPA, using the same Clean Water Act Section 308 letters noted above, required nine STPs discharging to the Newark Bay Complex to sample their influent and effluent for dioxin. Sampling was done during two dry weather and two wet weather periods. Analysis was conducted for the 2,3,7,8-TCDD congener. Data reports were recently submitted.

Dioxin was not detected in any samples at the reporting limit required in the Section 308 letters (5 parts per trillion). Recent improvements in analytical techniques, however, allowed quantification at much lower levels (1-100 parts per quadrillion). Even at these detection limits, dioxin was quantified in only one of the 54 samples analyzed, a wet weather influent sample at 45 parts per quadrillion.

Data are not available, however, to assess the environmental significance of these results (i.e., whether municipal discharges contribute significantly to exceedances of criteria for dioxin). There is no quantitative information on loadings of dioxin to the Harbor, other than the value reported above, and currently no model to assess bioaccumulation and fate (i.e., mass balance) of 2,3,7,8-TCDD and other dioxin congeners. HEP has begun an effort to develop such a model (see Action T-13.3 below).

Sources of PAHs to the environment are pervasive. PAHs are present in large quantities in petroleum and related materials and are used in the manufacture of materials such as dyes, insecticides, solvents, and asphalt. Higher molecular weight (heavier) PAHs (including fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene, etc.) are products of combustion. Their presence generally indicates contamination by atmospheric deposition. The lower molecular weight (lighter) PAHs (including naphthalene and fluorene) generally derive from unburned petroleum sources. Based on NYCDEP information showing high levels of PAHs in Jamaica Bay tributaries, and in CSO discharges and CSO sediment mounds throughout the City, CSOs and storm water discharges may be significant sources of PAHs Harbor-wide. There is, however, a need to collect data on levels of continuing discharges of PAHs Harbor-wide. These sources result from runoff and improper disposal of waste oil. In addition, direct spillage of petroleum may also contribute significant amounts of PAHs; large spills can have particularly significant short-term impacts. Petroleum spillage from petroleum transfer operations, shipping, and boat engines also contribute PAHs to the Harbor/Bight. In addition, direct and indirect industrial discharges

may contribute significant loads of PAHs. PAHs in sediments of the Bight tend to be the heavier PAHs, indicating that atmospheric deposition may be the principal source.

Tetrachloroethylene, also known as Perc, is a volatile organic chemical used as a solvent in dry cleaning and other industries. It has been detected in New York City STP effluents.

Additional monitoring and model development will be required to further refine the load estimates for PCBs, develop comparable estimates for other organic chemicals, and develop mass balances.

THE PLAN TO SOLVE THE PROBLEMS

The goals of HEP's toxic contamination management plan are to:

- Ë Restore and maintain a healthy and productive ecosystem, with no adverse ecological effects due to toxic contamination.
- Ë Ensure fish, crustacea, and shellfish caught in the Harbor/ Bight are safe for unrestricted human consumption.
- Ë Ensure that dredged sediments in the Harbor are safe for unrestricted ocean disposal.

In order to achieve these goals, HEP's toxics management plan includes objectives to:

- Ë Reduce continuing inputs of toxic chemicals to the Harbor/Bight system (see Objectives T-1 through T-8 below).
- Ë Remediate selected contaminated sediments (see Objective T-9 below).
- Ë Minimize human health risks due to the consumption of fish, crustacea, and shellfish caught in the Harbor/Bight (see Objective T-10 below).
- Ë Better understand the toxic contamination problem and take additional management actions as more is learned (see Objectives T-11 through T-13 below).

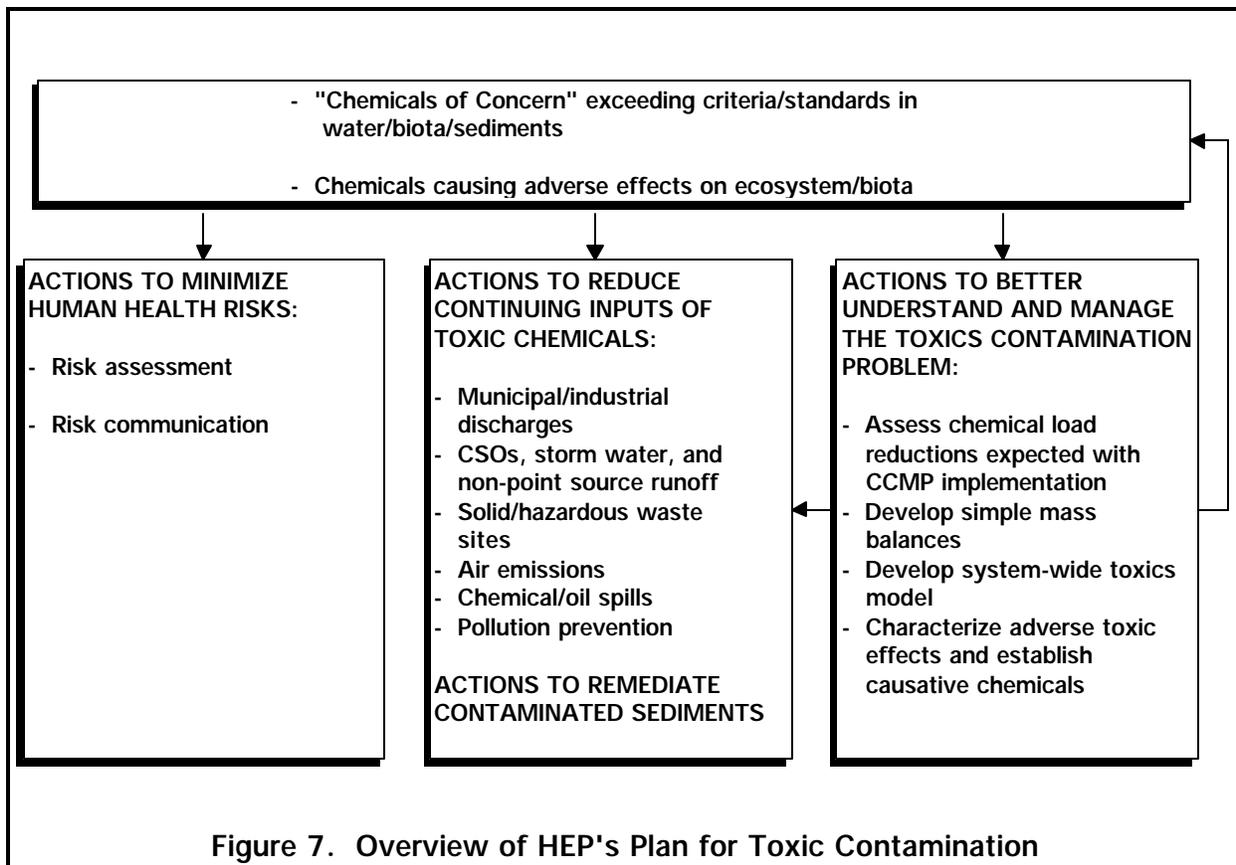


Figure 7. Overview of HEP's Plan for Toxic Contamination

The Harbor Estuary Program's approach to address the toxic contamination problem is illustrated schematically in Figure 7. HEP's Plan calls for actions now to reduce continuing inputs of toxic chemicals and remediate contaminated sediments, while continuing work to understand the contamination problem. The improved understanding gained will be used to develop additional actions to reduce contamination. HEP's Plan also includes actions to minimize human health risks associated with consumption of seafood contaminated with toxic chemicals.

COMMITMENTS AND RECOMMENDATIONS

Actions to Reduce Continuing Inputs of Toxic Chemicals

OBJECTIVE T-1 *Reduce municipal discharges of chemicals of concern*

Under the Clean Water Act, dischargers are required to meet secondary treatment requirements. Currently, only one STP in the Harbor, the Newtown Creek STP in New York City, is not meeting these requirements; however, a commitment is in place for this facility. For details, see the section on Management of Nutrients and Organic Enrichment.

It is expected that full implementation of secondary treatment will reduce discharges of many of the toxic chemicals of concern. However, this will not be sufficient to eliminate exceedances of water quality standards, restore beneficial uses, or eliminate other adverse ecosystem impacts due to municipal discharges of toxic chemicals.

ACTION T-1.1

Control of Discharges of Metals

Results of HEP-sponsored studies to define water quality-limiting¹ metals indicate that water quality-based control of discharges of two metals (copper and mercury) is necessary. In order to control metals discharges, USEPA, NYSDEC, and NJDEP will implement a phased TMDL approach for water quality-limiting metals by incorporating limits and additional requirements into draft permits by December 1995.

- Phase I permit limits for municipal discharges will be based on existing effluent quality (EEQ):
 - Harbor-wide for mercury.
 - In Newark Bay, Kills, Raritan Bay/River, Passaic River, and Hackensack River for copper.
- Phase II may include more stringent permit limits for copper, and limits for nickel and lead, based on additional data collection and modeling (see Action T-13.1 below). These studies are being conducted by the NJHDG.
- To prepare for possible reductions in metals loadings, based on the additional data collection and modeling, dischargers were required to conduct studies to evaluate the effectiveness of pretreatment, treatment optimization, corrosion control, and pollution prevention in reducing loadings of metals. Dischargers have submitted the required reports.
 - In New York, NYCDEP conducted the required studies under the SPDES permit process.

- In New Jersey, USEPA required the studies under CWA Section 308 letters (see Table 8(t) below).

ACTION T-1.2

"Track-down and Clean-up" of Significant Discharges of Organic Chemicals of Concern
NYCDEP, NJHDG, and other dischargers in the Harbor area, working with USEPA, NYSDEC, and NJDEP, under the auspices of HEP, will identify, track-down, and abate significant discharges of organic chemicals of concern. USEPA, in coordination with the States and dischargers, has already taken steps to begin implementation of this program.

- HEP will coordinate development of this program, including identifying the chemicals to be included, the dischargers to be included, and the monitoring techniques and sampling methodologies to be used.
- HEP will convene seminars to develop the program and assist technology transfer.

An overview of the Track-down and Clean-up program for discharges is presented on the following page. Note that Objective T-6 below describes a similar program where the "track-down" begins with monitoring conducted in the ambient environment (e.g., Harbor tributaries).

- As discussed previously in this section, there is clear evidence that PCBs exceed fish tissue action levels in the Harbor. Furthermore, as discussed previously, USEPA has already collected preliminary data confirming that municipal discharges of PCBs in the Harbor are significant.
 - Therefore, using CWA Section 308 letters, USEPA required municipal dischargers throughout the Harbor (see Table 8(t)) to identify the levels of PCBs in their discharges,

¹ The concentration of a substance in the water column exceeds, or is predicted by mathematical modeling to exceed, water quality standards.

"TRACK-DOWN AND CLEAN-UP" OF SIGNIFICANT DISCHARGES OF ORGANIC CHEMICALS OF CONCERN

This provides an overview of the Track-down and Clean-up program for discharges. Please refer to Action T-1.2 text and Table 13(ts) below, for specific information on program status and implementation.

Selection of Chemicals to be Considered for Track-down and Clean-up

USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP, will review available ambient data, criteria and testing methods, and results, to determine, by mutual agreement, which chemicals should be considered for Track-down and Clean-up. Chemicals to be considered for Track-down and Clean-up must be organic chemicals documented to cause environmental problems in the Harbor and/or Bight, i.e., the chemical:

- exceeds enforceable water quality standards, or
- exceeds USFDA fish tissue action levels or state advisory levels, or
- makes recently deposited sediment unsuitable for unrestricted ocean disposal, or
- causes documented adverse impacts on biota (including benthic biota).

HEP's program for Track-down and Clean-up of significant discharges is focusing on organic chemicals of concern, not metals. This is because municipal and industrial dischargers in the Harbor are subject to requirements for water quality-based control of the water quality-limiting metals (see Action T-1.1 below). Municipal and industrial discharges of mercury in the Harbor are believed to contribute only a small portion of the total mercury load (see Figure 5). However, note that there is a large unidentified source of mercury. Therefore, mercury will be considered for ambient Track-down and Clean-up (see Objective T-6 below). Also note that as additional information becomes available indicating that additional chemicals are of concern, or that municipal and industrial discharges of known chemicals of concern are significant, USEPA, the states, and the dischargers, under the auspices of HEP, will consider augmenting the Track-down and Clean-up program.

Identification of Significant Discharges

For those chemicals meeting any of the above criteria, dischargers, as appropriate, will screen their discharges using sensitive monitoring techniques (e.g., see below); dischargers will initiate the screening if there is a reasonable expectation that they are discharging the chemical(s) in question at elevated levels. Upon examination of the data, USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and others, under the auspices of HEP, will determine which, if any, discharges are significantly elevated and have reasonable potential to contribute to a violation of the applicable criteria.

Track-down and Abatement of Significant Discharges

Table 8(t). POTWs in NY-NJ Harbor Subject to USEPA CWA Section 308 Reporting Requirements for Metals, PCBs, and Dioxin (see text for details).

POTW	REQUIREMENT		
	Metals Evaluation	PCB Sampling	Dioxin Sampling
New Jersey			
Rahway Valley Sewerage Authority	X	X	X
Linden-Roselle Sewerage Authority	X	X	X
Joint Meeting of Essex & Union Counties	X	X	X
Middlesex County Utilities Authority	X	X	X
North Bergen Municipal Utilities Authority:			
- Central STP	X	X	X
- Woodcliff STP	X	X	
Edgewater Municipal Utilities Authority	X	X	
Hoboken-Union City-Weehawken Sewerage Authority	X	X	
West New York Municipal Utilities Authority	X	X	
Passaic Valley Sewerage Commission	X	X	X
Bergen County Utilities Authority	X	X	X
Secaucus Municipal Utilities Authority	X	X	X
New York			
Port Richmond STP		X	X
Oakwood Beach STP		X	
Tallmans Island STP		X	
Hunts Point STP		X	
Owls Head STP		X	
Red Hook STP		X	
Wards Island STP		X	
North River STP		X	
Jamaica STP		X	
Bowery Bay STP		X	
Rockaway STP		X	
Newtown Creek STP		X	
Coney Island STP		X	
26th Ward STP		X	
Yonkers Joint Wastewater Treatment Plant		X	

including wet weather influent as a surrogate for CSO discharge. New Jersey dischargers, New York City, and Yonkers Sewer District have submitted the required reports.

- USEPA, NYSDEC, NJDEP, NYCDEP, and NJHDG are using the data collected through the CWA Section 308 letters to identify which municipal discharges of PCBs are significant.
- NYCDEP, NJHDG, and other dischargers as appropriate, will track-down and abate the sources of PCBs to their sewage systems as described previously.
- As of July 1, 1995, NYCDEP, under a consent order with NYSDEC, has deployed 18 Passive In-Situ Concentration Extraction Samplers (PISCES) in the influent streams of the 14 New York City STPs. The devices will be deployed for 12 months to monitor for PCBs and other organic chemicals. By December 1996, NYCDEP will submit a report to NYSDEC on the analytical results. The report will propose the STP drainage basins in which the track-down of PCBs and other chemicals will be pursued. In deciding which basins will be pursued, NYCDEP and NYSDEC will consider the results of the monitoring conducted under the Section 308 letters. NYCDEP is currently committed to an additional two years of follow-up efforts on PISCES track-down.
- As discussed previously in this section, there is clear evidence that dioxin exceeds fish tissue action levels in the Harbor. However, there was no quantitative data on the levels of dioxin in municipal discharges to the Harbor.
- Therefore, using the same CWA Section 308 letters noted above, USEPA required municipal dischargers in the Newark Bay Complex [Table 8(t)] to identify the levels of dioxin in their discharges. The monitoring was required for dischargers in the Newark Bay Complex because dioxin contamination is worse in this area than in other areas of the Harbor.
- The POTWs listed in Table 8(t) collected influent and effluent samples during two dry weather periods, and influent during two wet weather periods. Analysis of these samples indicated that dioxin concentrations

were less than the required reporting limit of five parts per trillion.

- Available information on other organic chemicals of concern must be reviewed to determine whether those chemicals should be considered for track-down and clean-up.
- USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and other dischargers, in consultation with the appropriate HEP work groups, will review available ambient data on the other organic chemicals of concern, using the criteria described previously to determine which chemicals should be considered for track-down and clean-up.
- As appropriate, dischargers will screen their discharges using sensitive monitoring techniques to identify the levels of the chemicals being discharged.
- If significant discharges are found, those dischargers will track-down and abate the chemicals, or USEPA, NYSDEC, and NJDEP will require control of the chemicals quantitatively, through development of TMDLs/WLAs/LAs.
- Concurrent with updates of the list of chemicals of concern (see Action T-12.3 below), HEP will consider new information and report biennially through HEP CCMP updates (see Objective I-1 below), on whether additional organic chemicals should be considered for track-down and clean-up.

Additional information is needed to fully address the adverse impacts of these and other chemicals of concern. This is addressed in "Actions to Better Understand and Manage the Problem" (see Objectives T-11, T-12 and T-13 below).

OBJECTIVE T-2 *Reduce industrial discharges of chemicals of concern*

Permits for direct industrial discharges to the Harbor/Bight contain technology-based limits expected to minimize the discharge of toxic chemicals. Indirect industrial discharges to the

Harbor/Bight are subject to the Industrial Pretreatment Program.

ACTION T-2.1

Continuing Compliance with Controls on Industrial Discharges

All industrial facilities regulated under NPDES or approved pretreatment programs are required to self-monitor their effluents to determine compliance with permit requirements. The results of this monitoring are submitted to either the state or the POTW, as appropriate. The state or POTW reviews these reports for violations. Violations are acted upon by various forms of enforcement response, including, but not limited to, phone calls, inspections, notices of violation, and formal enforcement actions (administrative and judicial, including civil and criminal). There is also a routine inspection program where on-site work is conducted to verify that what is reported is accurate.

- NYSDEC, NJDEP, and ISC will assure continuing compliance with NPDES permit conditions for direct industrial discharges. (While NYSDEC and NJDEP are the permit-issuing agencies, as part of the ISC monitoring program, the Commission performs 24-hour NPDES compliance sampling of major industrial discharges in New York and New Jersey in coordination with the state environmental departments and USEPA. ISC supplies the results of this monitoring to the state environmental departments and USEPA.)
- For those facilities which have approved local pretreatment programs, the states and USEPA will assure that the local pretreatment programs remain in compliance.
- The states and USEPA will assure that categorical industrial users which do not discharge to an approved local pretreatment program remain in compliance.

ACTION T-2.2

Pretreatment Program Focus on Significant Industrial Users

USEPA, NYSDEC, and NJDEP will ensure that municipalities in the Harbor/Bight area focus their pretreatment programs on significant industrial users, and additional users as necessary, not just categorical industrial users.

This is intended to allow a focus on the most significant indirect industrial dischargers of toxic chemicals.

- As noted previously, NYCDEP has found significant decreases in loadings of several metals, attributable in part to implementation of the industrial pretreatment program. In New York City, 402 significant industrial users are currently under regulation. These include such industrial categories as electroplating, metal finishing, metals molding and casting, pharmaceutical manufacturing, and organic chemical manufacturing. NYCDEP has been tracking non-regulated businesses to improve information on loadings of metals and toxic organic chemicals. This is helping New York City target the pretreatment program on the most significant contributors. For example, New York City has recently added forty automobile radiator repair shops to the industrial pretreatment program. Also, New York City is developing an industrial control strategy for photo finishers.
- As discussed above, levels of tetrachloroethylene sometimes exceed the water quality guidance value in some New York City waters in the Harbor. In response to this, New York City is modifying its pretreatment program to reduce discharges of this chemical:
 - New York City has recently amended its Sewer Use Regulations to incorporate a prohibition of still bottom residue and filter material discharges by the dry cleaning industry. NYCDEP will develop an inventory of the industry and notify each facility of the requirements, and will monitor loadings in STP effluent and report on progress.
 - NYCDEP will investigate other potential sources of tetrachloroethylene.

ACTION T-2.3

Additional Requirements for Direct Industrial Dischargers

- Direct industrial dischargers will be subject to requirements to control loadings of copper and mercury, and nickel and lead as necessary, as described above for municipal discharges:

- Phase I permit limits will be based on EEO.
 - Harbor-wide for mercury
 - In Newark Bay, Kills, Raritan Bay/River, Passaic River, and Hackensack River for copper.
- Phase II may include more stringent technically defensible permit limits based on additional data collection and modeling (see Action T-13.1 below).
- Direct industrial dischargers will also be considered for "Track-down and Clean-up" of sources of organic chemicals of concern, as appropriate (see Action T-1.2).

ACTION T-2.4

Effluent Guidelines for Industry Categories
USEPA will promulgate effluent guidelines for toxic and non-conventional pollutants in accordance with schedules established in biennial plans.

- Rulemaking priorities are being set with public input, based on comparative environmental risk.
- Rulemaking will place limitations on discharges of pollutants not covered by existing regulations, as well as strengthen existing regulations.

OBJECTIVE T-3 *Minimize the discharge of toxic chemicals from CSOs, storm water, and non-point sources*

Combined Sewer Overflows

Effective abatement of CSO discharges is expected to be important in reducing the levels of metals in New Jersey tributaries and may be important Harbor-wide in reducing the levels of some of the toxic organic chemicals of concern. Full implementation of the Final National CSO Control Policy and currently planned New York and New Jersey CSO abatement programs are expected to reduce discharges of toxic chemicals. See the section on Rainfall-Induced Discharges for a description of these actions.

- HEP will, given sufficient funding, assess the load reductions of chemicals of concern expected with implementation of HEP's plan to abate CSO and other rainfall-induced discharges (see Action T-12.13 below).

Storm Water Discharges

Effective abatement of storm water discharges is expected to be important in reducing the levels of metals in New Jersey tributaries and may be important Harbor-wide in reducing the levels of some of the toxic organic chemicals of concern. Implementation of municipal and industrial storm water permit programs is expected to reduce storm water discharges. See the section on Rainfall-Induced Discharges for a description of these actions.

Non-Point Source Runoff

Because most of the Harbor area is sewered, there is very little non-point source runoff. Therefore, on a Harbor-wide basis, non-point source runoff is not a major source of toxic contamination. (Note that storm water and combined sewer overflows, which are point sources, are distinguished from non-point source runoff, as are other types of non-point sources, such as atmospheric deposition, sediment flux, and landfill leachate, not carried by a discrete conveyance such as a pipe). Non-point source runoff may, however, contribute significantly to loads of toxic chemicals entering the Harbor via tributaries and in the Navesink/Shrewsbury drainage area, and may be significant in the Bight. Details of current New York and New Jersey non-point source management programs can be found in the section on Rainfall-Induced Discharges.

Additional Actions to Address Rainfall-Induced Discharges

Currently planned or ongoing investigations by HEP may provide new information indicating the need for additional actions to fully address rainfall-induced discharges of the chemicals of concern. See "Actions to Better Understand and Manage the Problem" (see Objectives T-11, T-12 and T-13 below).

OBJECTIVE T-4 Reduce air emissions of chemicals of concern

Current Clean Air Act (CAA) requirements, such as the National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Review (NSR), will significantly reduce toxic loadings into the air. NESHAPs cover air emissions from industrial sources. NSR rules limit emissions of criteria pollutants and many volatile organic compounds, and, in addition, regulate dioxin and furans from municipal waste incinerators. Both New Jersey and New York have 70 to 99 percent control requirements for many hazardous air pollutants (HAPs) under their State Implementation Plan programs.

CAA amendments in 1990 enhanced the authority of USEPA and the states to regulate more than 189 specific HAPs, emitted from approximately 180 source categories, and to regulate a large number of area or small sources of HAPs.

The CAA amendments also established the Great Waterbodies Program, which requires USEPA to determine the contribution of atmospheric deposition to total pollutant loadings to New York-New Jersey Harbor and other "Great Waterbodies" and promulgate appropriate regulations under the CAA to assure protection of these waters (see Action T-12.11 below).

ACTION T-4.0
Implementation of Clean Air Act Requirements

- USEPA, NYSDEC, and NJDEP will continue to enforce existing air regulations limiting the emissions of toxic pollutants.
- Under CAA amendments, USEPA will develop emission standards, based on maximum achievable control technology, for all the source categories by the year 2000.
- USEPA will develop regulations for area or small sources of HAPs by the year 2000.

- Through implementation of the CAA requirements, USEPA projects an 85 percent reduction in atmospheric deposition of metals, nationwide, over the next 10-15 years. This reduction will contribute to the attainment of ambient water quality standards for mercury in the Harbor/Bight.

OBJECTIVE T-5 Remediate identified solid and hazardous waste sites

Active and inactive solid and hazardous waste sites may contaminate the Harbor/Bight, but the available information has not been analyzed to determine which sites are contributing chemicals of concern. HEP recommends using available information to help set priorities for clean closure or remediation of sites contributing contamination to the Harbor/Bight (Note: Contaminated sediment sites are discussed under Objective T-9 below).

ACTION T-5.1
Waste Site Inventory
HEP recommends that USEPA, NYSDEC, and NJDEP, with assistance from NYCDEP, develop a GIS-based integrated inventory of active and inactive solid and hazardous waste sites in the Harbor/Bight area contributing or potentially contributing toxics, especially chemicals of concern, to the Harbor/Bight. The geographic scope of this effort should include all areas draining to the Harbor/Bight system, including the Hudson River to the Troy Lock and Dam. The inventory should use existing state priority lists for hazardous waste sites. Existing data bases, such as the NJDEP Comprehensive Site List, should be used to develop the integrated inventory. Also, note that NYSDEC is incorporating information on inventoried inactive hazardous waste disposal sites into a GIS. The GIS inventory is complete for sites in New York City. The April 1995 Annual Report of Inactive Hazardous Waste Disposal Sites in New York State includes maps and descriptive information about each inventoried site. NYSDEC will complete the GIS inventory for sites in Long Island and the Hudson Valley

region in 1996. If funded, NJDEP will provide a GIS-compatible inventory of known or suspected contaminated sites within the defined boundaries of the Harbor/ Bight, using existing site remediation program data bases such as the Comprehensive Site List and the Known Contaminated Sites in New Jersey.

ACTION T-5.2

Remediation of Sites Contributing Significant Contamination to the Harbor/Bight

USEPA, NYSDEC, and NJDEP will develop site-specific schedules to expedite closure or remediation of the most significant sites.

- For publicly funded sites:
 - To the extent feasible, USEPA and the states will adjust schedules to address priority sites in the Harbor/Bight drainage area, within existing resources.
 - To the extent that these priorities cannot be addressed within existing resources, USEPA and the states will identify and seek the additional resources required.
- For privately funded sites, USEPA, NYSDEC, and NJDEP will negotiate with principal responsible parties to adjust schedules to address priority sites.

OBJECTIVE T-6 Track-down and clean-up of other sources of chemicals of concern

Action T-1.2 describes HEP's program to identify and abate significant municipal and industrial discharges of PCBs, dioxin, and other organic chemicals of concern. The actions below describe a similar program where the "track-down" originates in the ambient environment.

ACTION T-6.1

Organic Chemical and Mercury Screening

HEP recommends that USEPA, NYSDEC, and NJDEP conduct screening for ambient levels of organic chemicals of concern and mercury, in proximity to potential sources, using sensitive sample monitoring techniques (for example,

Passive In-Situ Concentration Extraction Samplers [PISCES] for organic chemicals and low-level detection methods for mercury).

ACTION T-6.2

Tracking and Elimination of Chemicals of Concern

Where significantly elevated levels are found, USEPA, NYSDEC, and NJDEP will initiate procedures to track-down and eliminate, or require the elimination of, the sources of the chemicals, giving priority to the most significant sources.

- Note that HEP's plans to focus pollution prevention activities on chemicals of concern (see Objective T-8 below), including identifying the largest emitters in the Harbor/Bight area, may contribute to track-down and elimination of sources.
- Note that the proposed screening will also be helpful to focus data collection efforts for developing mass balances (see Objective T-13 below).

ACTION T-6.3

Arthur Kill, New York PCB Trackdown

NYSDEC recently completed an effort to track down sources of PCBs in New York waters of the Harbor using PISCES. Initial Harbor-wide deployment of PISCES in Harbor tributaries in 1991 and 1992 found elevated levels of PCBs in several tributaries to the Arthur Kill. This was confirmed by additional sampling in 1993 and 1994. In one of these tributaries (Mill Creek, Staten Island) several possible discrete sources of PCBs were identified. Sampling at one of these facilities detected PCBs in the storm water discharges.

- This facility has been the subject of a NYSDEC multi-media pollution prevention effort. A multi-media Order on Consent requires the facility to conduct PCB soil testing in conjunction with an investigative work plan and possible remediation if contamination is found.
- NYSDEC is developing a SPDES permit for the facility which will not allow detectable PCB discharge.

- HEP recommends additional follow-up work: 1) to evaluate other possible sources of PCBs to Mill Creek; and 2) in conjunction with the Harbor-wide program recommended in Actions T-6.1 and T-6.2, to identify possible sources of PCBs in the other tributaries where elevated PCB levels were found.

OBJECTIVE T-7 *Improve chemical/oil spill response and prevention*

In response to several large oil spills in the Harbor, in 1989 and 1990, the Governors of New York and New Jersey and the responsible federal agencies joined with industry to form the New York Harbor Bi-State Oil Spill Response and Prevention Conference. The Bi-State Conference prepared a final report, including findings and recommendations, to prevent oil spills and to more effectively respond when they do occur. Subsequently, in March 1994, the U.S. Coast Guard (USCG) adopted an Area Contingency Plan, incorporating the recommendations of the Bi-State Conference.

ACTION 7.0
Review of Area Contingency Plan and Bi-State Conference Report

- HEP will review these documents and incorporate them, as appropriate, into the CCMP.
- HEP will provide relevant information to USCG and the Bi-State Conference to assist in updates of the Area Contingency Plan (e.g., see Objective H-10).

OBJECTIVE T-8 *Focus pollution prevention activities on chemicals of concern*

Pollution prevention activities focus on eliminating the generation of waste at the source. Pollution prevention is defined as changes in production technologies, raw materials, or products that result in a reduction in the demand for hazardous substances or in

the creation of hazardous substances or wastes prior to treatment, storage, out-of-process recycling, and disposal. HEP's plan for pollution prevention aims to focus programs both geographically (i.e., on the Harbor/Bight), and on HEP's chemicals of concern. For example, currently, some significant emitters may not have pollution prevention plans. Also, for those emitters which do have pollution prevention plans, additional action could be requested for HEP's chemicals of concern. Pollution prevention activities for sources close to the Harbor/Bight should target the most significant emitters of chemicals of concern. USEPA, NYSDEC, and NJDEP should incorporate pollution prevention activities addressing these sources and chemicals into programs across all media. HEP will, given sufficient funding, assess the load reductions of chemicals of concern expected with implementation of HEP's plan for pollution prevention (see Action T-12.13 below).

ACTION T-8.1
Identification of Large Emitters of Chemicals of Concern

- NYSDEC and NJDEP should review facilities in areas draining to the Harbor core area to identify the largest emitters of chemicals of concern using Toxics Release Inventory (TRI) and other data.
- To the extent feasible, NYSDEC and NJDEP will give these facilities highest priority for pollution prevention actions, including those found in Actions T-8.3 through T-8.5 below, within existing resources.
- To the extent priorities in the Harbor/Bight cannot be addressed with existing program resources, NYSDEC and NJDEP will identify and seek the additional resources required.

ACTION T-8.2
Non-Regulatory Pollution Prevention
Pollution prevention should be implemented through non-regulatory measures to the extent feasible.

- Under the New Jersey State Pollution Prevention Act, priority industrial facilities are preparing, annually, multi-media

pollution prevention plans. These plans are envisioned to build pollution prevention into day-to-day decision-making.

- HEP, through its liaisons with municipal dischargers and industrial facilities in the Harbor/Bight area, will seek commitments for voluntary reductions in releases of chemicals of concern to all media.
- HEP's public involvement and education plan emphasizes measures which can be implemented by citizens to reduce releases of chemicals of concern, in particular, petroleum.

ACTION T-8.3

Facility-Wide Permits

NJDEP is evaluating a Facility-Wide Permit (FWP) approach, to integrate air, water, and hazardous waste permits from a facility with its pollution prevention plan.

- NJDEP is currently conducting a FWP pilot project.
- If successful, NJDEP will seek legislative approval to implement the FWP program.

ACTION T-8.4

NPDES Pollution Prevention

Currently, NPDES permits may not include pollution prevention plan requirements. For regulatory programs under their purview:

- NYSDEC will add such requirements, addressing the chemicals of concern, to NPDES renewal permits, permit modifications, and new permits.
- NJDEP will consider, if given legislative authority, adding pollution prevention requirements addressing the chemicals of concern to NPDES renewals and permit modifications.

[Note: In connection with development of TMDLs for water quality-limiting metals, dischargers were required to evaluate the cost effectiveness of pollution prevention and other measures to reduce metal discharges (see Action T-1.1)].

ACTION T-8.5

RCRA Permitting and Enforcement

USEPA, NYSDEC, and NJDEP will give high priority to those hazardous waste treatment, storage, and disposal facilities in the Harbor/Bight area that manage one or more of the chemicals of concern.

- Permits issued by USEPA will require stringent waste management measures to prevent releases to the environment, clean-up of any past releases, and submittal of a pollution prevention plan.
- USEPA, NYSDEC, and NJDEP will target RCRA inspections for those hazardous waste generators in the Harbor/Bight area that manage one or more of the chemicals of concern.

Actions to Remediate Selected Contaminated Sediments

OBJECTIVE T-9 Identify and remediate selected contaminated sediments

Objectives T-1 through T-8 address reduction of continuing sources of toxic chemicals to the Harbor/Bight. However, contamination of sediments of the Harbor/Bight from past discharges also contributes significantly to the contamination of seafood and to adverse ecological effects. Contaminated sediments may be significant sources of chemicals of concern, including dioxin, PCBs, and mercury.

HEP endorses a comprehensive management approach to address these contaminants. To assess the public health and ecological significance of all sources of contaminants of concern, HEP is recommending development of mass balances (see Objective T-13 below) and applied research efforts (see Objective T-12 below), which may be expensive and technically complex. However, consistent with our management approach, HEP also endorses action now to address significant known sources of contamination.

The principal authorities for remediating contaminated sediments are the Comprehensive Environmental Response, Compensation and Liability Act, (CERCLA), also known as "Superfund", and related state authorities.

ACTION T-9.1

Remediation of Known Areas

USEPA and other responsible agencies will take appropriate steps to remediate known areas of highly contaminated sediments which are contributing to human health and ecological risks.

Diamond Alkali Superfund Site

The Diamond Alkali Superfund Site includes a land-based portion (i.e., the former pesticides manufacturing factory at 80 and 120 Lister Avenue in Newark, New Jersey) and the adjoining six-mile reach of the Passaic River, known as the Passaic River Study Area. The soil in the land-based portion of the site and the sediments in the Passaic River Study Area are contaminated with dioxin and may contribute significant loads of dioxin to the Estuary as a whole. Occidental Chemical Corporation (OCC), a successor to the Diamond Shamrock Chemicals Company, is required to perform the clean-up activities at the site, with USEPA oversight.

Table 9(t) shows the status of actions at the Diamond Alkali Superfund Site. The interim remedy for the land-based portion of the site will contain the contamination to eliminate potential human exposure to dioxin and other hazardous compounds and eliminate any continuing load of these compounds entering the Passaic River from the site. Possible remedies for the Passaic River Study Area are being investigated.

- USEPA has reached an agreement with OCC under which OCC will conduct a Remedial Investigation/Feasibility Study (RI/FS) of the Passaic River Study Area. The RI/FS will characterize the contaminated sediments, determine what effect they are having on human health and the environment, and evaluate possible remedial alternatives to mitigate any adverse effects.

Table 9(t). Status of Actions at Diamond Alkali Superfund Site

ACTION	LEAD AGENCY	COMPLETION DATE
Land-based portion of site		
Installation of geotextile fabric over exposed soils.	NJDEP	Completed
Interim remedy under 1990 Consent Decree includes installation of an impermeable cap, in-ground slurry wall, and a system for pumping and treating contaminated groundwater; biennial re-evaluation.	USEPA	Remedial design: 1996 Construction: 1998
Passaic River Study Area		
Remedial Investigation/Feasibility Study and Record of Decision.	USEPA	1997

- Prior to completion of the RI/FS, USEPA will assess available data and information and evaluate interim remedial technologies/ actions likely to apply to the area.
- USEPA will issue a Record of Decision (ROD), specifying the remedial plan for the Passaic River Study Area in 1997.
- USEPA, in concert with HEP, will take appropriate steps to ensure an effective link between remedial actions at the Diamond Alkali Superfund site and impacts on the Estuary as a whole.
- In developing the ROD, USEPA will assess the current impact of dioxin and other contaminants within the Passaic River Study Area and the impact after the implementation of the remedial action.
- By June 1997, given sufficient funding, HEP will develop improved mass balances for dioxin and other contaminants in the Estuary, and develop preliminary control scenarios, using relatively simple or existing models (see Action T-13.3 below). The

effort should include data collection to support assessment of dioxin and other contaminant loadings to the Estuary and model calibration.

- USEPA will provide relevant data and/or a model to HEP for use in HEP's effort to assess the impact of dioxin and other contaminants from the Passaic River Study Area on the Estuary as a whole.
- If HEP's effort is completed prior to issuance of the ROD, USEPA will consider the results in selecting a remedy for the Passaic River Study Area.
- USEPA has indicated that HEP's effort should be completed at least 60 days prior to issuance of the ROD, in order to facilitate effective use of the information in USEPA's decision. HEP will work closely with USEPA to ensure that information is timely.

Upper Hudson River PCBs Sites

Several sites which may contribute loads of PCBs to the lower Hudson River have been identified in the upper Hudson River basin. These include the Hudson River PCBs Superfund Site, the Remnant Deposits, which are part of the Hudson River PCBs Site, and three sites upstream [Table 10(t)]. Responsible agencies have taken a number of interim or final remedial actions at these sites to reduce the loads of PCBs reaching the river; additional investigations are continuing.

- USEPA is conducting a Reassessment RI/FS for the Hudson River PCBs Superfund Site.
- USEPA will submit a proposed remedial plan for public review by March 1997.
- USEPA will issue a ROD by September 1997.
- USEPA, in concert with HEP, will take appropriate steps to ensure an effective link between remedial actions in the upper Hudson River basin and impacts on the lower River and Estuary. The goal of HEP is to ensure no transport down-river of a PCB load which would result in deposition of sediments that would violate human health advisories and protection levels for aquatic life and fish-eating wildlife.

Table 10(t). Sites Contaminated with PCBs in the Upper Hudson River Basin

SITE	LEAD AGENCY	STATUS
Hudson River PCBs Superfund Site	USEPA	USEPA is conducting a Reassessment RI/FS; will select a remedial action for the PCB-contaminated sediments by September 1997.
-- Remnant Deposits	USEPA	Capped in 1990-91 pursuant to USEPA/GE consent decree; post-construction monitoring continues.
General Electric Co. Hudson Falls Plant Site	NYSDEC	Interim remedial measures implemented including: eliminating water flow through an abandoned mill structure; removal of contaminated sediments in the mill; installation of seep collection systems and a water pretreatment system; and sealing fractured bedrock. GE is continuing investigations.
General Electric Co. Fort Edward Plant Outfall	NYSDEC	Interim remedial measure implemented: pipe installed to prevent discharge water from coming into contact with contaminated soils. GE is continuing investigations.
Niagara-Mohawk Site	NYSDEC	Site being investigated; impacts thought to be localized.

- In developing the ROD, USEPA will estimate the current flux of PCBs from the upper Hudson River to the lower River, and the flux based on implementation of remediation planned at all the upper Hudson River basin PCBs sites.
- By June 1996, HEP will develop an improved mass balance for PCBs in the Estuary, using relatively simple or existing models and existing data; by June 1997, given sufficient funding, HEP will further refine and update the mass balance for PCBs, including congener-specific behavior (see Action T-13.3 below). The effort should include data collection to support assessment of PCBs loadings to the Estuary and model calibration.

- USEPA will consider the results of HEP's efforts in selecting a remedy for the Hudson River PCBs Superfund Site, to the extent completed prior to issuance of the ROD.
- USEPA has indicated that HEP's effort should be completed at least 60 days prior to issuance of the ROD, in order to facilitate effective use of the information in USEPA's decision. HEP will work closely with USEPA to ensure that information is timely.

Marathon Battery Site

- With USEPA oversight, the principal responsible parties have completed the clean-up of the Marathon Battery site. The clean-up included remedial dredging of the Hudson River in the Cold Spring, New York pier area, remedial dredging of East Foundry Cove, remedial dredging and restoration of East Foundry Cove Marsh, and remediation of the upland portion of the site.
- Remediation was completed in June 1995.
- Long-term monitoring will begin in fall 1995.

ACTION T-9.2

Identification of Additional Areas

USEPA, NYSDEC, NJDEP, and USACE should identify additional areas of highly contaminated sediments for more in-depth assessment, including the feasibility of and need for remediation.

- As discussed in the section on dredged material management, USEPA and USACE are conducting studies under Section 405 of the Water Resources Development Act, which may help to develop remedial plans for contaminated sediments. For example, the decontamination technologies being evaluated may prove useful for sediments in areas which will not be dredged for navigational purposes.
- If funded, NJDEP will provide a GIS-compatible inventory of known or suspected sites with contaminated sediments as part of the information supplied under Action T-5.1.

Other actions on contaminated sediments are in the section on dredged material management.

Actions to Minimize Human Health Risks

OBJECTIVE T-10

Establish consistent methodology to assess risks and improve communication of fish advisories

Risk Assessment

The States of New York and New Jersey set fishing advisories and restrictions intended to protect the public, including local fishing communities, from health risks due to consumption of locally caught seafood which may be contaminated with toxic chemicals. With some exceptions, these advisories are based on criteria promulgated nationally by the Food and Drug Administration (FDA) of the U.S. Department of Commerce (called FDA action levels). The FDA action levels reflect the balancing of human health risks with factors such as the economic and social consequences of closing or restricting fisheries.

In developing water quality criteria for protection of human health, USEPA applies a risk assessment methodology which is more stringent than FDA's. USEPA's approach is intended for use in establishing pollution control objectives. Although USEPA has not published fish tissue criteria, it has used the risk assessment methodology to calculate fish tissue values associated with the published water quality criteria. These "criteria values" have been applied in HEP's evaluation of chemicals of concern. There is concern about whether FDA's approach is adequately protective of higher-risk segments of the fish-consuming public. The methods used by New York and New Jersey to set advisories and restrictions are different.

ACTION T-10.1

Risk Assessment Methodology

The States of New York and New Jersey should establish a consistent methodology, as appropriate, to assess human health risks from consumption of locally-caught seafood and to set fish advisories and restrictions.

- The states should prepare a report documenting their methodologies for assessing health risks.

ACTION T-10.2

Fish Tissue Criteria

USEPA and the States of New York and New Jersey should review available fish tissue criteria, and recommend necessary steps to adopt and implement revised criteria as appropriate (see Objectives T-11 and T-12 below).

Furthermore, additional information on the levels of contamination in various edible species in the Harbor/Bight is needed. This information is important to help develop and modify fish advisories and restrictions. HEP and others are taking steps to address this (see Action T-12.3 below).

Risk Communication

Effective communication of advisories is essential to minimize public health risks. Current efforts routinely conducted by both New York and New Jersey include: 1) providing advisory information to all those who are licensed to fish (Note, however, that in both New York and New Jersey, recreational fishing licenses are not required for marine waters, including most of the Harbor); 2) issuing press releases of advisories, including changes in advisories; and 3) providing advisory information to local environmental groups, local health departments, fishing organizations, bait and tackle shops, etc.

However, recent studies indicate that these efforts have not been sufficient to enable the public to make an informed choice regarding consumption. For example, a survey of anglers conducted along the Hudson River found that less than half of this group (42%), who indicate that they eat their catch, were aware of any advisories. Less than seven percent of those surveyed had an accurate knowledge of the advisories. Almost half (49%) of those surveyed thought that they could determine, by visual observation or previous experience, whether fish are safe to eat.

In addition, there are segments of the public that are not being adequately informed. These include people who fish but are not licensed, people below licensing age, or people who fish in marine waters (where no licensing is required). People who are non-English speaking or have little formal education are also of concern since they are less likely to comprehend, and therefore utilize, advisory information. Moreover, these groups often include people who fish for subsistence, whose diet is primarily locally caught seafood. Recipients of fish caught by others are also of concern, since they may not fish themselves and, therefore, may not be aware of existing health advisories.

ACTION T-10.3

Risk Communication Activities

The States of New York and New Jersey should target additional risk communication efforts to those sub-populations at greatest risk and develop, with USEPA's assistance, a regional approach to advisory communication.

- NYSDEC and NJDEP are conducting pilot projects to develop and evaluate advisory communication plans tailored to the needs of specific localities in the Harbor area. The projects include developing improved communications materials (e.g., in languages spoken by local populations) and training local authorities and grass-root organizers in advisory communications. The states will consider implementing favored approaches Harbor-wide.

Actions to Better Understand and Manage the Problem

As noted throughout this section, additional information is needed to better understand and manage the toxics contamination problem in the Harbor/Bight. The following action descriptions provide an overview of information needs, followed by recommendations and commitments to address the needs, including a description of ongoing efforts. Both the chemical-specific approach and the ecosystem approach are discussed.

OBJECTIVE T-11 *Review and develop criteria for copper and other priority chemicals*

The lack of numeric criteria or doubts about the validity or proper application of available numeric criteria (including, in some cases, regulatory criteria and standards) limit our ability to draw conclusions regarding whether a chemical is of concern in the Harbor/Bight. Therefore, management options are also limited:

- È There are no generally accepted regulatory criteria for sediment quality. USEPA is developing criteria based on equilibrium partitioning and has recently proposed draft criteria for the protection of benthic organisms for several pesticides and PAH compounds. Many other approaches are available for developing criteria. For example, New York State has developed sediment quality screening criteria for protection of human health, wildlife, and benthic organisms; and NOAA has proposed "Effects Range Values" based on associations between levels of a particular chemical and a variety of observed biological effects.
- È FDA's approach for developing action levels for fish, crustacea, and shellfish tissue may not be sufficiently protective of people who regularly consume locally caught seafood.
- È There are concerns about the validity of particular criteria, or their application. For example, applying water quality criteria for metals, based on an analysis of total metals, is likely to be overprotective because particulate metal is not as bioavailable as dissolved metal.

ACTION T-11.1
Site Specific Water Quality Criteria for Copper
NYSDEC and NJDEP will adopt site-specific water quality criteria for copper in New York and New Jersey water quality standards regulations.

ACTION T-11.2
New and Revised Priority Criteria
NYSDEC and NJDEP will analyze existing applicable criteria and adopt new and revised criteria as appropriate for priority chemicals.

- USEPA, NYSDEC, and NJDEP, under the auspices of HEP, will prepare a plan for developing and adopting new and revised criteria for priority chemicals.

USEPA has recommended that the states consider adoption of water quality criteria for dissolved metals:

- NYSDEC and NJDEP will adopt water quality criteria for dissolved lead and dissolved nickel.
- As part of their triennial reviews, NYSDEC and NJDEP will consider adoption of water quality criteria for other dissolved metals, as appropriate.

OBJECTIVE T-12 *Assess ambient levels, loadings, and effects of chemicals*

The principal objective of the assessments, both recommended and ongoing, included in this section is improved problem definition. This includes assessing whether a particular chemical is of concern in water, biota, and sediments, and assessing relative loadings. Assessments for development of mass balances are addressed below. Long-term monitoring to assess the success of CCMP implementation is discussed in the sections on Monitoring and Reporting on Progress in Implementing the Plan.

Ecological Indicators

ACTION T-12.1
Quantitative Ecosystem Goals and Biocriteria
USEPA, NYSDEC, and NJDEP, under the auspices of HEP, should develop ecosystem indicators as quantitative goals and biocriteria, and implement long-term monitoring of the indicators (see sections

on Monitoring and Reporting on Progress in Implementing the Plan below).

- Based on the Regional Environmental Monitoring and Assessment Program (R-EMAP) (see text and Action T-12.4 below) and other available data, HEP will develop an index of benthic degradation for the Harbor/Bight, to distinguish normal benthic communities from those degraded by pollution, and indicate the relative severity of degradation to the benthic communities.
- USEPA and the states should develop and implement a long-term monitoring program using the benthic index and other appropriate indicators.
- As part of their triennial reviews, NYSDEC and NJDEP should adopt biocriteria based on the benthic index and other indicators, as appropriate.

HEP funded a study to compare the reproductive success of several species of fish-eating birds in the Harbor/Bight region. The investigators concluded that reproductive success in several colonies in the Bight area was impaired. The cause(s) of the decreased reproductive success, however, is not clear and may include predation, human disturbance, toxic contamination, and other factors.

- HEP recommends additional efforts to monitor the size and productivity of local populations of herons, egrets, gulls, and/or terns, focusing on colonies nesting in the Harbor core area. Where impaired productivity and/or declining bird populations are found, HEP recommends analysis of bird tissue contaminant levels.

ACTION T-12.2

Identification of Chemicals Responsible for Adverse Ecological Effects

Where evidence of adverse ecological effects of toxic contamination is found, USEPA, NYSDEC, NJDEP, and other authorities will conduct studies to evaluate whether, and if so which, chemicals are responsible.

- HEP conducted studies to assess ambient water toxicity in the Harbor using sensitive test organisms (a sea urchin and a red alga). Initial studies indicated that Harbor waters in some areas were sometimes toxic to these organisms, but temporal variability was great. A followup study to characterize the variability on small spatial scales, and evaluate the classes of chemicals responsible for the observed toxicity, called a Phase I Toxicity Identification Evaluation (TIE), was recently completed. This study also found extreme temporal variability in toxicity, which made comparisons among stations and seasons ambiguous. Toxicity was found infrequently; when found, the pattern of toxicity reduction obtained during the Phase I TIE analyses was indicative of toxicity due to cationic metals.
- USEPA, as part of its ongoing program to develop methods for marine sediment TIE, using Water Resources Development Act (WRDA) funds, is conducting a Phase I TIE to evaluate the classes of chemicals responsible for toxicity in interstitial (pore) water at three sites in the Harbor (Newtown Creek, northern Arthur Kill, and north-central Newark Bay). USEPA, in cooperation with the National Biological Survey of the U.S. Department of the Interior, is also developing whole sediment TIE methods and will conduct Phase I TIEs in conjunction with this effort. The TIEs will use a variety of test organisms including an amphipod, a mysid, and a bivalve. Initial TIE work was completed in October 1995.
- HEP, in cooperation with USEPA, USACE, NYSDEC, and NJDEP, will, given adequate funding, conduct a sediment TIE program to supplement the above effort. The program should focus on identifying contaminants causing toxicity, or impaired benthos, on a Harbor-wide scale (as a follow up to R-EMAP; see below), with additional emphasis on dredged sediment. The program should include Phase I and Phase II TIEs, to identify specific chemicals causing toxicity, in interstitial water and whole sediment. HEP will develop a work plan for this effort.

Synthesis of Chemical-Specific Information

ACTION T-12.3

Revision to List of Chemicals of Concern
HEP will, on a biennial basis, and given sufficient resources, revise and update the list of chemicals of concern based on new information, including new and revised criteria (e.g., see Objective T-11), and new data on levels of chemicals in water, biota, and sediments (e.g., see Objective T-12).

Sediment Quality

Background

HEP is currently assessing sediment quality in coordination with R-EMAP. The objectives of the assessment are: 1) to estimate the extent and magnitude of sediment degradation in the study area using biological and chemical measures; and 2) to identify statistical associations among chemical contaminants, other stressors, such as low dissolved oxygen, and degraded benthos or toxic sediments. The assessment involves synoptic measurement of sediment toxicity, benthic community structure, and bulk sediment chemistry (including dioxin and PCB congeners, chlorinated pesticides, PAHs, metals, organotins), at stations selected randomly throughout the New York-New Jersey Harbor complex, western Long Island Sound, and Bight Apex (total of approximately 170 stations). The study will be complete in March 1996. The data will be useful to:

- Provide a baseline to evaluate the effectiveness of management strategies implemented to resolve sediment contamination issues (e.g., by comparing R-EMAP data to future studies to assess trends).
- Provide a perspective on the relative significance of contamination and other stressors, locally versus larger-scale phenomena (e.g., by comparing R-EMAP data to studies conducted on smaller spatial scales).

There are several additional ongoing or recently completed studies which attempt to characterize sediment contamination and biological effects. These include the NOAA Bioeffects Program and

recent studies by the Maxus Corporation focusing on the Newark Bay Complex.

ACTION T-12.4

Completion of R-EMAP Assessment
HEP will complete the R-EMAP project by March 1996.

ACTION T-12.5

Additional Sediment Quality Studies

- HEP will, given sufficient funding, conduct additional studies to assess sediment quality. Priorities are:
 - Assessment of ambient sediment bioaccumulation potential (i.e., the potential for organisms to accumulate contaminants in their tissues from ambient sediments).
 - Assessment of trophic transfer of contaminants and effects on higher trophic levels, including fundamental research, and studies supporting development of mass balance models. (Note: The Hudson River Foundation is funding research to address PCBs).
 - Evaluation of the chemicals causing sediment toxicity or impaired benthos (Note: USEPA is funding a sediment and pore water Toxicity Identification Evaluation; see Action T-12.2).
 - Characterization of sediment quality on small spatial scales, e.g., to identify "hot spots" and assess sources and sinks for contaminants in sediments.
- HEP will develop a work plan, including cost estimates, for these studies.
- HEP will recommend further management actions based on all available sediment quality assessment information. To the extent information is available, the actions will address:
 - Defining system-wide and basin-wide source control and remediation priorities.
 - Providing a basis for developing regional ecological indicators and biocriteria.
 - Developing regional and/or site specific sediment quality and management criteria for

the protection of marine life, wildlife, and human health.

Fish, Crustacea, and Shellfish Tissue Quality

ACTION T-12.6

Studies to Assess Tissue Quality

- HEP is assessing levels of toxic contaminants in edible fish, crustacea, and shellfish throughout the Harbor. The States of New York and New Jersey are collaborating on this effort. A wide variety of species is being sampled for all the chemicals of concern noted above. This effort will be complete in December 1995 at a cost of \$450,000.
- USEPA, USACE, and NMFS are conducting an assessment of contamination of several species of edible fish caught by the recreational fishing community (completed at a cost of \$200,000), and an assessment of contamination in lobsters in the Bight Apex (complete March 1996 at a cost of \$300,000).
- New York State is also assessing levels of PCBs in striped bass throughout its marine waters.
- HEP will, given sufficient funding, conduct future periodic fish tissue monitoring based on these studies. HEP will develop work plans and seek funding for these studies.

ACTION T-12.7

Modification of Advisories and Restrictions

- New York State will use the information from the above studies, as appropriate, to modify fishing advisories and restrictions and to identify additional data collection needs.
- New Jersey will use the information to identify additional data collection needs, ultimately resulting in modifications to advisories and restrictions.

Water Quality

ACTION T-12.8

New York Harbor Water Quality Survey

NYCDEP will continue its New York Harbor Water Quality Survey at current levels of effort.

ACTION T-12.9

Long-Term Monitoring Program in New Jersey
NJDEP should develop a long-term water quality monitoring effort similar in design to New York City's.

Loadings

In general, additional information on continuing loads of organic chemicals of concern to the Harbor/Bight is needed to identify the most significant sources and source categories. This will help focus management attention on reducing and eliminating these sources.

- Data collection associated with development of mass balances for specific chemicals of concern, discussed in Actions T-13.2 and T-13.3 below, is expected to be instrumental in improving loadings information for organic chemicals of concern.
- USEPA required dischargers to identify the levels of PCBs and dioxin being discharged from municipal STPs and CSOs (see Action T-1.2).
- Additional information from HEP's pollution prevention plan (Objective T-8), and track-down and clean-up plan (Objective T-6) may help set priorities for quantitative assessments of loads of chemicals of concern.

ACTION T-12.10

Principal Components Analyses

USEPA is conducting Principal Components Analyses for PCBs, dioxin, and PAHs for sediment samples from R-EMAP and several other available data sets. This effort is expected to help clarify the source categories responsible for the contamination.

ACTION T-12.11

Atmospheric Loadings under "Great Waterbodies" Program

Section 112(m) of the Clean Air Act of 1990, which establishes the Great Waterbodies Program, may provide an opportunity to assess and control atmospheric deposition of toxic chemicals and nitrogen compounds to the Harbor/Bight. Under this program, USEPA, in coordination with NOAA, is required to determine the contribution of atmospheric

deposition to the total pollutant loading to the Great Waterbodies (which includes all HEP waters), determine whether loadings of hazardous air pollutants (HAPs) cause or contribute to water quality violations, and promulgate regulatory revisions to the CAA and other federal laws necessary to assure protection of the waters. The USEPA Administrator will promulgate the regulatory revisions based on a determination of need as described in a report to Congress, prepared in 1993 and biennially thereafter.

- HEP will, given sufficient funding, assess atmospheric loadings of the chemicals of concern to the Harbor/Bight, as part of an expedited quantification of chemical loadings (see Action T-13.3 below); given sufficient funding, HEP will also assess expected reductions in atmospheric loadings of these chemicals with implementation of the Clean Air Act (see Action T-12.13 below).
- Within two years, given sufficient funding, HEP will develop simple mass balances to assess the relative contribution of all sources of the chemicals of concern, including atmospheric deposition.
- USEPA will review this information and, in coordination with HEP, will incorporate it into the Great Waterbodies Report to Congress biennial update not later than 1997. The report update will specify additional steps and regulatory revisions, as appropriate, to address atmospheric deposition of toxic chemicals to the Harbor/Bight.

ACTION T-12.12

Low-Level Detection Methods for Loadings
Assessments of loadings for the purpose of identifying the most significant sources and developing mass balances will require high quality data, often involving chemical analyses at very low levels of detection. Currently, most regulated parties are not prepared to conduct such analyses for several chemicals, including metals, PCBs, and dioxin.

- USEPA, NYSDEC, and NJDEP should develop guidance specifying appropriate methods, and work with regulated parties as necessary to ensure the collection of high quality loadings data. NJDEP is currently

developing such guidance for metals; NYCDEP has implemented "clean techniques" for metals.

- USEPA, NYSDEC, and NJDEP will incorporate the methods for metals into monitoring requirements for NPDES, CSO, and storm water permits.

ACTION T-12.13

Assessment of Load Reductions Expected with CCMP Implementation

- In parallel with development of simple mass balances for mercury and organic chemicals of concern (see Action T-13.3 below), HEP, given sufficient funding, will conduct an engineering assessment to estimate the load reductions of chemicals of concern expected with implementation of HEP's plan to reduce continuing inputs of toxic chemicals, and to control rainfall-induced discharges. In particular, expected load reductions with implementation of the following programs will be assessed:
 - The nine minimum control measures of the Final National CSO Control Policy (see Objective CSO-1 below)
 - Current CSO abatement programs (see Objective CSO-2 below)
 - Municipal and industrial storm water management programs (see Objective SW-1 below)
 - Full secondary treatment (see Objective N-1 below)
 - Pollution prevention (Objective T-8)
 - "Track-down and Clean-up" (Action T-1.2 and Objective T-6)
 - Focusing industrial pretreatment programs on significant industrial users (Action T-2.2)
 - Clean Air Act (Objective T-4)
- HEP would use this assessment to help determine whether the above actions will result in attainment of quantitative load reduction goals for the chemicals of concern, established under Action T-13.3 below, and how long it will take. If it is determined that goals will not be attained

in a timely fashion, HEP will identify additional actions to meet the goals.

- Data on loadings of chemicals of concern from important source categories (see Action T-13.3 below) should be used to help generate load reduction estimates.

OBJECTIVE T-13 *Develop mass balances for metals and organic chemicals*

ACTION T-13.1

Monitoring and Modeling for Metals other than Mercury

Consistent with the phased TMDL approach for water quality-limiting metals:

- The New Jersey Harbor Dischargers Group is conducting additional ambient and effluent monitoring and modeling, to support Phase II TMDLs for the waterbodies where copper, nickel, and lead may be water quality-limiting (see Objectives T-1 and T-2).
- NJHDG is currently conducting monitoring to determine which metals are water quality-limiting. They will submit data by February 1996.
- NJHDG will submit a work plan for additional Phase II monitoring and modeling studies by September 1996.
- NJDEP will review and approve this work plan, in coordination with HEP, by December 1996.
- NJHDG will conduct the studies and submit load matrices for determining TMDLs by June 1998.
- USEPA, NYSDEC, and NJDEP will, by December 1998, revise TMDLs as appropriate.

ACTION T-13.2

Comprehensive System-wide Model for Mercury and Organic Chemicals

HEP recommends development of mass balances to assess the significance of current sources of organic chemicals and bioaccumulative mercury, as

well as sediment flux, in causing exceedances of criteria.

- HEP is working with USACE to develop a comprehensive toxics model. USACE prepared a "straw" proposal, which was reviewed by HEP. USACE developed a work plan in response to HEP comments. The work plan includes a data collection program for mercury and organic chemicals of concern and model development initially focusing on PCBs.
- Model development and calibration for PCBs would take five years.
- A comprehensive data collection program addressing PCBs, dioxin, PAHs, pesticides, and mercury would take three years, and given adequate funding, will include:
 - A comprehensive quantitative assessment of loads of chemicals;
 - An assessment of levels of chemicals in water, biota, and sediments of the Harbor/Bight; and
 - An assessment of environmental transport and fate of chemicals.
- The model would be "state-of-the-art", and, as appropriate, would be used to help define optimal management approaches to address exceedances, including reduction and elimination of continuing discharges and potential remediation of contaminated sediments, on a geographically specific basis.
- HEP recommends that USACE seek funds to continue the development of the model, including revising the modeling work plan to include a detailed data collection plan and cost estimates.
- HEP will develop and seek funding for a program of research to complement the toxics modeling effort.
- HEP recommends that USACE seek authorization and funding to conduct modeling and monitoring to address toxic contamination in the Harbor/Bight, not tied to dredged material management.

ACTION T-13.3

Simple Mass Balance for Mercury and Organic Chemicals

In parallel with development of the comprehensive System-Wide Toxics Model described in Action T-13.2, HEP recommends development of simple mass balances for mercury and organic chemicals of concern within one to three years, to be used to support interim management assessments of dredged sediment contamination.

HEP would use the simple mass balances to assess major sources of chemicals of concern on a Harbor-wide scale; whether significant reduction of the chemicals in dredged sediments can be achieved by reducing continuing inputs, and, if so, which sources and how long it will take; and to set quantitative load reduction goals. HEP will, given sufficient funding, assess whether implementation of actions in the CCMP will result in attainment of these goals (see Action T-12.13). Note that the simple mass balances which are developed primarily to meet dredged material management objectives can also be used to meet ambient water and biota tissue objectives.

- The Hudson River Foundation (HRF), under the auspices of HEP, and with support from USACE, the Port Authority of New York and New Jersey, and USEPA, has initiated a project to develop and validate an integrated mathematical model for the transport, fate, and bioaccumulation of PCBs, dioxin, and PAHs in the Estuary. An existing model will be updated with new data and expanded to include PCB congener-specific behavior. The effectiveness of various control scenarios will be evaluated using recent data on chemical loadings, in terms of effect on striped bass tissue contaminant levels, sediment contamination, and water quality. The project is a three-year effort; full funding is in place for the first year. Key products and time frames are as follows:
 - Updated predictions of PCB striped bass response given recent data and refined model (one year);
 - Development, application, and calibration of model to PCB congener-specific behavior, dioxin, and PAHs (within two years);

- Preliminary evaluations of various control scenarios on toxics response (two years); and
- Final evaluations of control scenarios and final report (three years).
- A complete model development program, however, must include data collection to calibrate the model. In particular, to develop substantially improved mass balances, data on loadings of chemicals of concern from important source categories at low detection levels are needed; it also may be necessary to collect data on ambient levels of the chemicals. This data collection program should be complete within one year.
- Following model development, HEP will use the model to assess control strategies. As noted above, some of this work is planned under the HRF project, but full funding has not been identified. Also, additional model runs may be required.
- HRF, USACE, and USEPA, under the auspices of HEP, are developing a work plan, including cost estimates, for the overall modeling program, to supplement the HRF project.
- USACE has indicated willingness to fund the model development program and will seek funds as necessary based on the work plan for the overall modeling program.
- HRF, the Port Authority of New York and New Jersey, and USACE are already committed to partial funding of the model development program. HEP recommends they continue to fund the program.
- HEP recommends that USEPA and/or other appropriate sponsors fund the portions of the overall modeling program related to use of the model to assess control scenarios.

ACTION T-13.4

Whippany River Comparative Mass Balance Study

NJDEP will conduct a comparative study to evaluate two differing strategies used to develop soil clean-up standards for hazardous waste sites. Both strategies use fate and transport modeling to assess mass balance of toxics originating from hazardous waste sites. NJDEP will assess mass balances of metals and organic chemicals originating from numerous

waste sites in the Whippany River basin, and estimate the contribution of the waste sites to contaminant levels in water, sediments, and biota. This project will be an additional component of NJDEP's Whippany River non-point source management program (see Action NPS-1.1 below) and related pilot projects (see Action H-2.1) and may help to focus implementation of management measures.

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the Toxics section of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to address toxic contamination. The toxics management component of the CCMP itemizes 38 new HEP-driven commitments operating through base programs. These actions represent a major commitment to CCMP implementation.

The toxics management component of the CCMP also includes 44 significant commitments and recommendations that entail enhanced program funding. As shown in Table 11(tc) below:

Ë The Plan includes 16 actions for which a total of \$4.531 million plus \$80,000 per year has been committed by the responsible entities.

Ë The Plan includes 21 actions for which increased funding of \$1.915 million plus \$1.75 million per year is recommended.
Ë The Plan includes 7 additional commitments and recommendations for action for which cost estimates will be developed during the continuing planning process.

The toxics management component also includes 9 actions that will or may require the expenditure of project implementation funds by responsible entities. As shown in Table 12(tc) below:

Ë The Plan includes 1 action for which \$30,000 will be required to be committed, and an additional 3 actions for which funds will be required to be committed, by the responsible entities, based on regulatory requirements now being developed or finalized.
Ë The Plan includes 5 actions for which additional funds may be required to be expended by responsible entities, based on the potential outcomes of several ongoing or planned HEP efforts.

The costs of implementation actions to address toxic contamination may be large. Cost estimates for these actions will be developed during the continuing planning process.

Table 11(tc). Enhanced Program Costs for Management of Toxic Contamination

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-1.1: Evaluate metals reduction in connection with Phase II TMDLs (NJ).	\$100,000			
ACTION T-1.2: Conduct monitoring per §308 letters for PCBs and dioxin.	\$200,000			
ACTION T-1.2: Conduct additional CWA §308 monitoring as required.			*	
ACTION T-1.2: Deploy PISCES to monitor for PCBs and other organic chemicals in NYC STP drainage areas.	\$216,000			
ACTION T-2.2: Focus pretreatment program on significant industrial users (NYC).	\$80,000	\$80,000		
ACTION T-5.1: Develop waste site inventory for chemicals of concern in the Harbor/Bight area.			\$150,000	
ACTION T-5.2: Expedite remediation of the most significant sites (actions beyond existing program resources).			*	
ACTION T-6.1: Track-down sources of chemicals of concern.				\$200,000
ACTION T-6.3: Track-down PCB sources in NY tributaries to the Harbor using PISCES.	\$32,000			
ACTION T-8.1: Identify the largest emitters of chemicals of concern in the Harbor/Bight area.			\$50,000	
ACTION T-8.1: Give these facilities priority for pollution prevention actions (actions beyond existing program resources).			*	
ACTION T-9.2: Identify additional areas of highly contaminated sediments; use available information and develop work plan for additional studies.			\$100,000	

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-10.1: Establish consistent risk assessment methodology.			\$100,000	
ACTION T-10.2: Review fish tissue criteria.			\$100,000	
ACTION T-10.3: Conduct advisory communication pilot projects.	\$129,000			
ACTION T-10.3: Implement favored approaches Harbor-wide.			*	
ACTION T-10.3: Develop regional approach to advisory communication.			\$75,000	
ACTION T-11.2: Prepare plan for developing and adopting new criteria (NJ).			\$45,000	
ACTION T-12.1: Develop ecosystem monitoring plan.			\$75,000	
ACTION T-12.1: Implement ecosystem monitoring.				\$500,000
ACTION T-12.1: Monitor productivity of local populations of marine birds; analyze tissue contaminant levels where impaired productivity and/or declining populations are found.			\$300,000	Cost included in \$500,000 estimate above
ACTION T-12.1: Adopt biocriteria as part of triennial reviews.			\$90,000	
ACTION T-12.2: Complete Phase I ambient water TIE.	\$100,000			
ACTION T-12.2: Conduct Phase I sediment TIE.	\$100,000		\$200,000	
ACTION T-12.2: Conduct Phase II sediment TIE.			\$200,000	
ACTION T-12.3: Update list of chemicals of concern.				\$50,000
ACTION T-12.4: Complete R-EMAP assessment.	\$1.5 million			
ACTION T-12.5: Conduct additional sediment studies.			*	
ACTION T-12.6: Assess tissue quality: Harbor/Bight.	\$450,000		*	
ACTION T-12.6: Assess tissue quality: Bight Apex.	\$200,000			
ACTION T-12.6: Assess lobster tissue quality in Bight Apex.	\$300,000			
ACTION T-12.6: Assess PCBs in striped bass.	\$350,000			

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-12.9: Develop and implement NJ water quality monitoring programs.				\$1 million
ACTION T-12.10: Conduct principal components analyses.	\$75,000			
ACTION T-12.12: Develop methods guidance for organic chemicals.			\$75,000	
ACTION T-12.13: Estimate chemical load reductions expected with CCMP implementation.			\$100,000	
ACTION T-13.1: Conduct monitoring/modeling for Phase II TMDLs.	\$360,000 + *			
ACTION T-13.2: Develop system-wide toxics model.			\$100,000 + *	
ACTION T-13.2: Develop and implement complementary research program.			*	
ACTION T-13.3: Develop simple mass balances including improved information on loadings and ambient monitoring.	\$339,000		\$155,000 + *	
TOTAL	\$4,531,000 ¹ + *	\$80,000/yr	\$1,915,000 ¹ + *	\$1,750,000/yr

* Enhanced program costs to be developed as part of the continuing planning process.

¹ Notation (+ *) indicates cost plus additional costs to be determined.

Table 12(tc). Project Implementation Costs for Management of Toxic Contamination

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-1.1: Comply with Phase I TMDLs for metals.	\$30,000			
ACTION T-1.1: Comply with Phase II TMDLs for metals.			*	
ACTION T-1.2: Implement track-down and clean-up of discharges of PCBs/dioxin.	*			
ACTION T-1.2: Implement track-down and clean-up of discharges of other chemicals.	*			
ACTION T-6.2: Comply with requirements of ambient track-down, as appropriate.			*	
ACTION T-9.1: Remediate known sites of contaminated sediments.	*			
ACTION T-9.2: Assess/remediate any additional contaminated sediments.			*	
ACTION T-13.2: Comply with any additional controls required as a result of system-wide toxics modeling.			*	
ACTION T-13.3: Comply with any additional actions required as a result of simple mass balances.			*	
TOTAL	\$30,000 + *		*	

* Project implementation costs to be developed as part of the continuing planning process.

BENEFITS OF IMPLEMENTING THIS PLAN

HEP's plan to address toxic contamination has two fundamental paths dedicated to solving the toxic contamination problem. These are proceeding concurrently and are closely linked: "Actions to Reduce Continuing Inputs of Toxic Chemicals" (Objectives T-1 through T-9), and "Actions to Better Understand the Toxic Contamination Problem and Take Additional Management Actions as More is Learned" (Objectives T-11 through T-13). With one exception noted below, current information is insufficient for those involved with HEP to know whether full implementation of the former group of actions will result in the achievement of HEP's goals; the latter group of actions is intended to give us this information.

Full implementation of the Actions to Reduce Continuing Inputs of Toxic Chemicals is, however, expected to result in substantial progress toward HEP's goal to establish and maintain a healthy and productive Harbor/Bight ecosystem with no adverse ecological effects due to toxic contamination. This

progress may be reflected in a reduction in fishery restrictions due to toxic contamination and an improvement in the quality of newly deposited sediments. Furthermore, implementation of controls required by Phase II TMDLs/WLAs for copper, nickel, and lead will assure the elimination of violations of water quality standards due to these metals throughout the Harbor.

HEP has defined several key actions which will help us assess more precisely what benefits we will achieve with implementation of the Actions to Reduce Continuing Inputs, what additional actions will be necessary to achieve HEP's goals, and how long it will take. Among the key actions are modeling and monitoring efforts to develop mass balances and set quantitative load reduction goals for chemicals of concern on two-year and five-year schedules (Actions T-13.3 and T-13.2, respectively), and an assessment, on a two-year schedule, to determine quantitatively what load reductions of chemicals of concern will be achieved with implementation of the CCMP (Action T-12.13).

Table 13(ts). Summary—Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTIONS TO REDUCE CONTINUING INPUTS OF TOXIC CHEMICALS				
<i>OBJECTIVE T-1: Reduce municipal discharges of chemicals of concern.</i>				
ACTION T-1.1: Control discharges of metals.				
-- Promulgate <u>Phase I TMDLs for metals</u> .	USEPA with concurrence of NYSDEC & NJDEP	Proposed: Completed Final: May 15, 1996	Base program	C/N
-- Incorporate limits based on Existing Effluent Quality into draft permits (Harbor-wide for mercury, and in Newark Bay, Kills, Raritan Bay/River, Passaic River, and Hackensack River for copper.	NYSDEC & NJDEP	Draft permits: Completed Final permits: Jun 30, 1996	Base program	C/N
-- Comply with Phase I TMDLs.	NYCDEP, Yonkers Sewer District, NJ dischargers	Jun 30, 1996	NYC and Yonkers: No additional project implementation cost NJHDG: \$30,000	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this final CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

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² C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- <u>Phase II TMDLs</u> : Revise/promulgate TMDLs for copper, nickel, and lead to include more stringent permit limits as necessary based on additional data collection and modeling (see T-13.1).	NYSDEC & NJDEP with USEPA assistance	Dec 1998	Base program	C/N
-- Incorporate limits, as necessary, into permits.	NYSDEC & NJDEP	Draft permit modifications: Jan 1999 Final permit modifications: Jul 1999	Base program	C/N
-- Evaluate the effectiveness of pretreatment, treatment optimization, corrosion control, and pollution prevention, to reduce metals loadings.	NJ dischargers	Completed	Enhanced program cost - \$100,000	C/N
	NYCDEP	Completed	Enhanced program completed	C/N
	Yonkers Sewer District	Completed	Enhanced program completed	C/N
-- Comply with Phase II TMDLs.	NYCDEP & NJ dischargers	To be determined based on Phase II TMDLs	Project implementation cost of continuing compliance to be provided by dischargers based on Phase II TMDLs	R
ACTION T-1.2: "Track-down and clean-up" significant discharges of organic chemicals of concern (Note: USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP, will coordinate development of this program, including identifying chemicals to be included, dischargers, monitoring techniques, and sampling methodologies. See text for details).				
-- Identify the levels of PCBs and dioxin in municipal discharges (Harbor-wide for PCBs; Newark Bay complex for dioxin).				

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² C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
• Require monitoring using CWA Section 308 letters.	USEPA	Completed	Base program	C/N
• Conduct monitoring and submit report.	NYCDEP	Completed	Enhanced program cost - \$79,000	C/N
	NJ Harbor Dischargers Group (NJHDG)	Completed	Enhanced program cost - \$120,000	C/N
	Yonkers Sewer District	Completed	Enhanced program cost - minimal (less than \$1,000)	C/N
• Review data to identify significant municipal discharges of PCBs; develop program to track-down and abate the sources of PCBs to their systems.	USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Apr 30, 1996	Base program	C/N
• Implement track-down and clean-up program for PCBs.	NYCDEP, Yonkers Sewer District, NJHDG	Apr 30, 1996	Project implementation cost to be estimated by dischargers based on monitoring results	C/N
! Deploy PISCES for a 12-month period in the influent streams of the 14 NYC STPs to monitor for PCBs and other organic chemicals.	NYCDEP	Newtown Creek: Deployed Jun 1995 Other areas: Deployed Jul 1995	Enhanced program cost - \$216,000 over 3 yrs	C/O

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² C/O - An ongoing commitment, not driven by the HEP CCMP
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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
! Submit report to NYSDEC proposing the STP drainage basins in which track-down will be pursued, considering the results of the monitoring conducted under the Section 308 letters.	NYCDEP	Dec 1996	Cost included in above estimate	C/N
! Follow up with additional track-down efforts.	NYCDEP	By Dec 31, 1998	Cost included in above estimate	C/N
• Review the data to assess whether dioxin is being discharged.	USEPA, NYSDEC, NJDEP, under the auspices of HEP	Completed	Base program	C/N
-- Review available information on other organic chemicals of concern to determine whether dischargers should identify the levels of these chemicals in their discharges.	USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Jul 1997	Base program	C/N
-- Determine which dischargers should identify the levels of these chemicals in their discharges.	USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Sep 1997	Base program	C/N
• Conduct screening of these discharges to identify the levels of chemicals being discharged, and submit report, as necessary.	Municipal & industrial dischargers, as appropriate	Sep 1998	Enhanced program cost to be provided by dischargers based on monitoring requirements	R
• Implement program to track-down and abate sources of other chemicals of concern if significant discharges are found, or proceed to develop TMDLs/WLAs/LAs.	USEPA, NYSDEC, NJDEP, and dischargers as appropriate, under the auspices of HEP	Dec 1998	Base program	C/N

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- Review new information and report on whether additional chemicals should be considered for track-down and clean-up.	USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Dec 1996 & biennially thereafter	Base program	C/N
OBJECTIVE T-2: Reduce industrial discharges of chemicals of concern.				
ACTION T-2.1: Assure continuing compliance with permit conditions for direct industrial discharges.	NYSDEC, NJDEP, ISC	Ongoing	Base program	C/O

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² C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-2.2: Ensure that municipalities in the Harbor/Bight area focus their pretreatment programs on significant industrial users, and additional users as necessary, not just categorical industrial users.	NYSDEC & NJDEP	Ongoing	Base program	C/O
	NYCDEP	Began Jul 1994	Enhanced program cost - \$80,000/yr	C/N
-- Modify pretreatment program to reduce discharges of metals and other chemicals:	NYCDEP			
<ul style="list-style-type: none"> Add 40 automobile radiator repair shops to the pretreatment program. 		Began Jul 1994	Enhanced program cost - \$80,000	C/N
<ul style="list-style-type: none"> Develop an industrial control strategy for photo finishers. 		Submitted to NYSDEC Jun 1995		
-- Modify pretreatment program to reduce discharges of tetrachloroethylene:	NYCDEP		Base program (NYCDEP has committed \$100,000 for this effort)	C/O
<ul style="list-style-type: none"> Amend Sewer Use Regulation. 		Completed		
<ul style="list-style-type: none"> Inventory dry cleaning industry and notify. 		Completed Jan 1, 1996		
<ul style="list-style-type: none"> Investigate other potential sources. 		Dec 31, 1996		
ACTION T-2.3: Direct industrial dischargers are subject to the requirements to control loadings of metals (see T-1.1), as well as consideration for track-down and clean-up of organic chemicals of concern (see T-1.2).				
ACTION T-2.4: Publish biennial plans to identify industries discharging pollutants and establish schedules for promulgation of effluent guidelines; promulgate guidelines.	USEPA	Proposed biennial plan May 1994	Base program	C/O

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² C/O - An ongoing commitment, not driven by the HEP CCMP
 C/N - A new commitment, driven by the HEP CCMP
 R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
OBJECTIVE T-3: Minimize the discharge of toxic chemicals from CSOs, storm water, and non-point sources (Note: see section on Rainfall-Induced Discharges).				
OBJECTIVE T-4: Reduce air emissions of chemicals of concern.				
ACTION T-4.0: Implement Clean Air Act requirements.				
-- Enforce existing air regulations limiting the emissions of toxic pollutants.	USEPA, NYSDEC, NJDEP	Ongoing	Base program	C/O
-- Develop emission standards for HAPs based on the maximum achievable control technology for major source categories.	USEPA	By Dec 31, 2000	Base program	C/O
-- Develop regulations for area or small sources of HAPs.	USEPA	By Dec 31, 2000	Base program	C/O
OBJECTIVE T-5: Remediate identified solid and hazardous waste sites.				
ACTION T-5.1: Using existing state priority lists for hazardous waste sites, develop a GIS-based integrated inventory of active and inactive solid and hazardous waste sites in the Harbor/Bight area, contributing or potentially contributing toxics to the Harbor/Bight.	USEPA, NYSDEC, NJDEP, with assistance from NYCDEP, under the auspices of HEP	Jun 1996	Enhanced program cost - \$150,000	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-5.2: Develop site-specific schedules to expedite clean closure or remediation of the most significant sites.				
-- For publicly funded sites.				
• As feasible within existing resources.	USEPA, NYSDEC, NJDEP	Begin by Jun 1996	Base program	C/N*
• To the extent existing resources are insufficient to address priority sites in the Harbor/Bight drainage area, identify and seek additional resources.	USEPA, NYSDEC, NJDEP	Jun 1996	Enhanced program costs to be identified based on Action T-5.1 ³	C/N*
-- For privately funded sites.	USEPA, NYSDEC, NJDEP and principal responsible parties	To be negotiated with responsible parties	To be negotiated with responsible parties ³	R
OBJECTIVE T-6: Track-down and clean-up chemicals of concern.				
ACTION T-6.1: Conduct screening for ambient levels of organic chemicals and mercury in the Harbor/Bight in proximity to potential sources, using sensitive sample monitoring techniques.	USEPA, NYSDEC, NJDEP, under the auspices of HEP	Begin by Jun 1996	Enhanced program cost - \$200,000/yr	R
ACTION T-6.2: Where significantly elevated levels are found, initiate procedures to track-down and eliminate or require the elimination of sources, giving priority to the most significant sources.	USEPA, NYSDEC, NJDEP, under the auspices of HEP	Begin by Jun 1996	Enhanced program cost included in estimate for Action T-6.1	C/N**

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R - Recommendation

³ Note: Costs may range from \$60,000 to \$450,000 per acre, depending on the level of closure or remediation needed, and considering prioritization.

* Commitment contingent on completion of Action T-5.1.

** Commitment contingent on completion of Action T-6.1 and funding of the track-down.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- Comply.	Regulated entities	Begin by Jun 1996, as appropriate	Project implementation cost to be determined on case-by-case basis based on sources to be eliminated	R
ACTION T-6.3: Track-down PCB sources in New York tributaries to the Harbor using PISCES.				
-- Screen for elevated PCB levels in Harbor tributaries, and identify possible PCB sources in those tributaries.	NYSDEC	Completed	Enhanced program cost - \$32,000	C/O
-- Develop SPDES permit prohibiting storm water discharges of PCBs from identified facility discharging to Mill Creek, SI.	NYSDEC	By Dec 1996	Base program	C/N
-- Conduct additional work to evaluate other possible PCB sources to Mill Creek and to identify possible PCB sources in other Harbor tributaries where elevated levels were found.	NYSDEC	Begin by Jan 1996	Enhanced program cost included in Action T-6.1	R
OBJECTIVE T-7: Improve chemical/oil spill response and prevention.				
ACTION T-7.0: Review the area contingency plan and recommendations of the final report of the Bi-state Oil Spill Response and Prevention Conference, and incorporate, as appropriate, into the CCMP.	HEP	Dec 1996	Base program	C/N
-- Provide relevant information to USCG and the Bi-State Conference to assist updates of the area contingency plan.				

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² C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
OBJECTIVE T-8: Focus pollution prevention activities on chemicals of concern.				
ACTION T-8.1: Review TRI and other data for industrial facilities in areas draining to the Harbor core area to identify the largest emitters of chemicals of concern.	NYSDEC & NJDEP, under the auspices of HEP	Jun 1996	Enhanced program cost - \$50,000	R
-- Give these facilities highest priority for pollution prevention actions including those found in T-8.3 through T-8.5, to the extent feasible within existing resources.	NYSDEC & NJDEP	Begin by Jun 1996	Base program	C/N*
-- To the extent existing program resources are insufficient to address Harbor/Bight priorities, identify and seek additional resources.	NYSDEC & NJDEP	Begin by Jun 1996	Enhanced program cost estimate to be developed by NYSDEC & NJDEP based on Action T-8.1	C/N*
ACTION T-8.2: Implement non-regulatory pollution prevention.				
-- Under the NJ State Pollution Prevention law, develop and report annually on a multi-media pollution prevention plan.	Priority industrial facilities in NJ	Ongoing	Base program	C/O
-- Seek commitments for voluntary reductions in releases of chemicals of concern to all media.	HEP	Ongoing	Base program	C/N
-- Promote measures which can be implemented by citizens to reduce releases of chemicals of concern. (Note: see public involvement section).	HEP	Ongoing	Base program	C/N

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C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

* Commitment contingent upon completion of Action T-8.1.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-8.3: Evaluate a Facility-Wide Permit (FWP) approach, to integrate the air, water, and hazardous waste permits from a facility with its pollution prevention plan.				
-- Conduct pilot project to evaluate FWP approach.	NJDEP	Complete by Aug 1997	Base program	C/O
-- Seek legislative approval to implement approach as appropriate.	NJDEP	Aug 1997	Base program	C/O
ACTION T-8.4: For regulatory programs under state purview:				
-- Add pollution prevention plan requirements, addressing the chemicals of concern, to NPDES renewal permits, permit modifications, and new permits.	NYSDEC	Begin by Jun 1996	Base program	C/N*
-- Consider, if given the legislative authority, adding pollution prevention requirements addressing the chemicals of concern to NPDES renewals and permit modifications.	NJDEP	Begin by Jun 1996	Base program	C/N*
ACTION T-8.5: Require hazardous waste treatment, storage, and disposal facilities in the Harbor/Bight area, that manage one or more of the chemicals of concern, to submit and implement a pollution prevention plan.	USEPA & NYSDEC	Begin by Jun 1996	Base program	C/N*
-- Target RCRA inspections for RCRA hazardous waste generators in the Harbor/Bight area that manage one or more of the chemicals of concern.	USEPA, NYSDEC, NJDEP	Begin by Jun 1996	Base program	C/N*

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² C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

* Commitment contingent upon completion of Action T-8.1.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
OBJECTIVE T-9: Identify and remediate selected contaminated sediments.				
ACTION T-9.1: Take appropriate steps to remediate known areas of highly contaminated sediments.				
-- Issue ROD for the Passaic River Study Area, considering impacts on the Estuary as a whole. (Note: USEPA will provide relevant data and/or model to HEP and, in selecting a remedy, will consider the results of HEP's effort under Action T-13.3, if completed prior to issuance of the ROD).	USEPA	By Dec 31, 1997	Base program	C/O
• Remediate site, as appropriate.	USEPA & Potentially Responsible Parties	To be determined based on ROD	Project implementation cost to be determined based on ROD	C/O
-- Submit proposed remedial plan for Hudson River PCB site for public review.	USEPA	Mar 1997	Base program	C/O
-- Issue ROD for Hudson River PCBs Superfund site considering impacts on the Estuary. (Note: In developing the ROD, USEPA will provide relevant data to HEP and, in selecting a remedy, will consider the results of HEP's effort under Action T-13.3, if completed prior to issuance of the ROD).	USEPA	Sep 1997	Base program	C/O
• Remediate site, as appropriate.	USEPA & Potentially Responsible Parties	To be determined based on ROD	Project implementation cost to be determined based on ROD	C/O

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² C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- Complete remediation of Marathon Battery Superfund site.	USEPA & Potentially Responsible Parties	Completed	Paid by Potentially Responsible Parties	C/O
• Begin long-term monitoring of Marathon Battery site.	USEPA & Potentially Responsible Parties	Fall 1995	Paid by Potentially Responsible Parties	C/O
ACTION T-9.2: Identify additional areas of highly contaminated sediments for more in-depth assessment, including feasibility of and need for remediation.				
-- Identify areas and assess feasibility based on available data and information.	USEPA, NYSDEC, NJDEP, USACE, under the auspices of HEP	Sep 1996	Enhanced program cost - \$100,000	R
-- Develop work plan including cost estimate for additional studies to identify areas of highly contaminated sediments.	USEPA, NYSDEC, NJDEP, USACE, under the auspices of HEP	Sep 1996	Enhanced program cost included in above estimate	R
-- Initiate action to assess and remediate additional sites, as appropriate.	USEPA, NYSDEC, NJDEP, Potentially Responsible Parties	Begin by 1996 as necessary	Project implementation cost to be determined as areas identified	R
ACTIONS TO MINIMIZE HUMAN HEALTH RISKS				
<i>OBJECTIVE T-10: Establish consistent methodology to assess risk and improve communication of fish advisories.</i>				
ACTION T-10.1: Establish a consistent methodology as appropriate to assess human health risks due to the consumption of locally-caught seafood, and to set fishing advisories and restrictions.	NYSDOH, NYSDEC, NJDEP, NJDOH	Jun 1996	Enhanced program cost - \$100,000	R
-- Prepare report documenting NY & NJ methodologies for assessing health risks.	NYSDOH, NYSDEC, NJDEP, NJDOH	Jun 1996	Cost included in above estimate	R

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² C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-10.2: Review fish tissue criteria and recommend steps to adopt and implement revised criteria as appropriate (Note: also see Objectives T-11 and T-12, re: criteria review and development).	NYSDEC, NYSDOH, NJDEP, NJDOH, USEPA	Jun 1996	Enhanced program cost - \$100,000	R
ACTION T-10.3: Target additional risk communication efforts to those sub-populations at greatest risk..				
-- Conduct pilot projects to tailor advisory communication plans to local communities.	NYSDEC	Oct 1996	Enhanced program cost - \$40,000	C/O
	NJDEP	Sep 1996	Enhanced program cost - \$89,000	C/O
-- Implement favored approaches Harbor-wide.	NJDEP	Beginning Oct 1996	Enhanced program cost estimate to be developed by NYSDEC & NJDEP depending on approaches to be implemented	R
	NYSDEC	Oct 1996		
-- Develop regional approach to advisory communication.	NYSDOH, NYSDEC, NJDEP, with USEPA assistance	Oct 1996	Enhanced program cost - \$75,000	R
ACTIONS TO BETTER UNDERSTAND AND MANAGE THE PROBLEM				
<i>OBJECTIVE T-11: Review and develop criteria for copper and other priority chemicals.</i>				
ACTION T-11.1: Adopt site-specific water quality criteria for copper in New York and New Jersey water quality standards regulations.	NYSDEC	Apr 1996	Base program	C/N
	NJDEP	Jun 1996	Base program	C/N
ACTION T-11.2: Analyze existing applicable criteria and adopt new and revised criteria as appropriate for priority chemicals.				

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- Prepare a plan for developing and adopting new and revised criteria.	USEPA, NYSDEC, NJDEP, under auspices of HEP	Jul 1996	USEPA & NYSDEC: Base program	C/N
			NJDEP: Enhanced program cost - \$45,000	R
-- Adopt water quality criteria for dissolved lead and nickel.	NYSDEC	Apr 1996	Base program	C/N
	NJDEP	Dec 1996		
-- Consider adopting water quality criteria for other dissolved metals as appropriate as part of triennial review.	NYSDEC	Jan 1996	Base program	C/N
	NJDEP	Dec 1996		
OBJECTIVE T-12: Assess ambient levels, loadings, and effects of chemicals.				
ACTION T-12.1: Develop ecosystem indicators as quantitative goals and biocriteria, and implement long-term monitoring of the indicators.				
-- Develop benthic index based on R-EMAP and other data.	HEP	Apr 1996	Part of R-EMAP assessment (See Action T-12.4)	C/N
-- Develop long-term monitoring program for benthic index and other indicators.	USEPA, NYSDEC, NJDEP, under auspices of HEP	Jun 1996	Enhanced program cost - \$75,000	R
-- Implement long-term monitoring program.	USEPA, NYSDEC, NJDEP, under auspices of HEP	Begin by summer 1996	Enhanced program cost - \$500,000/yr	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- Monitor size and productivity of local populations of herons, egrets, gulls and/or terns, focusing on colonies in the Harbor core area.	HEP, NYSDEC, NJDEP, USDOJ/NPS	Spring 1996	Enhanced program cost - \$15,000/yr (Note: included in above estimate)	R
-- Analyze contaminants in bird tissues in cases of low productivity and/or declining bird populations.	HEP, NYSDEC, NJDEP, USDOJ/NPS	Initiate in 1997; Complete by Dec 31, 1998	Enhanced program cost - \$300,000 over two years	R
-- Adopt biocriteria based on the benthic index and other indicators as appropriate as part of triennial review.	NYSDEC & NJDEP	Begin by Dec 31, 1997	Enhanced program cost - \$90,000	R
ACTION T-12.2: Where evidence of adverse ecological effects of toxics is found, conduct studies to evaluate whether, and if so which, chemicals are responsible.				
-- Complete Phase I TIE on ambient water.	HEP	Completed	Enhanced program cost - \$100,000	C/N
-- Conduct Phase I TIE on interstitial water and whole sediment from several sites in the Harbor.	USEPA	Completed	Enhanced program cost - \$100,000	C/O
-- Conduct Phase I sediment TIE program to identify contaminants causing toxicity or impaired benthos Harbor-wide, including dredged sediment.	HEP, in coordination with USEPA, USACE, NYSDEC, NJDEP	Jun 1996	Enhanced program cost - \$200,000	R
-- Conduct Phase II sediment TIE program to identify contaminants causing toxicity or impaired benthos Harbor-wide, including dredged sediment.	HEP, in coordination with USEPA, USACE, NYSDEC, NJDEP	Dec 1996	Enhanced program cost - \$200,000	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-12.3: Revise and update the list of chemicals of concern in the Harbor/Bight based on new information including new and revised criteria and new data on levels of chemicals in water, biota, and sediments.				
-- Modify list based on readily available and summarized new data and information.	HEP	Dec 1995 & annually thereafter	Base program	C/N
-- Modify list based on comprehensive data assessment.	HEP	Dec 1996 & biennially thereafter	Enhanced program cost - \$50,000/yr (work to be conducted biennially)	R
ACTION T-12.4: Complete R-EMAP baseline sediment quality assessment.	USEPA in coordination with HEP	Apr 1996	Enhanced program cost - \$1.5 million	C/O
ACTION T-12.5: Conduct additional studies to assess sediment quality.				
-- Develop work plan including cost estimates for priority studies.	HEP	Mar 1996	Base program	C/N
-- Conduct studies.	HEP	Begin by Sep 1996	Enhanced program cost to be determined based on work plan	R
ACTION T-12.6: Assess fish, shellfish, and crustacea tissue quality.				
-- Assess levels of chemicals in tissues of edible fish, shellfish, and crustacea in the Harbor/Bight.	HEP	Draft reports: Completed Final reports: Jul 1996	Enhanced program cost - \$450,000	C/N

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
-- Assess levels of chemicals in recreational finfish in Bight Apex.	NMFS, USEPA, USACE	Completed	Enhanced program cost - \$200,000	C/O
-- Assess levels of chemicals in lobsters in Bight Apex.	NMFS, USEPA, USACE	Mar 1996	Enhanced program cost - \$300,000	C/O
-- Assess levels of PCBs in striped bass in NY State marine waters.	NYSDEC	Completed	Enhanced program cost - \$350,000	C/O
-- Conduct future periodic fish tissue monitoring based on the results of the above studies.				
• Develop work plans and seek funding.	HEP	Jul 1996	Base program	C/N
• Conduct monitoring.	HEP or other responsible entity	Beginning Fall 1996	Enhanced program cost to be determined based on above work plan	R
ACTION T-12.7: Use new information on tissue quality to identify additional data collection needs to support modifications to fishing advisories and restrictions.	NYSDEC, NYSDOH, NJDEP, NJDOH	Mar 1996	Base program	C/N
-- Use new information on tissue quality to modify fishing advisories and restrictions, as appropriate.	NYSDEC & NYSDOH	Feb 1996	Base program	C/N
ACTION T-12.8: Continue New York Harbor Water Quality Survey at current levels of effort.	NYCDEP	Ongoing	Base program	C/O
ACTION T-12.9: Develop and implement a similar long-term water quality monitoring program.	NJDEP	Dec 1995	Enhanced program cost - \$1 million/yr	R

¹ Responsible entities may accomplish the actions directly or via contract or grant.

² C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-12.10: Conduct principal components analyses for PCBs, dioxin, and PAHs for sediment samples from R-EMAP and several other available data sets.	USEPA	Apr 1996	Enhanced program cost - \$75,000	C/O
ACTION T-12.11: Review available information on atmospheric deposition to the Harbor/Bight developed by HEP under Actions T-12.13 & T-13.3, and incorporate in Great Waterbodies Report to Congress biennial update; specify additional steps and regulatory revisions, as appropriate, to address atmospheric deposition of toxic chemicals to the Harbor/Bight.	USEPA, in coordination with HEP	By Dec 31, 1997	Base program	C/N
ACTION T-12.12: Implement low-level detection methods for loadings.				
-- Develop guidance specifying appropriate methods, and work with regulated parties as necessary to ensure the collection of high quality loadings data [Note: Effort ongoing in connection with CWA Section 308 letters (See Actions T-1.1 and T-1.2)].				
• For metals.	USEPA, NYSDEC, NJDEP	Ongoing	Base program	C/N
• For organic chemicals such as PCBs and dioxin.	USEPA, NYSDEC, NJDEP	Jun 1996	Enhanced program cost - \$75,000	R
-- Incorporate the methods for metals into monitoring requirements for NPDES, CSO, and storm water permits.	USEPA, NYSDEC, NJDEP	Jun 1996	Base program	C/N

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C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-12.13: Estimate chemical load reductions expected with implementation of HEP CCMP.	HEP	Sep 1996	Enhanced program cost - \$100,000	R
-- Use the information to help determine whether CCMP actions will result in attainment of load reduction goals (see Action T-13.3) and how long it will take; identify additional actions to meet the goals as necessary.		Dec 1996 (See Action T-13.3)		
OBJECTIVE T-13: Develop mass balances for metals and organic chemicals.				
ACTION T-13.1: Conduct additional monitoring and modeling to support revised (Phase II) TMDLs for water quality-limiting metals.	NJ Harbor Dischargers Group (NJHDG)	Complete Jun 1998	Enhanced program cost - \$360,000	C/N
-- Submit water and sediment quality data.	NJHDG	Feb 1996	Cost included in above estimate	C/N
-- Submit work plan for Phase II monitoring and modeling studies.	NJHDG	Sep 1996	Cost included in above estimate	C/N
-- Approve work plan for Phase II studies.	NJDEP	Dec 1996	Base program	C/N
-- Submit load matrices for determining TMDLs.	NJHDG	Jun 1998	Enhanced program cost to be determined based on work plan	C/N

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C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-13.2: Develop a comprehensive toxics model, including defining goals and objectives, scope, and costs. Work plan to include monitoring program.				
-- Develop work plan.	USACE, under the auspices of HEP	Completed	Base program	C/N
-- Revise work plan, including monitoring plan.	USACE, under the auspices of HEP	Sep 1996	Enhanced program cost - \$100,000	R
-- Seek authorization and funding to conduct modeling and monitoring to address toxic contamination in the Harbor/Bight, not tied to dredged material management.	USACE	Ongoing	Base program	C/N
-- Conduct monitoring and develop the model, and use as appropriate, to help define optimal approaches to reduce and eliminate discharges of toxic chemicals and potential remediation of contaminated sediments.	USACE under auspices of HEP	By Dec 31, 2000	Enhanced program cost to be determined based on detailed revised work plans	R
-- Develop and seek funding for a program of research to complement the toxics modeling effort.	HEP	Sep 1996	Base program	C/N*
-- Comply with controls which may be required as a result of improved understanding.	Regulated parties	By Dec 31, 2000	Project implementation cost to be determined based on controls required	R

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R - Recommendation

* Commitment contingent on funding for completing modeling work plans.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY ¹	TARGET DATE	ESTIMATED COST	STATUS ²
ACTION T-13.3: Develop simple mass balances for mercury and organic chemicals of concern (Note: see text for details).				
-- Develop and validate an integrated model of organic chemical transport, fate, and bioaccumulation using an existing model.	Hudson River Foundation, under the auspices of HEP & with USACE, Port Authority, and USEPA support	Interim result: Jun 1996	Enhanced program cost - \$161,000	C/N
		Final: Jun 1998	Enhanced program cost - \$178,000	C/N
			Enhanced program cost - \$155,000	R
-- Develop overall modeling program work plan to supplement the above effort.	HRF, USEPA, and USACE, under the auspices of HEP	Feb 1996	Base program	C/N
-- Collect data for model development, including chemical loadings and ambient levels.	USACE or other sponsors, under the auspices of HEP	Complete Dec 1996	Enhanced program cost to be determined based on work plan	R
-- Use the model to assess control scenarios.	USEPA or other sponsors, under the auspices of HEP	Jun 1997 through Jun 1998	Enhanced program cost to be determined based on work plan	R
ACTION T-13.4: Conduct comparative study in the Whippany River Basin to assess the use of two mass balance strategies in development of soil cleanup standards for hazardous waste sites.	NJDEP	Dec 1996	Base program	C/O

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R - Recommendation