Department of Environmental Conservation

Division of Water

Oswego River Remedial Action Plan

Stage II

June 1991

New York State Department of Environmental Conservation
MARIO M. CUOMO, *Governor* THOMAS C. JORLING, *Commissioner*

OSWEGO RIVER

REMEDIAL ACTION PLAN

STAGE II

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This Oswego River Remedial Action Plan, Stage II, was prepared by the New York State Department of Environmental Conservation in cooperation with the Oswego River Citizens' Advisory Committee.

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[1]This document is a continuation of the Stage I Oswego River Remedial Action Plan:

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CHAPTER 7

STAGE II - INTRODUCTION

INTRODUCTION

The International Joint Commission (IJC) has identified 43 Areas of Concern (AOC) in the Great Lakes drainage basin where pollutants are impairing beneficial uses of a waterbody. The Oswego River is one of these AOC's because: 1) past industrial and municipal discharges have contaminated the river and its bottom sediments, and 2) pollutants from the river's drainage basin have traveled through the river and harbor to Lake Ontario, adding to that lake's environmental problems.

New York State, the other Great Lakes states and the Province of Ontario, are preparing Remedial Action Plans (RAPS) for the remediation of the problems in these Areas of Concern under the requirements of the United States-Canada Great Lakes Water Quality Agreement (GLWQA). The plans are to serve as an important step toward virtual elimination of persistent toxic substances and toward restoring and maintaining the chemical, physical, and biological integrity of the Great Lakes Basin Ecosystem.

A RAP embodies an aquatic ecosystem approach to restoring and protecting the biota and water quality in the AOC. Correction of these problems in the AOC will contribute to overall improvement of environmental conditions in the river and in the Great Lakes system.

As a first step in preparing the Oswego RAP, the New York State Department of Environmental Conservation (NYSDEC) formed a Citizens' Advisory Committee that includes residents of the Oswego River Basin, industry representatives, outdoor sports enthusiasts, environmentalists, research scientists and local government representatives. NYSDEC staff and the Citizens' Advisory Committee worked together to develop the Oswego RAP.

Development of RAPs is a three stage process. Stage I (February, 1990) describes the environmental problems and impaired uses of the AOC, the pollutants causing impairments of uses, and the sources of those pollutants. Stage II (this document) describes a remedial strategy, recommends remedial actions, makes specific remedial commitments and describes methods for monitoring remedial progress in the AOC. Periodic progress reports will be necessary during the implementation of the Stage II RAP. This is discussed in more detail in Chapter 12. Finally, when monitoring results indicate the beneficial uses of the AOC have been restored, a Stage III RAP documenting the restoration is to be submitted to the International Joint Commission.

Thus, the RAP will be a continuing process for remediating known problems and to carry out investigations needed to further identify water quality impairments and their causes. NYSDEC will use the RAP as a basis for deciding on remedial priorities, to seek support from funding agencies and to commit to specific remedial actions.

To emphasize the continuity of the first two stages of the RAP, the chapter numbering of this Stage II document begins where the Stage I report ended. Thus, chapter 7 of the Oswego RAP is the first Stage II chapter. Details of water quality impairments and potential sources discussed in Stage I will not be repeated in Stage II. For detailed evidence of impairments and sources the reader is referred to the Stage I RAP which is available from NYSDEC.

In Stage II, current remedial and control programs are evaluated, and remedial recommendations and commitments are developed in response to the problems and sources identified in Stage I. The remedial strategy aims to restore the water quality within the Oswego Harbor and lower river, and to eliminate adverse impacts to Lake Ontario from pollutants carried by the Oswego River.

The RAP also describes a long-term strategy for tracking remedial progress and reporting that progress to the public, for making further agency commitments and for revising the overall remedial strategy as more information becomes available.

Priorities are established for gathering additional data on water quality indicators for which insufficient information is available to evaluate an impairment (the six indicators referred to as "low confidence" or "unknown" in Stage I).

STAGE I SUMMARY

Background

The Oswego River, with its harbor to Lake Ontario, is a valuable natural resource for industry, commerce and recreation in central New York State. The lower Oswego River (and Oswego Harbor) can be characterized as a multiple-use resource: manufacturing plants, commercial storage facilities and locks to accommodate canal navigation line the shore along with charter docks, a marina, restaurants and services for recreational harbor users and tourists. Tourism and commercial activity generated by the sport fishery are important to the area's economy.

The average water flow into the Oswego Harbor from the Oswego River is 4.2 billion gallons per day. This includes runoff from more than three million acres of urban, rural, and agricultural land. The Oswego River and its associated tributaries drain a 5,000 square mile watershed, the second largest in New York State.

The waters of the Oswego include the drainage from the hills above the Finger Lakes and treated discharge from sewage treatment plants and industries as far from Oswego as Canandaigua and Ithaca. A dominant urban core (Syracuse and its suburbs) is within the basin, as are eight smaller cities and dozens of villages. There are extensive areas of farmland and forest, and scattered shoreline development.

The health of the entire river system is vital to the more than 1.2 million people who live in the drainage basin. A variety of industries use the river basin's water for processing, cooling, and discharging treated wastes. The waters of the river also provide habitat for a variety of fish and waterfowl. The Oswego is second in size only to the Niagara River as a tributary to Lake Ontario. Pollutants carried by the Oswego River also affect the health of Lake Ontario's ecosystem.

Environmental Setting

The Area of Concern (AOC) is located on the southeastern shore of Lake Ontario and is centered in the City of Oswego (Figure 7-1). Since the IJC did not precisely define the Oswego River AOC, NYSDEC on the advice of the Oswego River Citizens Advisory Committee, defined it as: the area at the mouth of the Oswego River bounded by the breakwalls and an imaginary line connecting the breakwalls; the Oswego River as far south as the first barrier, the Varick dam; and the shoreline area from the breakwall on the west to a point on shore where a line extended from the breakwall on the east would meet the shore (Figure 7-2).

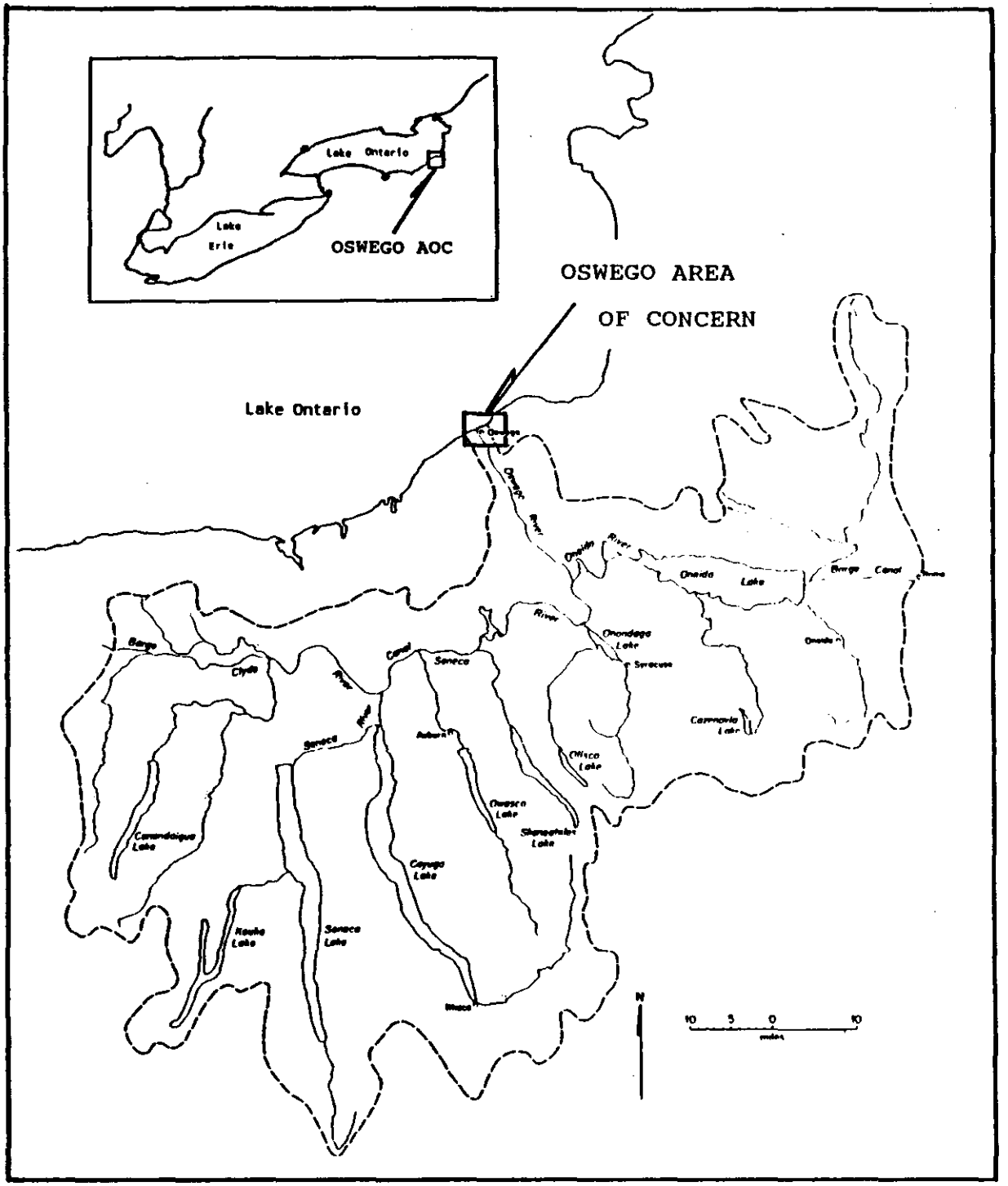

Figure 7-1

The Oswego River Area of Concern Location and the Seneca-Oswego-Oneida Rivers Basin

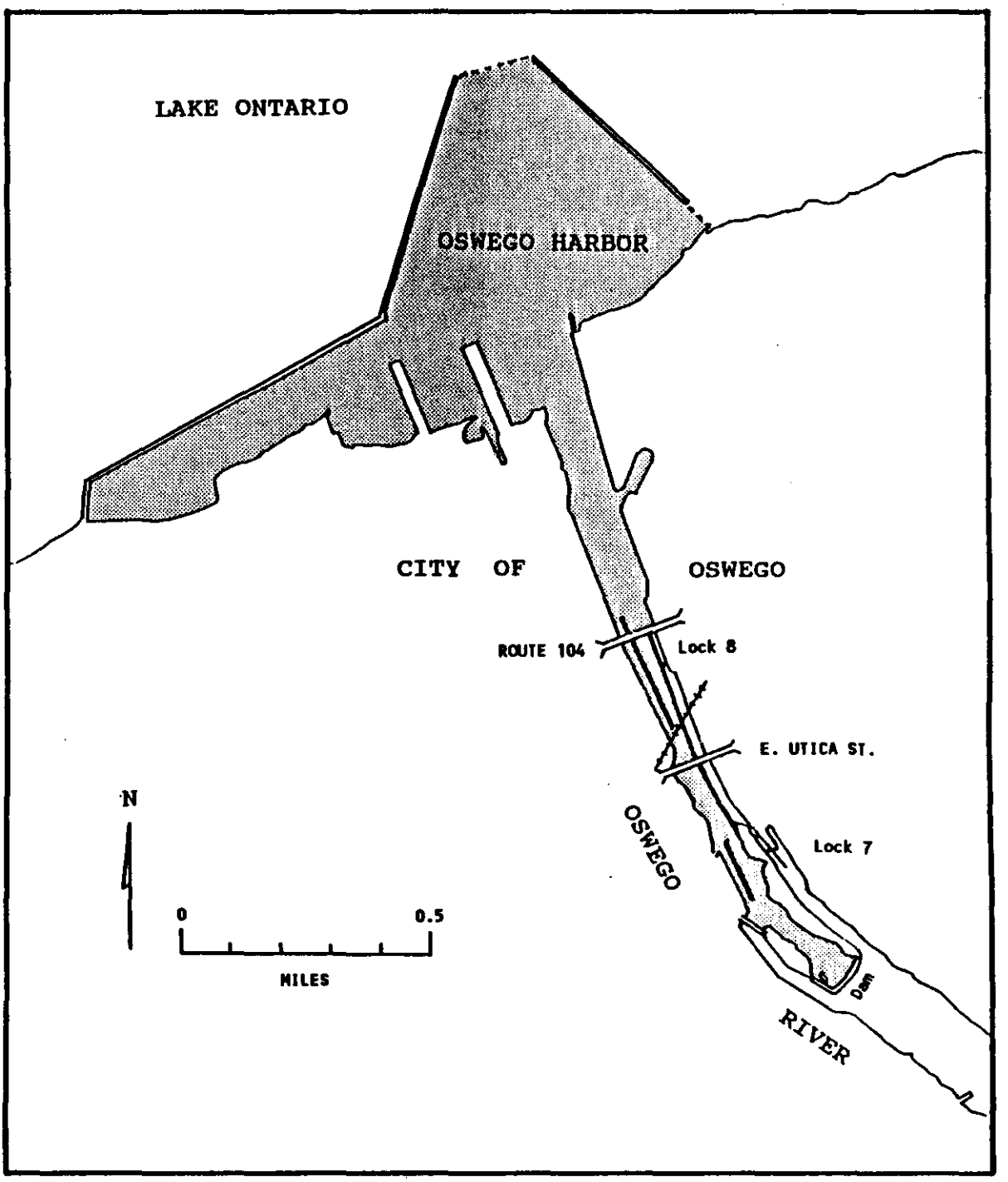

Figure 7-2
The Oswego River Area of Concern

Goal

The Goal of the Remedial Action Plan, as established by the New York State Department of Enviornmental Conservation and the Citizens' Committee is three-fold:

1. to achieve the purposes of the Great Lakes Water Quality Agreement within the Oswego Area of Concern;

2. to restore the water quality of the AOC so that it is capable of supporting swimming and an edible, diverse, and self-sustaining fishery; and

3. to eliminate adverse impacts to Lake Ontario arising from the Oswego-Oneida-Seneca basin.

Problems: Water Quality Impairments and Pollutants

The RAP identifies water quality problems in the Oswego River Area of Concern, including potential adverse impacts to Lake Ontario. A two-step process was used for preparation of the Stage I RAP. Step 1 involved the identification of impaired uses in the Area of Concern, including human uses such as swimming, fishing and commercial navigation, as well as those water quality factors affecting fish and wildlife. Step 2 identified the causes of use impairments based on best available scientific evidence. In some cases, limited data were available to identify use impairments and their causes. Further research is needed to collect additional evidence on impairments. The terms "high confidence" and "low confidence" are used to describe the degree of certainty of the findings based on the sufficiency of available data.

Oswego River Area of Concern Water Quality Impairments

NYSDEC and the Citizen's Advisory Committee (CAC) examined information on the water quality in the harbor and lower Oswego River. This information included pollutant concentrations in the water, bottom sediments and in fish and aquatic life. It was compared against the fourteen water quality impairment indicators listed in the Great Lakes Water Quality Agreement.

After evaluating available evidence, five of the indicators were identified with high confidence:

1. Restrictions on Fish Consumption:

   Impairment does exist. PCBs and dioxin were identified as the causes.

2. Degradation of Fish and Wildlife Populations:

   Impairment does exist. A known cause is the formation of periodically dry areas below the Varick Dam which causes destruction of fish eggs.

3. Eutrophication or Undesirable Growth of Algae:

   Impairment does exist. The cause is phosphorus from municipal sewage discharges, combined sewer overflows, and street and agriculture runoff.

4. Added Cost to Agriculture or Industry Due to Water Quality Problems:

   This is not impaired because no industries or farms are known to withdraw water directly from the Area of Concern.

5. Restrictions on Dredging:

   This is not impaired because there are no current restrictions on open lake disposal of dredge spoil from the area. The CAC, however, is opposed to open lake disposal because some sampling points in the harbor exhibit elevated levels of cyanide, zinc, barium, lead, grease, and oil.

For five other indicators, the RAP assigned "low confidence" to the conclusions because of the lack of direct evidence. The need for additional information on these five indicators is addressed in Chapter 9. Based on indirect evidence, three indicators of impairment may exist.

1) Bird and Animal Deformities or Reproductive Problems;
2) Degradation of Micro-organisms, Insects, and Small Animals Living in Bottom Sediments.

The indirect evidence on which this judgment is based includes elevated levels of PCBs, octachlorostyrene and dioxin in fish from the area. There also have been observations of

3) Fish Tumors and Other Deformities from fish in the AOC.

Also falling into the "low confidence" category are two indicators for which indirect evidence suggests impairment may not exist. No reports of 1) Tainting of Fish or Wildlife, have been recorded. Likewise, there has been no evidence of continuing 2) Degradation of Aesthetics, such as unnatural color or odor. There have been incidents of muddy water linked to high flow periods, but these are thought to be natural.

One indicator, Degradation of Phytoplankton and Zooplankton, has been designated as unknown. No data exist to determine whether or not these minute floating plant and animal organisms are affected by water quality conditions in the Area of Concern.

Two of the three remaining indicators listed in the Great Lakes Water Quality Agreement were found not to apply to this Area of Concern.

1. Restrictions on Drinking Water Consumption:

   The water from the AOC is not presently a drinking water source.

2. Beach Closings:

   The lake bottom in the harbor, and along the shoreline immediately adjacent, is steep and probably not suitable for swimming beaches. Boat traffic precludes use due to safety reasons.

The Stage I RAP does not address the final impairment indicator, Loss of Fish and Wildlife Habitat, because the AOC is in a highly developed urban area where obvious degradation has occurred. Habitat improvement recommendations are made in chapter 10.

Lake Ontario Water Quality Impairments

In addition to evaluating the Oswego AOC relative to the impairment indicators, the RAP also views the river as a contributor of pollutants to Lake Ontario. To identify problems in Lake Ontario that may originate in the Oswego River and its basin, the RAP began with the Lake Ontario Toxics Management Plan (LOTMP).

The LOTMP was adopted in 1989 by the NYSDEC, the US Environmental Protection Agency, the Ontario Ministry of the Environment, and Environment Canada to guide a coordinated effort to remedy the lake's toxics problems. The LOTMP identified seven contaminants that exceed enforceable standards either in Lake Ontario water or fish flesh. The RAP examined export of these seven pollutants from the Oswego River to Lake Ontario to identify those likely to be coming from or through the Oswego River in significant amounts.

Of the seven contaminants, evidence suggests that four: mirex, PCBs, dioxin and mercury may be entering Lake Ontario from the Oswego River. For the other three contaminants, the evidence suggests it is unlikely that there is a significant net transport of aluminum, chlordane or iron from the river to Lake Ontario.

Sources of Pollutants Causing Impairments

Where an impairment is indicated in the AOC and its cause is known, environmental and source data were examined in Stage I to make a preliminary evaluation of the possible sources of the pollutants. In some cases, the data are insufficient to make a definite assignment of a source. The attached table shows the pollutants known to cause certain impairments, and the known possible sources of those pollutants. Sources of pollutants causing impairment are discussed in detail in Chapter 5 of the Stage I RAP.

Sources of pollutants to the AOC can be classified as either 1) point or nonpoint sources within the Seneca-Oneida-Oswego River basin or 2) from Lake Ontario. This is because the waters of the Area of Concern are made up partly of what comes down the Oswego River and partly what enters the AOC from Lake Ontario. Little is known about the dynamics of interchange of Lake and river waters, but that it occurs is certain. Waters entering from Lake Ontario can carry contaminants with them, as can the fish that swim from Lake Ontario into the AOC. Likewise, waters from upstream can carry contaminants which may effect the AOC and Lake Ontario. Therefore, remedial actions on the sources of pollutants throughout the Oswego River drainage basin must be coordinated and implemented to properly address the problems in the AOC.

TABLE 7-13

Summary of Sources of Pollutants Causing Impairments

Pollutant	Impairments (Confidence)	Possible Sources*
PCBs	Fish consumption advisories (high)	Lake Ontario
	Export to Lake Ontario (low)	Permitted discharges (3)
		Bottom sediments of Onondaga Lake
		Hazardous waste sites in Oswego basin(9)
		Outflow from Owasco and Onondaga Lakes
		Vicinity of Village of Skaneateles Falls (suspected specific source unknown)
		Oswego River drainage between Fulton & Phoenix (suspected specific source unknown)
Dioxin	Fish consumption advisories (high)	Unknown - Niagara River and 18 Mile Creek are suspected sources to Lake Ontario
	Export to Lake Ontario (low)	
Phosphorus	Algal growth	Sewer overflows
		Sewage treatment plants
		Agricultural runoff
Mercury	Export to Lake Ontario (low)	Bottom sediments of Onondaga Lake associated with past chlor-alkali manufacturing
		Bottom sediments in AOC
		Permitted discharges (7)
Mirex and photomirex	Export to Lake Ontario (low)	Bottom sediments of Oswego River below Fulton
		Hazardous waste sites (2)
Octachlorostyrene	Reduction of bird and animal populations (low)	Lake Ontario, industry around Onondaga Lake

*Sources believed to be major are underlined.

SOURCE UPDATE

Since the development of the Stage I RAP (published by NYSDEC in February, 1990) there have been a number of activities which effect the RAP and its sources to the Area of Concern. These activities are summarized below.

Hazardous Waste Sites

In Chapter 5 (Table 5-2 and 5-3), hazardous waste sites were characterized as sources by the likelihood that they contribute PCBs to the drainage basin that could be reaching the Area of Concern. Investigations of these sites have proceeded since the publication of the Stage I RAP. In some cases the investigations have uncovered evidence that warrants a change in the characterization of a particular site. These changes are reflected in Table 8-6 and are summarized below:

1. Columbia Mills - This site off Route 48 in Minetto, was not characterized as a potential source of pollutants to the Area of Concern in the Stage I RAP. However, a preliminary remedial investigation concluded that metals may have migrated in the past from the site to the Oswego River. Recent sampling has not detected any contaminants migrating from the site and the PCB contamination appears to be localized on-site only. Therefore, this site has been added and characterized in the RAP as an unlikely source of PCB'S (Category C - investigations incomplete).

2. North and South Armstrong Landfills - The Phase II hazardous waste site investigation is now complete for these sites. The Phase II investigations did not detect hazardous contamination migrating offsite in either surface or groundwater. In the Stage I RAP these sites were categorized as a "likely source of PCB's to the Area of Concern (Category A)". In Stage II this categorization has been changed to "Investigations incomplete, thought to be an unlikely source (Category C)". It should be noted that these hazardous waste sites include the landfills only. River sediments will be dealt with as a separate issue (see Chapter 9).

3. Tripoli Landfill - A Phase II investigation did not find hazardous materials migrating from the site. Consequently, the RAP categorization of this site has been changed from "Investigations incomplete, thought to be an unlikely source (Category C)" to "investigations or remediation complete, thought to be an unlikely source (Category D)".

4. Split Rock - A Phase II investigation did not show hazardous materials migrating from the site. Therefore, this site has been delisted from the New York State registry of Inactive Hazardous Waste Sites. The RAP categorization of this site has been changed from "Investigations incomplete, thought to be an unlikely source (Category C)" to "Investigations or remediation complete, thought to be an unlikely source (Category D)".

5. Rockwell - Remediation has been completed at this site. This has included removal of contaminated tanks and soils. Therefore this site has been delisted from the New York State Registry of Inactive Hazardous Waste Sites. The RAP categorization of this site has been changed from "Investigations incomplete, thought to be an unlikely source (Category C)" to "investigations complete, thought to be an unlikely source (Category D)".

6. Fulton Terminals - The EPA Record of Decision (9/89) documents that a supplemental remedial investigation have determined no effects to the Oswego River from this site. A soil removal action has been completed at this site and only trace amounts of PCBs have been detected (480 ug/ks). Therefore, the RAP categorization of this site has been changed from "likely source to the AOC" (Category A) to "Investigations or remediation complete, thought to be an unlikely source (Category D).

7. Clothier Disposal - 2200 drums of hazardous substances and visibly contaminated soil were removed from this site in 1986-88. As a result of these activities only low levels of residual contamination are present on-site. Studies have shown no impact from this site to Ox Creek which is a tributary to the Oswego River. Therefore, the RAP categorization of this site has been changed from "likely source to the AOC" (Category A) to "Investigations or remediation complete, an unlikely source" (Category D).

Oswego Harbor Sediment Sampling

The U.S. Army Corps of Engineers sampled sediment from four areas in the Oswego Harbor during Summer 1990. The samples were analyzed at the lowest possible detection limits for dioxin, mirex and eight polynuclear aromatic hydrocarbons (PAHs). Dioxin (TCDD) was not detected at limits ranging from 1.80 to 2.80 pg/g (parts per trillion). Mirex was not detected at limits ranging from 0.12 to 0.32 ng/g (parts per billion). PAH results ranged from nondetectible (10 ng/g) to 201 ng/g.

Treated Wastewater Discharges

In 1989 the City of Fulton's municipal sewage treatment plant discharged 229 pounds of phosphorus per day to the Oswego River (Table 5-7). In 1989 the plant completed upgrades which reduced the total loading to an average of 14.3 pounds of phosphorus per day.

Stage I identified three permitted industrial discharges of PCBs to the Oswego River drainage basin. In addition, Marleys/Carousel Center was issued a permit on September 11, 1989, which includes PCB monitoring for construction pump-out and runoff due to its proximity to a hazardous waste site. To date PCBs have not been detected in this discharge. This is discussed in more detail in Chapter 8.

The Stage I RAP identified seven permitted sources of mercury to the drainage basin. Since then the Syracuse Metropolitan Treatment Plant and Oneida Silversmith have been required to add mercury to their discharge permits. In addition, Gould Pumps inadvertently was omitted from the Stage I listing of mercury dischargers to the Oswego River drainage basin. This is discussed in greater detail in Chapter 8.

Onondaga Lake Remediation Conference

Onondaga Lake drains to the Seneca River which combines with the Oneida River to form the Oswego River. Therefore, the numerous environmental problems in this lake (see Appendix 1) may be significantly contributing to the impairments in the Area of Concern.

The Onondaga Lake Remediation Conference was held at the Sagamore Conference Center in Bolton Landing, NY on February 5-8, 1990. This conference was attended by 35 scientists and engineers from the U.S., Canada, Sweden, and France. It's primary purpose was to evaluate various methods for the study and remediation of Onondaga Lake.

The conference was divided into five working groups: habitat,bioaccumulation, geochemistry, simulation modeling, and remediation. The working groups discussed matters related to Onondaga Lake within each topic area[2].

Appendix D of the conference proceedings outlines a preliminary mass balance for mercury in Onondaga Lake. Although this information is preliminary from a limited data base (a single sample), it shows mercury (2-7 ng/L) leaving the lake to the Seneca-Oswego River system[3]. However, it is unknown if significant amounts of mercury are making the approximate thirty mile trip to the Area of Concern and Lake Ontario. This matter is complicated by the periodic reverse flows to Onondaga Lake from the Seneca River and the potential for contaminant losses (to the atmosphere, buried in sediment,etc.) between Onondaga Lake and the Area of Concern.

Supplemental Flow

The Stage I RAP neglected to document that approximately 400 cubic feet per second of water is diverted from the Genesee River basin to the barge canal during the navigation season. This can be a significant portion of the total flow to the upper Oswego River drainage basin during summertime low flow periods. Thus, it is another potential pollution source.

References

[1] Saroff, S.T., Editor (1990). Proceedings of the Onondaga Lake Remediation Conference. NYS Department of Law, NYS Department of Environmental Conservation.

[2] Bloom, N.S. (2/6/90). A Preliminary Mass Balance For Mercury in Onondaga Lake, New York. Appendix D of the Proceedings of the Onondaga Lake Remediation Conference. NYS Department of Law, and NYS Department of Environmental Conservation, 124-128.

CHAPTER 8

CURRENT PROGRAMS AND REMEDIAL OPTIONS

INTRODUCTION

The Stage I Remedial Action Plan (RAP) identified water quality use impairments in the Area of Concern (AOC). It also determined potential sources of pollutants suspected to be causing these impairments. Although use impairment effects are evaluated in the Area of Concern, the sources may be found throughout the drainage basin.

This chapter describes and evaluates current control and remedial measures being applied to the sources identified in Stage I. Areas where additional remedial measures are needed will be identified. Alternative regulatory or remedial options available to restore beneficial uses also will be discussed.

A more thorough definition of all current programs is included in a number of other documents, such as the Lake Ontario Toxics Management Plan (Copies are available from NYSDEC). Therefore, detailed program descriptions will not be repeated here. Instead, this chapter will describe how each program specifically is applied to sources identified to the Area of Concern.

It is recognized that not all of the sources of pollution are known at this time. However, by addressing these suspected sources, progress will be made toward a cleaner environment. Table 8-1 summarizes each suspected source for the area of concern and identifies the control and remedial measures currently applied to each source.

Table 8-1

Existing control and remedial programs applied to the sources identified in Stage I

Possible Source of Pollutant(s) Causing Impairment in AOC	Pollutant(s)[a]	Existing Program
Industrial discharges	PCBs, mercury	SPDES - industrial point sources
Sewage treatment plants	phosphorus	SPDES - municipal point sources, industrial pre-treatment program
Sewer overflows	phosphorus	SPDES - combined sewer overflows
Agricultural runoff	phosphorus	Nonpoint source management
Hazardous waste sites	PCBs	Inactive hazardous waste site program
Onondaga Lake/Ley Creek	PCBs, mercury	Inactive hazardous waste site
Contaminated sediments	PCBs, mercury, mirex	Various
Owasco Lake drainage; Oswego River drainage between Fulton and Phoenix; Skaneateles Falls area	PCBs	Monitoring programs to identify sources
Lake Ontario	mercury, mirex, dioxin, octachlorostyrene, PCBs	Lake Ontario Toxics Management Plan
Unknown	Dioxin	

[a]The pollutant is underlined when the corresponding source is believed to be major.

INDUSTRIAL DISCHARGES

Point source industrial discharges have been reduced greatly in the past two decades via the SPDES program. Many contaminants now are discharged in amounts that are at the limits of current technology. However, the Stage I RAP identified permitted industrial discharges as a possible source of PCBs and mercury to the Oswego River drainage basin.

Program Description

In accordance with the federal Clean Water Act, it is illegal for a facility to discharge pollutants at a point source to a surface waterway without obtaining a federal permit. In New York State, the authority to issue these federal permits is delegated to the Department of Environmental Conservation. These State Pollutant Discharge Elimination System (SPDES) permits include effluent limitations on the discharge of pollutants, schedules for the construction or installation of new pollution control technology and requirements for self-monitoring and reporting.

SPDES permit effluent limits are developed from the more stringent of federally mandated, technology-based treatment standards (or best professional judgement where such standards are lacking) or from water quality standards. Water quality standards and guidance values have been adopted for over 200 toxic substances. In addition, SPDES permits now include whole effluent toxicity testing, particularly where water quality-based controls may not assure conformance with water quality standards.

Current Initiatives for PCBs

The present New York State water quality standard for PCBs is 0.001 ug/L or 1 part per trillion (1 ppt). The concentration in most effluents needed to maintain this standard in receiving water is lower than the current analytical detection limit for PCBs. Therefore, existing discharge permits that include PCBs contain numerical mass equivalents of the accepted analytical detection limit which existed at the time of permit issuance. The previously accepted analytical detection limit for PCBs was 1.0 ug/L. Thus, this value was used for permit development.

Recent advances in analytical chemistry are gradually lowering the detection level for PCBs in water. EPA Method 608, which is approved for use in the SPDES permit program gives a detection limit of 0.065 ug/l (65 ppt) for each aroclor of PCB in distilled water. This method also allows the permittees to test for a higher detection limit in their specific treated wastewater effluent if analytical interferences prevent a lower detection limit. Present NYSDEC policy requires PCBs to be nondetectible in the treated wastewater effluent at the Method Detection Limit for EPA Method 608.

The Stage I RAP identified three permitted industrial discharges as potential sources

of PCBs in the Oswego River drainage basin: General Motors Corporation-Fisher Guide and Roth Brothers Smelting, both discharging into Ley Creek, a tributary of Onondaga Lake; and Industrial Oil Tank Service, into Stoney Creek, a tributary of Oneida Lake. The permitted limit for Industrial Oil Tank Service is 0.0003 pounds per day. The limit for Roth Brothers Smelting is 1.0 ug/L from an approximate flow of 13,300 gallons per day of cooling water, or a maximum of 0.0001 pounds per day, plus a similar concentration from a non-quantified storm water discharge. The permitted limit for GMC-Fisher Guide is 0.0047 pounds per day. These loads should be compared to the estimated 3.4 lb/day of PCBs entering Lake Ontario from all sources[1]. These permitted PCB loads are expected to be reduced in the future as the NYSDEC attempts to modify the permits of all three companies to reflect the new lower PCB detection limit (65 ppt). However, this lower limit has been challenged by some industries and currently is being litigated.

In addition, the Marleys/Carousel Center was issued a permit on September 11, 1989, to discharge construction pump-out and runoff to Onondaga Creek from its shopping mall construction site. Due to the proximity of this construction to an inactive hazardous waste site and numerous oil terminals, the permit includes monthly PCB monitoring at the new 0.065 ug/L analytical detection limit. To date PCBs have not been detected in the discharge at a detection limit of 0.050 ug/L (50 ppt).

Current Initiatives for Mercury

The discharge limits set by NYSDEC for release of mercury are determined on a case-by-case basis. Such limits vary with the nature of the receiving stream and the nature of the discharger. When Best Available Technology (BAT) standards exist for selected industrial categories, these Federally mandated technology-based treatment standards are used to establish discharge limits. In the absence of such standards, technology based limits are determined by using Best Professional Judgement (BPJ). The BPJ target for mercury is 0.1 mg/L.

The levels of discharge required to protect water quality also is determined for all permits. The present New York State ambient water quality standards for mercury is 2 ug/L, based on the protection of human health, and 0.2 ug/L, based on the protection of aquatic life. After the appropriate water quality limits have been determined, they are compared to the technology based standards. The final effluent limitations used in the SPDES permit are the more stringent of the determined limits.

The Stage I RAP identified seven permitted sources of mercury in the Oswego River drainage basin: Clark Specialty Company, Hammondsport; Evans Chemetics, Waterloo; Fulton Wastewater Treatment, Granby; General Motors Corporation, Syracuse; Lockwood Ash Disposal, Torrey; Milliken Ash Disposal Site, Lansing; and Syroco Inc., Baldwinsville. In addition, during recent permit renewals, two facilities were required to add action levels for mercury: Metropolitan Wastewater Treatment, Syracuse and Oneida Silversmith, Sherrill. Also, one facility, Gould Pumps, Seneca Falls, inadvertently was omitted from the Stage I listing of mercury dischargers to the basin.

Therefore, there are ten permitted dischargers of mercury in the Oswego River drainage basin. The loading under permit and actual 1989 loading of mercury from these facilities are summarized in Table 8-2.

There is evidence that municipal sludge incineration using garbage as fuel leads to high mercury levels in wastewater from air pollution control scrubbers[2]. The mercury is likely derived from the garbage used as fuel (ie. discarded batteries). Although there are no facilities in the Oswego River basin that match this description, there are two municipal facilities that incinerate sludge: Auburn and Oswego. The Oswego (westside) facility monitors mercury in its effluent on an annual basis, and has not had detections at an analytical detection limit of 0.2 ug/L.

Conclusions

Current point source discharges are considered to be relatively minor sources of RAP pollutants of concern when compared to other sources. For example, the current total permitted loading from PCB dischargers in the Oswego River basin is 0.0051 lb/day. This should be compared to the estimated 3.4 lb/day of PCBs entering Lake Ontario from all sources (The Niagara River and other tributaries, industrial and municipal point sources in the U.S. and Canada, and estimates of atmospheric deposition to Lake Ontario)[1].

Since the permitted load of PCBs is at the analytical detection limit, the actual load is unknown and may be much lower. The new NYSDEC PCB permit policy should further reduce the PCB loading. Therefore, current permitted sources are not considered to be significant in comparison to all the other sources of PCBs within the drainage basin. The largest source of PCBs to the Area of Concern is believed to be Lake Ontario.

Point source discharges of mercury to the drainage basin reflect the limits of current technology. Consideration is also given to analytical limits of detection and analytical variability. For example, the current SPDES permit for the Onondaga County Department of Drainage and Sanitation Syracuse Metropolitan Treatment Plant contains an Action Level for mercury of 1.3 pounds per day. This was based on the SPDES level of detection specified in TOGS 85-W-40 (now TOGS 1.3.7) of 1 ug/L. A variability factor of 2 was applied, which yields a mass limit of 1.3 pounds per day at the permitted flow of 80 Million Gallons per Day (MGD). Reported loadings are significantly lower due mostly to improved analytical levels of detection (see Table 8-2).

The permit renewal process for the Syracuse Metro Plant will contain a rigorous review of the effluent limit for mercury. A preliminary water quality analysis indicates that an allowable discharge to Onondaga Lake is a maximum of 0.27 pounds of mercury per day. A review of current guidance on analytical detectibility (TOGS 1.3.7) indicates that the actual final effluent limitation may be slightly higher due to current analytical detection limits.

Table 8-2 / 1989
Mercury loadings to the Oswego-Oneida-Seneca River Basins

Facility (Location)	Receiving Stream (Classification)	Allowable mercury loading under permit lb/day	1989 Average reported discharge - million gallons per day (number of measurements)	Actual 1989 Mercury loading - lb/day (number of measurements)[1]
Clark Specialty Company (Hammondsport)	Tributary to Keuka Inlet (D)	0.002	0.0043(6)	0.002(8)
Evans Chemetics (Waterloo)	Seneca River/ Barge Canal (C)	0.001	2.42(12)	0.0002(2)
Fulton Wastewater Treatment (Granby)	Oswego River (C)	0.052	2.71(6)	0.0006(1)
General Motors Corporation (Syracuse)	Ley Creek (B)	0.001 mg/l[2]	0.028(12)	<0.0002(2)[3]
Gould Pumps (Seneca Falls)	Seneca Barge Canal (B)	0.0016 mg/l[2]	0.19(8)	<0.0009(4)[4]
Lockwood Ash Disposal (Torrey)	Keuka Lake Outlet (C)	0.002 mg/l[2]	0.065(2)	<0.0002(2)[4]
Syracuse Metropolitan Wastewater Treatment	Onondaga Lake (C)	1.3[5]	74(9)	0.23(8)
Miliken Ash Disposal Site (Lansing)	Tributary of Cayuga Lake	0.15	3.83(12)	0.0004(1)
Oneida Silversmiths (Sherrill)	Sconondoa Creek (C(t))	0.006[5]	0.39(12)	0.0006(12)
Syroco Inc. (Baldwinsville)	Seneca River (D)	0.005	0.10(12)[6]	0.0004(2)[7]
	TOTALS	1.521		0.236

[1] Unless otherwise noted, all loadings are averages from 1989 discharger monitoring reports. The number of data points is shown in parentheses. Unless noted otherwise, all loadings are based on the facilities maximum flow.

[2] There are no allowable loadings under permit, however, this facility must meet the concentration limits noted.

[3] Values based on average flow. Both concentrations were reported as "less than".

[4] All values were reported as "less than".

[5] Value in permit is an "Action Level", not a discharge loading.

[6] Average discharges are unavailable. Discharge based on the average value of 12 monthly maximum flow measurements.

[7] available data is from 1988.

Point source discharges of persistent toxic substances often reflect the limits of current technology. Therefore, further remedial actions on current dischargers beyond that provided through the SPDES program, will not solve the perceived problems in this drainage basin and are likely to have only marginal water quality effects. Other sources such as the previously contaminated sediments of Onondaga Lake, inactive hazardous waste sites, etc., are believed to be more significant sources of RAP pollutants than currently released under permits by industrial dischargers. Numerous actions including a mass balance of Onondaga Lake, are planned as a part of the Onondaga Lake remedial efforts (see Appendix 1).

The need for remedial/control measures for the Oswego and Auburn municipal treatment plants should be determined. Mercury sampling of the plant discharge and the air pollution control wastewater from the sludge incinerator is needed to determine if problems exist. Consideration of attaching limits on mercury discharges to the permits of these facilities may be appropriate. The remedial strategy for this potential problem will be discussed in the permitted municipal discharge section of Chapter 10.

Remedial/Control Options

Although the present SPDES program is adequate to protect water quality standards, the goal of the RAP calls for the virtual elimination of persistent toxic substances. Therefore, additional measures should be taken to meet RAP goals for the area of concern. These could include continued steps toward zero discharge of persistent toxics and further implementation of the antidegradation provisions of the Clean Water Act.

EPA should continue to develop BAT guidelines (with periodic updates). The use of more efficient, safer, pollution control technology should be encouraged. The allowable discharges of substances of concern should be lowered as it becomes feasible due to technology advances. Such an effort should begin with the mercury discharge at the Metropolitan Treatment Plant in Syracuse.

References

[1] NYSDEC, Ontario MOE, USEPA, Env. Canada (1989). Lake Ontario Toxics Management Plan.

[2] Glass, G.E., J.A. Sorenson, K.W. Schmidt, and G.R. Rapp (1990). New Source Identification of Mercury Contamination in the Great Lakes, Environmental Science and Technology, 24, 1059-1069.

MUNICIPAL DISCHARGES

The discharge of untreated or partially treated sewage has been eliminated or greatly reduced throughout the State. This has led directly to a substantial improvement in water quality. However, the Stage I RAP documented reports of algal blooms in the area of concern (page 4-20), with excess phosphorus identified as the likely cause. Sewage treatment plants and combined sewer overflows are thought to be major sources of phosphorus to the area of concern. These sources and the industrial pretreatment program are discussed below.

Program Description

There are currently 20 major (design wastewater flow greater than 1 mgd) and 46 minor publicly owned treatment works (POTW) in the Oswego River drainage basin. The Clean Water Act requires all POTWs to obtain a permit for discharge to a surface waterway. The authority to issue State Pollutant Discharge Elimination System (SPDES) permits was delegated by the EPA to the NYSDEC in 1975. All discharge permits in the Lake Ontario drainage basin require a minimum of secondary treatment or more stringent treatment as required to meet water quality standards. In addition, all major discharges into the Great Lakes drainage basin are required to comply with a 1.0 mg/l phosphorus effluent limit.

Combined sewers convey both storm water and sanitary waste to the POTWs. Such sewers may also convey industrial waste. In New York State, no dry weather overflows are allowed from a combined sewer system. However, during storm or snow melt events the treatment capacity of the POTW may be exceeded, resulting in a combined sewer overflow to a surface waterbody. This overflow contains stormwater and sewage, and thus, may be a significant short-duration pollution source.

Combined sewer overflows (CSOs) are included in municipal SPDES permits as additional discharge points. NYSDEC has provided guidance through the Technical and Operation Guidance Series (TOGS) for decisions in the evaluation of CSOs to ensure that water quality objectives are met. The TOGS calls for the elimination or reduction of CSO discharge whenever possible.

Industrial discharges to POTWs are regulated by the National Industrial Pretreatment Program. The EPA is the pretreatment program approval authority, pending delegation of this program to the NYSDEC. Pretreatment programs are required to be developed as follows:

1) Any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 MGD and receiving pollutants from industrial users which pass through or interfere with the POTWs operation or are otherwise subject to pretreatment categorical standards.

2) Any POTW, regardless of design flow, if the nature and volume of the industrial effluent is determined by EPA or NYSDEC to cause: an upset of the treatment process, a violation of the POTWs effluent limitations, contamination of municipal sludge or other circumstances to warrant a program to prevent interference with the POTW or to prevent pass through of a substance.

Regulations governing the implementation of the Pretreatment Program direct control of pollutants originating with industrial users discharging to POTWs to be implemented in part by developing local limits to prevent interference or pass through of such pollutants. The meaning of the terms "interference" and "pass through" both involve discharges which cause a violation of any requirement of the POTW's SPDES permit. Therefore, municipal SPDES permits are the primary avenue for controlling such pollutant parameters.

EPA, with assistance from NYSDEC, monitors the implementation of eight approved pretreatment programs in the Oswego River drainage basin: Auburn, Canandaigua, Fulton, Geneva, Ithaca, Newark, Oswego and Onondaga County. The Onondaga County Pretreatment program includes five major waste treatment facilities: Balwinsville-Seneca Knolls, Meadowbrook Limestone, Syracuse Metro, Oak Orchard, and Wetzel Road. EPA/DEC review the pretreatment reports submitted under terms of the POTWs SPDES permits. Annual pretreatment program inspections or audits also are conducted by the regulatory agencies.

Current Initiatives

Major studies are underway to determine the levels of treatment required in various parts of the basin. Water quality models are being developed by the Upstate Freshwater Institute for Onondaga Lake and the Three Rivers (Seneca, Oneida, Oswego) area to determine the effects of municipal discharges, CSOs, etc., (see Appendix 1). It is likely that the Syracuse Metropolitan Treatment Plant (the largest point source phosphorus contributor in the basin) and other facilities in Onondaga County (see Table 8-3) will be required to upgrade their systems.

The Onondaga Lake Model will be used to determine the extent of additional treatment needed at the Syracuse Metropolitan Treatment Plant. Likewise, Onondaga County's Wetzel Road facility may be required to complete significant upgrades pending the results of the Three Rivers Modeling effort.

The second highest point source phosphorus loading total in the basin was identified in Stage I as the City of Fulton's municipal treatment plant. This facility discharged 229 pounds of phosphorus per day in 1988 (Table 5-7). Since that time the plant has undergone extensive upgrading to include additional primary and secondary clarifiers, sludge treatment, and chemical treatment for phosphorus. In the eight months since the upgraded plant was completed (October, 1989), the phosphorus loading to the Oswego River from this facility has dropped 94% to an average loading of 14.3 pounds of phosphorus per day. Monitoring of this discharge will continue, but further upgrading is not likely to be required.

Table 8-3
Phosphorus Loads from Major[1] Municipal and Industrial Sources in the Three Primary Subbasins[2]

Facility	Flow wt. Av. P. Conc. (mg/L)[3] 1988	1989	1990	Load (MT/yr)[4] 1988	1989	1990
Lower Seneca-Oswego River Subbasin:						
Balwinsville-Seneca Knolls (Onondaga Co)	0.43	0.43	0.29	2.50	2.74	1.84
Fulton (c)[5]	10.35	6.11	0.55	38.58	25.32	2.32
Oswego (c) West	0.79	0.83	0.78	3.44	4.05	3.48
Wetzel Road (Onondaga Co)	2.95	1.28	0.96	14.25	6.40	4.60
Anheuser-Busch[6]	1.02	0.52	0.48	4.08	2.47	2.04
Miller Brewing	0.45	0.48	0.44	1.57	1.27	1.47
Oneida River Subbasins:						
Brewerton (Onondaga Co) Lake Shore S.D.	0.54	0.69	0.53	1.00	1.40	1.25
Canastota (v)	3.00	2.99	0.77	2.72	5.02	1.48
Meadowbrook-Limestone (Onondaga Co)	0.64	0.60	0.53	3.60	3.55	3.76
Oak Orchard (Onondaga Co)	0.39	0.55	0.68	2.45	3.26	5.34
Oneida (c)	1.06	0.50	0.42	2.45	1.45	1.46
Onondaga Lake Subbasins:						
Syracuse Metro (Onondaga Co)	0.85	0.59	0.62	87.80	63.27	67.09

[1] Major is defined as an average discharge flow greater than one Million Gallons per Day (MGD).

[2] With the exception of Anheuser Busch and Miller Brewing, all material for this table was obtained from: New York State Phosphorus Reduction Plan for the Great Lakes, New York State Great Lakes Phosphorus Reduction Task Force, February 1991. Data represents a compilation of discharger monitoring reports received by the DEC.

[3] SPDES permits in the Great Lakes basin require a maximum P concentration of 1.0 mg/L.

[4] A metric ton (MT) is equivalent to 2205 pounds.

[5] As reported in the text the Fulton Plant completed significant upgrades in 1989.

[6] The Anheuser-Busch Brewery was fined by DEC for bypassing waste from its treatment plant. Therefore, actual loads are likely to be higher than those reported here.

Although phosphorus inputs to the Oswego River drainage basin are primarily from municipal treatment plants, there are two important industrial sources of phosphorus: Anheuser Busch (Baldwinsville) and Miller Brewing (Fulton). The relative contribution of phosphorus from these two facilities is shown in Table 8-3.

Anheuser Busch signed a Consent Order in September, 1989 which required the correction of operational problems in the Baldwinsville facility. The plant was not treating phosphorus at all times resulting in phosphorus effluent discharge as high as 9 mg/L. Therefore, the actual loads from this facility are likely to be significantly higher than the reported loads shown in Table 8-3. Anheuser Busch is currently completing upgrades, including expanded treatment capacity. The facility has also completed a phosphorus study designed to identify optimum phosphorus removal methods. The results of this study will be used to evaluate the need for additional phosphorus controls.

Certain corrosion/scale inhibitors, biocidal compounds, etc. which are used as boiler/cooling water additives may contain phosphorus. Efforts are underway to limit the use of such water treatment chemicals. All chemical additives must be listed in the SPDES permit application and the use of alternative compounds that do not contain phosphorus is encouraged during the permit process.

Table 8-4 shows the municipalities in the drainage basin that have combined sewer systems and summarizes current remedial initiatives to control these discharges. In the past, combined sewer overflow abatement projects in priority water quality areas were funded by the EPA and NYSDEC construction grants program. Although this grant program has ended, a revolving loan program has been established as a source of funding for remedial activity.

A domestic sewage study ("Report to Congress on the Discharge of Hazardous Waste to POTWs") was completed on a national scale in 1986. This study evaluated the impact of hazardous waste on municipal treatment plants and recommended methods to improve the control of such wastes. Consequently, the federal pretreatment regulations were revised in 1988 to implement recommendations from the study. Further regulatory revisions have been proposed to implement other recommendations of the 1986 study and to improve the ability of local pretreatment programs to control hazardous wastes.

Conclusions

Municipal permit programs are operating effectively as many systems are studying or implementing corrective measures to reduce discharges. Such studies and required municipal system upgrades should be implemented in a timely fashion to reduce any detrimental effects to the environment.

Table 8-4

Combined Sewer Systems in the Oswego River Drainage Basin

Community	Combined Sewer Overflow (CSO) Remedial Action(s)
Auburn	The City is studying alternative solutions to CSOs under the requirements of a consent order.
Canastota	Under court order to upgrade the system.
Fulton	None - overflows are unusual in this system.
Ithaca	None - overflows do not occur in this system.
Oswego (westside)	None - installed a swirl concentrator CSO treatment system in 1986.
Oswego (eastside)	The current discharge permit requires an evaluation of the sewer system to determine the rehabilitative work needed to reduce CSO frequency. The permit also requires one year of intensive CSO discharge monitoring to determine if the permit should be modified to include an implementation schedule for CSO treatment and/or elimination.
Onondaga County - Syracuse Metro Service Area	Onondaga County is under consent order to develop engineering alternatives to control CSO discharges. The County has been implementing best management practices such as sewer cleaning recently to enhance conveyance capability.
Waterloo	Under a consent order to eliminate illegal stormwater connections.

Although all appropriate municipal wastewater systems operate pretreatment programs, the implementation and enforcement of such local programs may be inconsistent and vary among municipalities. In addition, only two of the six Oswego RAP contaminants of concern, phosphorus and mercury, are presently monitored in the pretreatment programs. The others, PCBs, dioxin, mirex, octachlorostyrene, are not subject to pretreatment monitoring. Therefore, it is unknown if RAP contaminants of concern are passing through POTWs in the basin.

Remedial Options

Potential remedial options could include additional pretreatment monitoring with expanded parameters. A study of the pretreatment program should be conducted to address the issue of inconsistencies between local programs, potential additional toxic loadings, etc. Such an investigation would determine if POTWs are a significant source of toxics to the area of concern and would also determine if the pretreatment program could be improved. The local pretreatment programs could then be modified to assure that all chemicals of concern are being addressed. Modifications to pretreatment programs could be implemented by the SPDES permit process.

Remedial options for combined sewer systems include: enhanced conveyance capability (removal of any sewer system restrictions), increased POTW treatment capability, overflow collection and treatment (such as the City of Oswego swirl concentrator system), development of in-system storage through operational modification and use of off-system storage for post-storm conveyance and treatment. Combined sewer overflow remediation is being addressed in the basin as a municipal permit condition or under the authority of consent orders.

AGRICULTURAL NONPOINT SOURCE POLLUTION

A nonpoint source (NPS) may be an areawide source or many small sources distributed diffusely over an area which cumulatively result in water quality degradation. Contaminants enter surface waters either dissolved in runoff or attached to sediment or other materials. Contaminants also enter groundwater by infiltrating through soil. Agricultural sources of phosphorus in the Oswego basin likely include fertilizer applications to cropland, land disposal of animal waste from livestock operations, barnyard runoff, and livestock access to streams. Consequently, the Stage I RAP identified agriculture as a potential source of phosphorus to the area of concern.

Current Programs

Addressing agricultural and other types of nonpoint source pollution involves a broad array of program activities on the part of several federal, state and local agencies. NYSDEC has lead responsibility in New York by virtue of its statutory authority for the management of water resources and control of water pollution.

There are several existing federal, State and local programs that can be used to reduce agricultural NPS pollution in the Oswego River drainage basin. Many of these programs are listed in Table 8-5. While the total amount of activity that may be considered NPS control-related during the past few years has been substantial, collectively, the activities have not constituted a defined program. However, the federal Water Quality Act of 1987 has provided new direction and authorized federal assistance for the preparation and implementation of state NPS programs.

As required by the Water Quality Act, the State submitted an assessment report[1] to the EPA. This February 1989 report identified those waters that cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of the Clean Water Act due to NPS pollution. It also described the specific NPS categories that affect these waters and general programs and methods used for controlling nonpoint source pollution. In January 1990 the State submitted to EPA a NPS management program[2] that provides an overview of the New York NPS program and identifies objectives for the next four years. Both reports were approved by the EPA.

Conclusion

The primary agricultural inputs of nonpoint pollutants, particularly phosphorus and sediment (erosion), to the basin are expected to come from areas of intensive agriculture such as the south shore of Oneida Lake and the area drained by the Seneca River. Although there is currently no specific information on the transport and delivery of agricultural phosphorus from the watershed to the area of concern, the many large lakes (such as the Finger Lakes) are expected to trap much of the phosphorus derived upstream of them, thus precluding it from reaching the area of concern.

Table 8-5

Existing Agencies Programs for Controlling Agricultural Nonpoint Source Pollution

County Soil and Water Conservation Districts
New York Soil and Water Conservation Committee
Cornell Cooperative Extension Service
USDA Agricultural Conservation Program
USDA Conservation Operations Program
USDA Conservation Reserve Program
USDA Food Security Act
USDA Inventory and Monitoring Program
USDA Forestry Incentives Program
USDA Resource Conservation and Development Program
USDA Watershed Protection and Flood Prevention Act
NYSDOS Coastal Management Program
NYSDEC Nonpoint Source Management Program
NYSDEC Clean Lakes Program
NYSDEC Pesticide Management
NYSDEC Stream Corridor Management
NYSDEC Groundwater Program
NYSDEC Great Lakes Phosphorous Reduction Plan
NYSDEC Stream Protection Permit Program
NYSDEC Stream Habitat Improvement
NYSDOH Public Water Supply Program

NYSDEC = New York State Department of Environmental Conservation
NYSDOH = New York State Department of Health
NYSDOS = New York State Department of State
USDA = United States Department of Agriculture

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[1] For more information on any of these programs, please refer to Chapter 5 of the NYSDEC Nonpoint Source Assessment Report, February 1989.

However, phosphorus enters the Oswego River from the three lakes (Oneida, Onondaga, and Cross) close to its headwaters[3]. Therefore, phosphorus pollution remains a concern. While existing programs have operated over the years to reduce agricultural NPS pollution in the basin, these programs have had limited funding and were not always well coordinated with each other. Continued progress is essential to maintain phosphorus loss reductions already achieved and to implement further reductions where deemed necessary.

The future must hold an accelerated and coordinated effort to control agricultural as well as other nonpoint sources of pollution. Such an effort will require a watershed basin approach and will also require monitoring to check progress made within each subbasin. Although the new NPS program is a positive step to integrate these programs, increased funding and staffing will be required at both the local and state levels of government to implement needed programs.

Remedial/Control Options

Many programs control agricultural pollution directly by aiming to conserve and manage soil and water resources within the basin. These programs are administered by a number of local, state and federal agencies. Participation normally is voluntary in such programs which include elements of financial incentives, technical assistance, technology transfer and education.

Existing programs such as those directed by Soil and Water Conservation Districts and the U.S. Department of Agriculture should focus on water quality concerns. These programs should be concentrating their efforts in areas where the agricultural sources are having an adverse impact on water quality.

To control agricultural pollution, agencies use management practices that prevent or reduce the availability or transport of undesirable materials. These practices are essential tools to link water quality with the land management activities of pertinent agencies and with the activities of local government. Since most of the institutional capability for implementing management practices to control NPS exists at the local level, cooperation and coordination among agencies and landowners is essential.

Specific agricultural nonpoint sources that need to be controlled in the Oswego basin likely include row cropping on inappropriate sites which results in excessive soil erosion; improper timing and excessive rates of fertilizer application; improper land spreading of animal waste; and uncontrolled runoff from livestock concentration areas. Sound soil, water and nutrient management practices should be implemented on specific farms identified as contributing to the agricultural nonpoint source pollution problem.

Practices are selected based on the nature of the farms pollution problems, the suitability to the farms operation and budget and the availability of funding sources. It is important to place the proper priorities on contaminant sources and use resources effectively. Guides to the selection of agricultural management practices for improving water quality are available from the NYSDEC[4,5].

References

[1] NYSDEC (2/89). Nonpoint Source Assessment Report, Bureau of Water Quality Management.

[2] NYSDEC (1/90). Nonpoint Source Management Program, Bureau of Water Quality Management.

[3] Effler, S.W., Editor. A Preliminary Water Quality Analysis of the Three Rivers System. Upstate Freshwater Institute, Inc.

[4] Longabucco, P. (1991). Controlling Agricultural Nonpoint Source Pollution in New York State: A Guide To the Selection of Best Management Practices to Improve and Protect Water Quality. NYSDEC, Albany, NY

[5] NYSDEC (1991). Management Practices Catalog: Agriculture. NYSDEC, Albany, NY.

HAZARDOUS WASTE SITES

The Stage I RAP determined hazardous waste sites may be sources of PCBs, mirex, and mercury to the area of concern. The potential source sites were categorized based on the likelihood of being a source of PCBs to the Oswego Harbor (page 5-11, Stage I). Sites thought to be potential sources include: Onondaga Lake, Ley Creek PCB dredgings, Clothier and Fulton Terminal. The bottom sediments of Onondaga Lake are contaminated with mercury; they most likely are a source of mercury to the area of concern. Investigations at the Armstrong landfills have not detected hazardous waste migrating from the site; however, further investigations of these landfills is needed. The status of these and other sites are described below along with New York's hazardous waste clean-up program.

Program Description

The New York State Hazardous Waste Remedial Program is managed by the NYSDEC with assistance from the Department of Health and the Department of Law. It officially began in 1979 with the passage of the Abandoned Sites Act which provided the state with the legal authority to compel responsible parties to clean up hazardous waste sites. In 1982, New York established the State Superfund to pay for site investigation and remedial programs where there was not a responsible party. The Environmental Quality Bond Act of 1986 raised $1.1 billion to accelerate Superfund remedial action. State funds are used only when responsible parties can not be found or will not agree to remediate a site, or when federal funding is not available.

Under New York's program if a site is known or suspected to contain hazardous waste, it is listed on the registry of inactive hazardous waste sites. Once a hazardous waste site is listed in the registry, the state must 1) determine whether hazardous wastes are indeed present at the site and whether the site constitutes an imminent or significant threat to the environment or public health, and 2) identify potentially responsible parties. Priority for action is dependent on a number of factors including the type of waste deposited at the site, the potential for contaminant migration and the presence of groundwater or surface water contamination from the site.

Tracking these sites in the RAP will help in setting priorities for clean-ups. However, local health concerns may continue to demand higher priority due to the special circumstances of the sites.

After it is listed, a site is investigated to determine the extent of the problem. A Phase I investigation evaluates existing information about the site and attempts to identify responsible parties. Field work is not conducted during this phase. A Phase I investigation typically requires eight to twelve months to complete.

If additional information is needed to classify and rank a site, a Phase II investigation will be conducted to determine if the site poses a significant threat to public health or the environment. This phase typically involves limited field work, including sample collection and analysis, and requires one to two years to complete.

The data gathered in the Phase II field investigation is applied to the EPA hazard ranking system model to determine if the site should become part of the National Priorities List (the federal Superfund site list) and to determine the need for additional remedial action. If a site qualifies for the National Priorities List, the EPA becomes the lead regulatory agency for the project.

A Remedial Investigation (RI) is undertaken to determine the nature and extent of contamination at and emanating from the site and to evaluate its impact on public health and the environment. A feasibility study (FS) is performed to develop and evaluate remedial alternatives to address the contamination problem at the site. An RI/FS requires approximately 18 months to two years to complete.

After selecting the appropriate remedy, a remedial design is prepared and the remedial construction is completed. Remedial designs typically require one year to complete. Remedial construction may require several years to complete depending on the complexity of the site. Following remediation each site is monitored to determine the effectiveness of the remedial effort.

Current Initiatives

The remedial action status of sites determined in Stage I to be potential sources to the area of concern are summarized in Table 8-6. In some cases sufficient information exists to warrant proceeding directly to the RI/FS phase without conducting a Phase I or Phase II investigation. Such cases are designated as NR (Not Required) in Table 8-6.

The Columbia Mills site in Minetto has been added to the list of potential sources to the Area of Concern. It is categorized as a C (unlikely source) because investigations to date have shown PCB contamination isolated in the basement soil of an old boiler room.

Onondaga Lake

Onondaga Lake is a 4.5 square mile lake approximately 30 miles upstream from the area of concern. Past industrial discharges have resulted in increased salinity and mercury contamination severe enough to declare the lake bottom sediments an inactive hazardous waste site. In addition, the urbanized nature of the surrounding 240 square mile watershed (which includes the City of Syracuse) has created sewage related problems for the lake.

Table 8-6
Hazardous Waste Site Remedial
Action Summary

Site	Phase I	Phase II	RI/FS	Remedial Design	Construction
Category A. Thought to be a likely source to the Area of Concern (AOC).					
Onondaga Lake	NR	X	4/91		
Ley Creek	NR	NR	9/90		
Volney Landfill	X	NR	X	3/91	ongoing
Category B. Insufficient information to categorize					
Clay Landfill	NR	NR	4/91-consent order negotiation		
Salina Landfill	NR	Presently seeking contractor for Phase II			
Category C. Investigations incomplete; an unlikely source to the AOC.					
Canastota Landfill	X	12/90			
Quanta	X	12/90			2/90
Old Syracuse Die	NR	X	1/91		
Syracuse Fire Training	X	NR	2/90		
Vals Dodge	NR	12/90			
Winkleman	NR	NR			
Alpha Portland (Otisca Industries)					
Brighton Landfill	contractor selection process for Phase II ongoing				
N. Armstrong Landfill	X	X			
S. Armstrong Landfill	NR	X			
Colture	X	12/90			
Columbia Mills	NR	X	3/89	Interim tank & drum removals completed	
Category D. Investigations or remediation complete; an unlikely source to AOC.					
Clothier	X	NR	X	X	X*
Fulton Terminal	NR	NR	X	9/90	X*
Split Rock	X	X	Site delisted		
Tripoli Landfill	NR	X			
Rockwell	X	X	Site remediated and delisted		

Key

Phase I	=	Evaluates existing information
Phase II	=	Field study to determine site significance
RI/FS	=	Detailed field study to determine the extent of contamination and recommend solutions
NR	=	Not Required(sufficient information exists to proceed to next phase)
X	=	Completed Action date
Date	=	Anticipated start date for a planned action or the actual start for a remedial action in progress
*	=	Construction completed for a surficial clean-up only

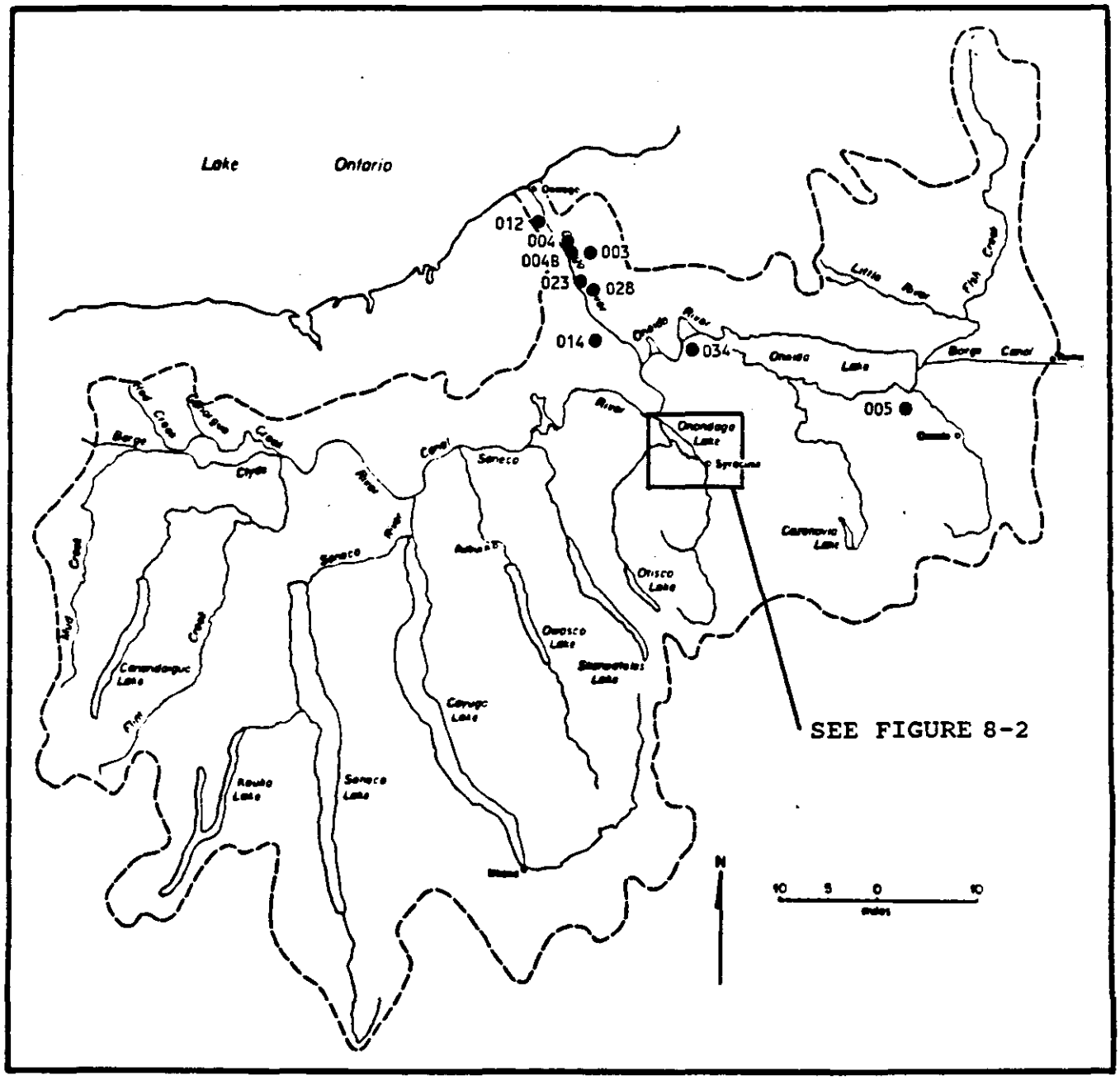

FIGURE 8-1

Inactive Hazardous Waste Sites in the Seneca-Oneida-Oswego Rivers Basin known or suspected to contain PCBs (numbers refer to the last three digits of site numbers):

Site #	Waste Site
727005	Canastota Landfill
734034	Clay Town Landfill
738003	Volney Landfill
738004	N. Armstrong Landfill
738004B	S. Armstrong Landfill
738012	Columbia Mills Company
738014	Clothier Site
738023	Fulton terminals site
738028	Colture Property

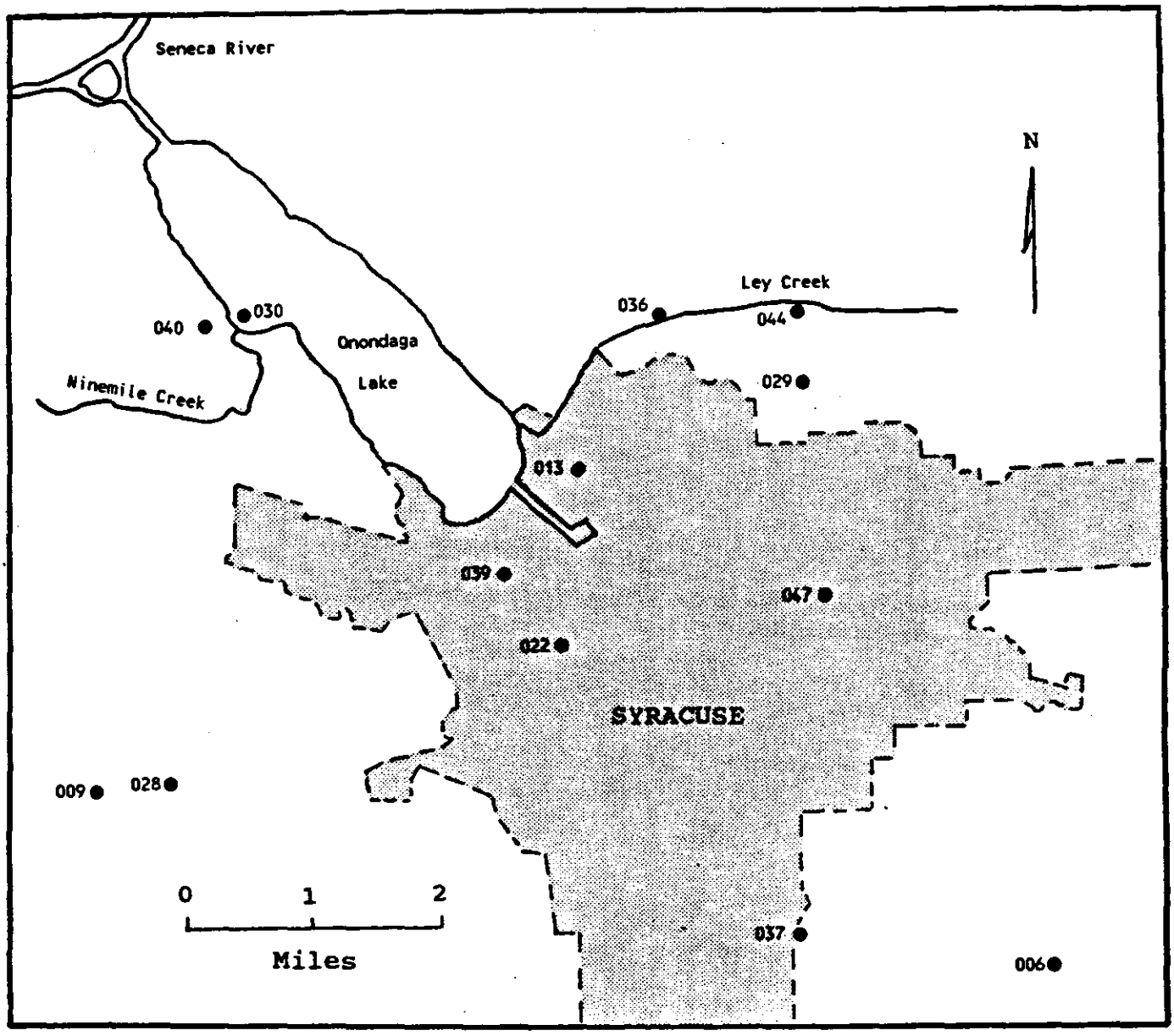

FIGURE 8-2

Inactive Hazardous Waste Sites in the Syracuse Area known or suspected to contain PCBs (numbers refer to the last three digits of site numbers):

SITE #	Waste Site
734006	Alpha Portland (Otisca Industries)
734009	Tripoli Landfill
734013	Quanta Resources
734022	Rockwell (delisted)
734028	Split Rock (delisted)
734029	Old Syracuse Die Casting
734030	Onondaga Lake
734036	Salina Town Landfill
734037	Brighton Avenue Landfill
734039	Syracuse Fire Training School
734040	Val's Dodge
734044	Ley Creek PCB Dredgings
734047	Peter Winkleman Company

Table 8-7

Summary of Available Action Techniques for Hazardous Waste[1]

Technique	Functions	Applications/Restrictions	Estimated Cost
Land Disposal	Dispose of waste materials in landfills	Improper disposal can result in air pollution, groundwater and surface water contamination. RCRA requirements will markedly increase the cost but will provide for more sound disposal methods.	$ 90-200 per ton
Incineration	Thermally oxidize waste material in a controlled environment	Most effective for all organic wastes, especially those with low flash points and containing relatively low ash contents.	$400-500 per ton
Solidification	Incorporate waste material in a controlled environment	Most economical for small quantities of waste. Waste material must be compatible with solidification agent. Waste may leach from matrices over time.	$ 50-150 per ton
Encapsulation	Surround waste material with impermeable coating	Most applicable to containerized waste materials or dewatered sludges. Not fully demonstrated	$100-140 per ton
in-situ solidification	Inject waste solidification agents directly into waste site	Applicable to liquid wastes from surface impoundments and well defined landfill sections. Not applicable to containerized wastes.	$100-150 per ton
in-situ neutralization/detoxification	Neutralize or immobilizes wastes by application of a neutralization agent (i.e., lime) or detoxifies waste by chemical reaction	Most applicable to surface impoundments and disposal sites with permeable surfaces for metal bearing wastes. Degree of effectiveness may be difficult to determine.	$25-150 per ton

Table 8-7
(cont'd.)

Summary of Available Remedial Action Techniques
for Hazardous Waste[1]

Technique	Functions	Applications/Restrictions	Estimated Cost
in-situ biological	Biodegradation of organic waste by microorganisms	Most effective for landforms and surface impoundments; can degrade a wide range of organics when acclimated. Degradation process is slow and requires adequate aeration.	$15,000 per acre
Physical Treatment	Separates and concentrates the hazardous component by physical methods	Normally used for liquid wastes and includes such techniques as carbon adsorption, air stripping, sedimentation, etc. Results in a concentrated residual that must be further treated or disposed.	varies with specific technique

References for Cost Estimates

1) "Remedial Action Technology for Waste Disposal Sites"
P. Rogoshewski, H. Bryson, K. Wagner, 1983.

2) "Wide Beach Superfund Site Pilot Testing of Chemical Treatment"
Glason Research Corporation, March 1988.

3) "RI/FS for the 93rd Street School Site"
Loureiro Engineering Associates, March 1988.

4) "Remedial Action at Waste Disposal Sites"
USEPA, October 1985.

Due to the extent and nature of these and other problems, the NYSDEC created the Onondaga Lake Advisory Committee in 1986. Recent redevelopment efforts in the City of Syracuse have focused increased attention toward Onondaga Lake and its clean-up. For example, a bill passed by Congress set up a lake management conference and provided limited funding for investigations. Additional legislation will be proposed to fund remediation. Onondaga Lake and its problems are discussed in more detail in Appendix 1.

Conclusions

The hazardous waste program at both the federal and state level are striving to remediate all of the hazardous waste sites within the Oswego River drainage basin. The remedial program (investigations and feasibility studies followed by remediation and monitoring) is under way at all sites and well advanced at sites thought to be a source to the area of concern.

Remedial efforts at these sites will help to correct the water quality impairments to the area of concern. The RAP can assist this effort with its systematic, comprehensive, ecosystem approach to restoring and protecting the biota and water quality.

Remedial/Control Options

The hazardous waste program has a rigorous investigatory procedure. Part of this process involves a feasibility study which includes the development, screening and detailed analysis of remedial alternatives. The result of the feasibility study is the selection of a preferred remedial alternative for each site. A summary of some potential remedial action techniques is shown in Table 8-7. The preferred remedial alternative for a hazardous waste site may include one or a combination of these technologies.

The federal Superfund Amendment and Reauthorization Act (SARA) requires that preference be given to remedial alternatives that reduce toxicity, volume or mobility of contaminants. Therefore, the NYSDEC policy is to implement permanent remedies where practicable.[2]

References

[1] NYSDEC (1989). Buffalo River Remedial Action Plan.

[2] NYSDEC Division of Hazardous Waste Remediation Technical and Administrative Guidance Memorandum (1989). Selection of Remedial Actions at Inactive Hazardous Waste Sites (HWR-89-4030).

BOTTOM SEDIMENTS

The Stage I RAP has determined bottom sediments in the basin to be potential sources of contaminants to the area of concern and Lake Ontario. Sediment sources may include Onondaga Lake (mercury and PCBs), the Oswego River below Fulton (mirex and photomirex) and possibly the Oswego Harbor (mercury).

Program Description

No formal regulatory or remedial action programs specific to contaminated sediments currently exist at the federal, state or local levels. However, other environmental quality programs such as the inactive hazardous waste site program address specific sediment related problems.

Current Initiatives

For example, the mercury contaminated bottom sediments of Onondaga Lake have been listed as an inactive hazardous waste site. The contaminants in the sediment have been mapped and the site will continue to be subject to the remedial procedures discussed in the previous section.

Also, the NYSDEC Division of Water includes sediment sampling in its water quality monitoring program and conducts studies in contaminated sediment problem areas. One such study is the Hudson River research/demonstration project. This project proposes to dredge and encapsulate PCB-contaminated sediment while continuing to investigate destruction technologies such as biodegradation and incineration. The lessons learned from this project may assist the RAP. The NYSDEC nonpoint source management program also addresses sediment contamination problems.

At the Federal level, the EPA Great Lakes National Program Office is conducting a five-year study and demonstration program to determine methods for the control and removal of contaminants from bottom sediments. New York's Buffalo River is one of five national demonstration projects being used to assess environmental concerns, study potential remedial technologies and evaluate the environmental and economical effectiveness of remediation. The technologies developed in this project may be transferrable to the Oswego River basin. In addition, EPA is developing sediment clean-up criteria for use in risk management decisions. The Army Corps of Engineers also is evaluating sediment remediation technology.

Conclusions

There is insufficient data to draw conclusions on the status of bottom sediments in the Area of Concern. Before the advent of the Clean Water Act, many years of unregulated industrial and municipal discharges may have resulted in bottom sediments with elevated levels of contaminants in the Oswego River drainage basin. Rural and urban runoff and atmospheric deposition may also have contributed to this problem. Such contamination may result in bioaccumulation of toxic materials through the food chain.

Major contaminated sediment sources, such as Onondaga Lake, receive adequate investigative and remedial support through the inactive hazardous waste site program. However, sites that do not legally qualify as inactive hazardous waste sites, do not always receive the benefit of a comprehensive program or remedial funding source. Typically such sites are more innocuous than the inactive hazardous waste sites. However, they are not necessarily environmentally benign. Therefore, a gap may exist in the regulation and remediation of contaminated sediments.

Remedial/Control Options

In order to determine the need for remediation and evaluate the options available for contaminated sediment clean-up the following obstacles must be overcome:

Investigations - The location and extent of the contaminated sediment problem must be determined by sediment sampling and investigation. However, investigations often are complicated due to the heterogeneous nature of bottom sediments. Contamination may be widespread due to resuspension from currents, waves, boats, etc. Also sediment dynamics often vary with flow, eroding during high flow and depositing during low flow. Thus, computer modeling may be required to fully understand contaminated sediment characteristics.

Risk Assessment - The risks from contaminated sediments to human health, fish and wildlife mobility, water quality, etc., must be determined. Also the effects bioaccumulation may have on the environment must be evaluated. The NYSDEC Division of Fish & Wildlife has produced sediment criteria to assist in evaluating the threat of contaminated sediments to fish and wildlife and other aquatic organisms. This criteria uses equilibrium partitioning for generating sediment criteria numbers for non-polar organics. The NYSDEC Clean-up Standards Task Force is currently evaluating different approaches at defining clean-up criteria for the protection of human health and the environment. The question of what level of contamination in bottom sediments is acceptable for protecting human health and the environment must be answered. Only then can the need for sediment remediation be properly evaluated and intelligent choices concerning remedial options be made.

Remediation - The selection of the final remedial option, if needed, is complicated because the environmental management of contaminated sediments is in its infancy. Few contaminated sediment remedial actions have been completed, making the effectiveness of the various alternatives difficult to determine. To date, few remedial options that are environmentally sound, acceptable to the public and practical to implement have been completed.

The remedial options available for contaminated sediments are summarized in Table 8-8. In some instances it may not be necessary to take remedial action. Contamination levels may be low or natural forces of sediment burial and armoring may take place.

Armoring may occur as a result of erosion and scouring of the sediments which causes a natural sorting of the material by particle size. The subsequent covering and compaction of the sediment layers results in an armored layer that is more resistant to resuspension. Although this option may take longer to show substantial benefits (if any), it might be considered as a potential alternative in some cases.

However, resuspention of sediments is only one factor that determines bioavailability of contaminants. There are many factors that determine contaminant bioavailability including, sediment type, particle size, total organic carbon content, biological activity, hydrology, among others.

Table 8-8
Summary of Available Remedial Action Techniques for Contaminated Sediments*

Technique	Function	Application/Restrictions	Estimated Costs
Confined Disposal Facilities (CDF)	Dispose of material in an isolated, diked location in the water or along the shore.	The most common contaminated sediment disposal practice. May create wetlands or islands. Requires maintenance to prevent erosion and leakage. May expose wildlife.	$4 per cubic yard
Depositional zone placement	Open water disposal of dredged sediments.	May be capped with clean sediments. Difficult to monitor and confirm adequate placement. Difficult to place without contaminating water column.	$0.26 per cubic yard per mile (transpor-tation cost)
Contained aquatic disposal	Cover sediments in-situ or relocate and cover with clean sediments.	Successfully demonstrated in Long Island Sound/NY Bight. Navigational use may preclude in-situ capping. Erosion may be a factor.	$14-35 per cubic yard (estimated cost is $5/yd^3 for NY Bight-USEPA)
Land Disposal	Dispose of sediments in landfills.	Material must be dredged and transported. Dewatering and material handling problems. Cost and availability of landfill space may preclude this option. May create a RCRA/CERCLA site. By increasing potential energy of contaminants, may enhance opportunity for movement therefore increasing likelihood of contaminating soils, groundwater, and surface water.	$90-200 per ton
Solidification	Incorporate waste material into an immobile matrix such as cement, resin or grout.In-situ techniques are unproven. Solidification following dredging not proven with sediments but has been done with other wastes. May leach from matrices over time.		$40-75 per cubic yard (dredged)
In-situ treatment	Biological or chemical treatment in place.No need to move contaminated sediments. Has not been demonstrated for toxics.		

Table 8-8
(cont'd.)
Summary of Available Remedial Action Techniques for Contaminated Sediments*

Technique	Function	Application/Restrictions	Estimated Costs
Off-site treatment	Excavation and treatment to reduce or eliminate toxicity.	May be treated and replaced or treated and disposed. Other methods of hazardous waste treatment may be used (Table 8-7).	$40-75 per cubic yard (dredged))
Beneficial uses of dredged sediments	Agricultural landspreading; beach nourishment; upland fill for recreation; quarry/strip mine reclamation.	Primarily for non-toxic sediments. May not be applicable to the AOC.	

* Material for this table is from IJC (1988). "Report to the Great Lakes Water Quality Board: Options for the Remediation of Contaminated Sediments in the Great Lakes".

UNKNOWN PCB SOURCES

The Stage I RAP identified the following areas as having high levels of PCB in local fish:

Owasco Lake drainage
Skaneateles Creek below Skaneateles Falls
Onondaga Lake Drainage
Oswego River between Phoenix and Fulton

The evidence for fish contamination resulted from NYSDEC fish flesh analyses[1] and is explained on page 5-5. However, the sources for this contamination are unknown.

Program Description

Although there is not a specific program to remedy problems of this nature, such problems may receive remedial action from an existing program described in this chapter if a source can be identified. Therefore, the environmental monitoring conducted by many programs is a critical early tool.

However, monitoring related to surface waters is most pertinent to the RAP. Consequently, two monitoring programs are described in this section: water quality monitoring conducted by NYSDEC's Division of Water; and fish flesh monitoring conducted by NYSDEC's Division of Fish & Wildlife.

Water Quality Monitoring

New York State's water quality monitoring program was significantly modified in 1987 to integrate ambient monitoring for toxic and conventional water quality parameters in four media: water column, sediment, macroinvertebrates and fish. This program modification is called Rotating Intensive Basin Studies (RIBS).

In the RIBS program the major drainage basins of the State have been divided into three groups to balance anticipated workloads. Each grouping is monitored extensively for two consecutive years within a six-year cycle. During each two-year study, 18-24 water column samples are collected at each monitoring site. Flow measurements are also made and the sampling schedule is designed to increase the frequency of sampling during months which have the greatest hydrological (flow) variability. This increase the likelihood of sampling under a wide range of flow conditions.

The water column samples are analyzed for metals (cadmium, copper, mercury, nickel, lead, zinc, iron, aluminum, manganese), volatile halogenated organics, nutrients, suspended solids, total and fecal coliform, conductivity, hardness, turbidity, dissolved oxygen, pH and temperature. Bioassays are also performed with Ceriodaphnia to test for possible toxicity.

The RIBS program also includes collection of sediment, macroinvertebrates and fish samples. Two composites of fine grained surficial bottom sediments are collected at each monitoring site. Bottom sediment analysis includes heavy metals, PCBs, organochlorine pesticides, and nitrogen/phosphorus based pesticides. In addition total volatile solids, acid volatile sulfides, sediment grain size, and two types of total organic carbon analyses (hard and soft) are performed to normalize the data.

Macroinvertebrates are collected 2-6 times at each site during the RIBS. They are analyzed for community structure (species richness and diversity), heavy metals, PCBs and organochlorine-based pesticides.

The RIBS also includes the collection of 2-4 species of fish at each site. Fish sampling and a community evaluation is performed by the Division of Fish and Wildlife. The fish are analyzed for heavy metals, PCBs and organochlorine pesticides by the NYS Health Department. The Division of Fish and Wildlife also conducts its own monitoring program which is described in more detail below.

Fish Flesh Monitoring

In addition to assisting with fish sample collection for the RIBS program, the Division of Fish & Wildlife conducts the statewide Toxic Substances Monitoring Program (TSMP). The TSMP is used primarily to identify waters throughout the state with PCB, organochlorine pesticide and mercury contamination by analysis of fish flesh.

This data is also evaluated by the NYS Health Department (NYSDOH) for risk to human consumers. Fish flesh contaminant data collected through this program have led to NYSDOH consumption advisories for Lake Ontario and its tributary streams as described in the Stage I report (p. 4-4 to 4-6).

A minimum of two different species (one predator and one forage fish) are collected from waterways throughout the State. Sampling locations include all major waterways in the Oswego River drainage basin including: each of the Finger Lakes, Onondaga and Oneida lakes, the Seneca, Oneida and Oswego rivers, Skaneateles and Chittenango creeks, and the Oswego Harbor.

New York State also conducts a fish flesh monitoring program for Lake Ontario. Collections are made on a biennial basis because of the time required to produce meaningful changes in contaminant concentrations in adult fish. These changes frequently require one to three years to manifest themselves once a contaminant source is eliminated.

Due to the special nature of its problems, Onondaga Lake is currently receiving intensified study as part of a remedial investigation to include increased sample numbers and species types. Other special monitoring studies for the Oswego basin include the Finger Lakes organochlorine analyses (1983, 1985 and present) and the Great Lakes Nearshore Fish Contaminant Surveillance (1984-87).

Current Initiatives

The first RIBS for the Oswego River basin was conducted in 1989/90 and the results will be documented in a 1991 report. The RIBS sampling sites are shown in Figure 8-3. Although intensive monitoring will be conducted at all sites on a six-year cycle (two on followed by four off), annual monitoring will continue at the permanent sites shown in Figure 8-3. Annual monitoring will be performed five times annually and consist of water column analyses for metals, halogenated organics and standard field parameters.

Conclusions

Although the monitoring programs described in this section will identify potential problem areas, they were not designed to identify the specific sources of contamination. Therefore, source trackdown investigations are needed in the three identified potential unknown source areas: Owasco Lake drainage, Skaneateles Creek below Skaneateles Falls and the Oswego River between Phoenix and Fulton.

Remedial/Control Options

Investigations to identify potential unknown source areas should be conducted. Such investigations would confirm or deny the presence of PCBs in these areas and would also locate potential sources. PCB investigations are discussed in Chapter 9.

The ultimate remediation of these sources would be completed by the program which is most appropriate for the identified source.

References

[1] NYSDEC (1987). Toxic Substances in Fish and Wildlife Analyses since May 1, 1982. Volume 6.

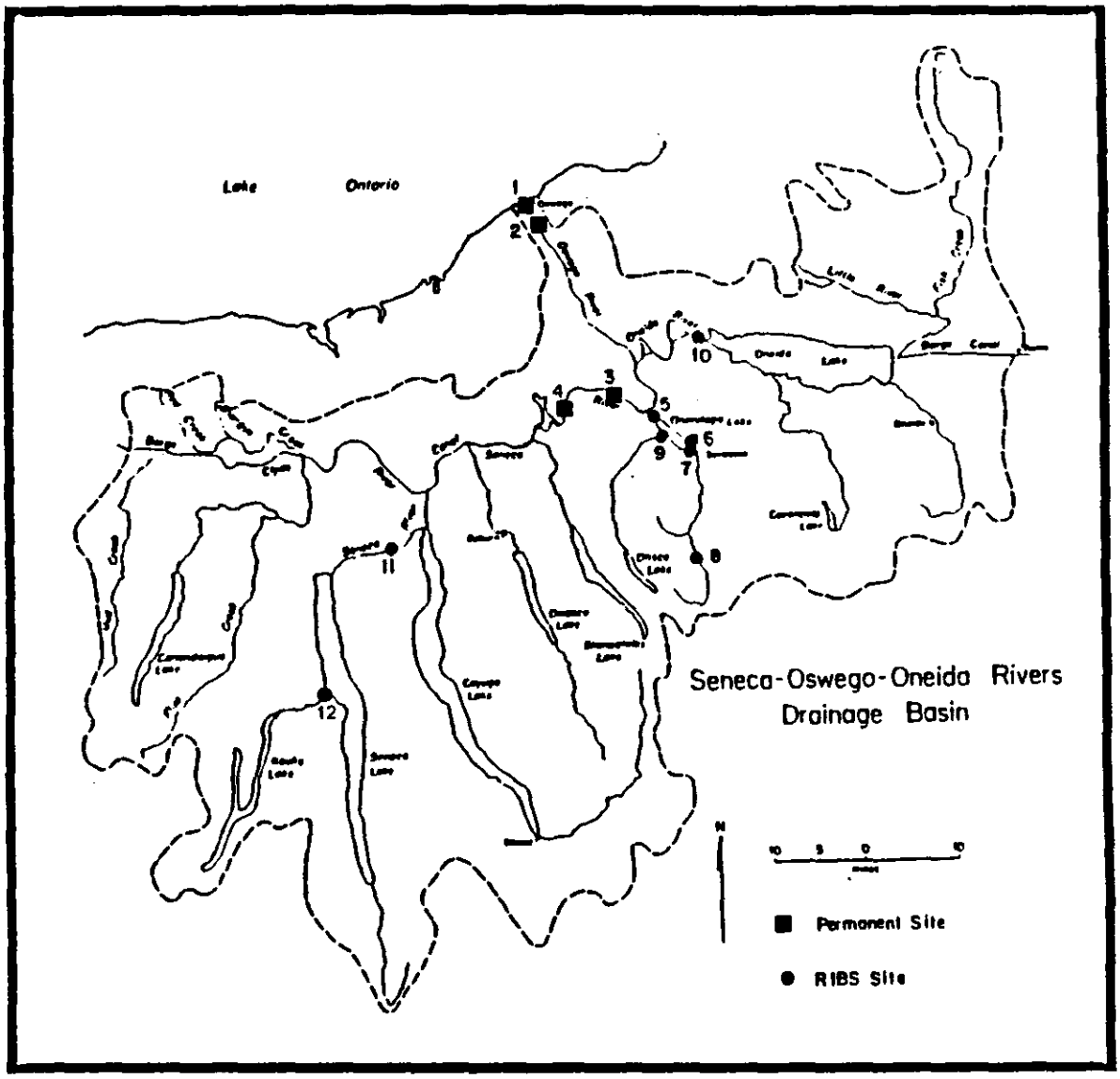

Figure 8-3

Rotating Intensive Basin Studies (RIBS)
Monitoring Sites

LOCATION KEY

1. Oswego River at Lock 7 in Oswego (discontinued in 1987)
2. Oswego River in Minetto (Co. Rt. 25 bridge)
3. Seneca River at Rt. 31 bridge in Baldwinsville (discontinued in 1987)
4. Seneca River in Jacks Reef (Co. Rd. 32 bridge)
5. Onondaga Lake Outlet in Salina (Longbranch Rd. bridge)
6. Ley Creek in Syracuse (Park St. bridge)
7. Onondaga Creek in Syracuse (Spencer St. bridge)
8. Onondaga Creek in Lafayette (Webster Rd. Bridge)
9. Ninemile Creek in Lakeland (Rt. 48 bridge)
10. Oneida River in Brewerton (Rt. 11 bridge)
11. Seneca River in Seneca Falls (Bridge St. bridge)
12. Keuka Lake Outlet in Dresden (Milo St. bridge)

POTENTIAL DIOXIN SOURCES

Dioxins were determined to be contaminants of concern in the Stage I RAP due to the presence of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) above State standards in a single composite sample of three carp taken from the Oswego Harbor (Stage I, p.5-13). Since then the Army Corps of Engineers investigated the potential presence of this compound in the Oswego Harbor by taking four sediment samples in July 1990. 2,3,7,8-TCDD was not detected in the sediment samples at a detection limit of 1.8-2.8 pg/g (ppt). There is little additional data on Polychlorinated dibenzo-p-dioxins (PCDD) in the drainage basin because of the difficulty and expense of reliable testing. However, NYSDEC is currently conducting a statewide dioxin investigation which includes sampling in the Oswego River drainage basin.

PCDD are characterized by two benzene rings connected by two oxygen atoms. There are 75 possible dioxin isomers depending on the degree of chlorine substitution on the PCDD molecule. 2,3,7,8-TCDD is the most toxic of the dioxin compounds and therefore has received the most attention. However, toxicity and potential environmental impacts greatly differ between the PCDD compounds.

There are no confirmed sources of dioxins to the area of concern. However, PCDDs have a number of source types (past and present) some of which exist in the Oswego River drainage basin. These are discussed below.

Herbicide Manufacture By-product

Dioxins are not a manufactured chemical. However, they are a contaminant (up to ppm quantities) in many chlorophenol-derived herbicides. 2,4,5-T, 2,4-D and silvex have been found to be contaminated with 2,3,7,8-TCDD, Erbon, ronnel, DMPA, sesone and others have also been contaminated by PCDD. These herbicides had widespread use throughout the United States and the world.

For example, 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) was developed during World War II and registered as a pesticide in 1948. Due to its ability to kill broadleaf weeds and undergrowth, it received widespread residential and commercial use. 2,4,5-T and 2,4-D were also combined to make the herbicide Agent Orange used in Vietnam. In 1970, many domestic uses of 2,4,5-T such as use in yards, lakes, ponds and most food crops were curtailed due to toxicity concerns. However, commercial use of 2,4,5-T was continued until 1979. Such commercial uses included forestry management, power transmission rights-of-way, rangelands, rice fields and turf. 2,4,5-T has also been used in disinfectants for hospital rooms, bathrooms, food processing plants, swimming pool surfaces, etc.[1]

Another PCDD-contaminated (with higher chlorinated dioxins) chemical that has received widespread use is pentachlorophenol (PCP). Used primarily as a wood preservative, PCP has also found use as a biocide in process cooling water and pulp and paper mills, a weed defoliant on seed crops, an insecticide for termite control, a slime controller in the petroleum industry, etc.

Since many products may have had trace levels of dioxins, there are many ways dioxins could enter the aquatic environment including direct application to lakes and streams, runoff from pesticide treated lands, leaching from PCP-treated docks, industrial accidents, etc.

Combustion By-product

Dioxins may be released or created in trace quantities during many different combustion processes. Therefore, industrial, commercial and solid waste incinerator emissions and residual ash may be sources of dioxins to the environment. Incineration reactions are complex and at present it is unknown if the dioxins are formed during incineration or are already present in the material being incinerated. There is growing evidence that dioxins may be released in ultratrace quantities during incineration of many materials, including wood, coal and paper[1-4]. In addition, PCDD formation has been linked to the exhaust emissions of automobiles using leaded fuel.[5]

Air transport of combustion products may lead to widespread distribution. Therefore, dioxins may be found throughout the environment due to its presence in airborne emissions. For example, PCDDs have been detected in the sediments of an island lake (Lake Siskiwit, Isle Royale) in Lake Superior. This lake is considered pristine and only affected by airborne deposition.[6]

Emissions of dioxins may be controlled by proper combustion practices.[2,7] PCDD formation is favored by low combustion temperatures, insufficient or excess oxygen conditions, inadequate residence time and wet conditions.[3] Properly controlled combustion conditions and modern air pollution control techniques should lessen the airborne load of dioxins to the environment.

Oswego County has a municipal refuse incinerator, the Oswego County Energy Recovery Facility, on the east bank of the Oswego River in Fulton. The NYSDEC Division of Air Resources conducted emmission sampling at the outlet of the electrostatic precipitator of this facility on two occasions in 1986. Results of this testing and subsequent air modeling and risk assessment has concluded that this facility does not pose a potential health risk to nearby individuals from emissions of dioxins and furans[8].

Other Sources

Another environmental source of dioxins is the improper disposal of products or by-products contaminated with PCDD. Many contaminated areas are now Superfund sites subject to extensive clean-up efforts. Improper disposal of PCDD-contaminated materials may taint soil, groundwater, surface water, etc. There are no dioxin-contaminated hazardous waste sites reported in the Oswego River drainage basin. But, dioxins are not routinely analyzed at such sites.

In 1987, an EPA study identified the presence of dioxins in many bleached paper products. Dioxins are believed to be formed by a chemical reaction between the chlorine used in bleach and the paper pulp and organic matter in the pulp. This is especially true for the Kraft paper processes. Therefore, dioxins may enter the environment through the paper products (food wrappers, diapers, toilet tissue, etc.) or by the release of paper manufacturing wastes.[2] Dioxins are also characteristic of the NaOH regeneration process used in reformulating catalysts in petroleum refining.

Conclusion

The potential sources for the release of dioxins into the environment are many and varied. Due to the numerous potential sources and transport mechanisms, many researchers believe dioxins are becoming ubiquitous in trace quantities in the environment. By discovering and controlling sources of dioxins, the future toxic load to the environment should lessen.

Current Initiatives

In addition to the statewide NYSDEC study (page 8-36), the EPA is conducting a national bioaccumulation study to evaluate the effects of toxic substances in the food chain. The study will include not only dioxins, but dibenzofurans, PCBs, persistent pesticides, etc. The results from this study will expand our knowledge of the effects of persistent toxic chemicals in the environment and may assist in future standard setting and policy making.

References

[1] USEPA, (1980). Dioxins, EPA-600/2-80-197.

[2] Gough, M. (1988). "The Most Potent Carcinogen", Resources, No. 2:2-5.

[3] Lisk, D.J. (1988). "Environmental implications of incineration of municipal solid waste and ash disposal," The Science of the Total Environment, 74:39-66.

[4] Long, J.R., Hanson, D.J. (1983). Dioxin issue focuses on three major controversies in U.S., Chemical & Engineering News, June 6, 1983: 23-26.

[5] Marklund, S., Rappe, C., Tysklind, M., and Egeback, K.E. (1987). - "Identification of polychlorinated dibenzofurans and dioxins in exhausts from cars run on leaded gasoline." Chemosphere, 16:29-36.

[6] Czuczwa, J.M., and Mites, R. (1985). "Airborne Dioxins and Dibenzofurans: sources and fates," Environmental Science & Technology, 20:195-200.

[7] Weerasinghe, NCA., and Gross, M.L. (1985). "Origins of Polychlorodibenzo-p-dioxins (PCDD), and Polychlorobenzofurans (PCDF) in the Environment", in Dioxins in the Environment, hemisphere publishing, 133-151.

[8] NYSDEC, (1988). "Emmission Source Test Report: Preliminary Report on Oswego County ERF". Division of Air Resources, Bureau of Toxic Air Sampling.

LAKE ONTARIO

The Stage I Remedial Action Plan (Chapter 5) identified Lake Ontario as a potential major source of PCBs and octachlorostyrene to the area of concern. However, lakewide sources are beyond the scope of the Oswego River RAP.

The Lake Ontario Toxics Management Plan (LOTMP, February 1989) was developed jointly by the United States Environmental Protection Agency, Environment Canada, the Ontario Ministry of the Environment, and NYSDEC. The LOTMP addresses the problem of lakewide contamination through planning and commitments by the agencies to specific actions to control toxics in Lake Ontario. The role of the LOTMP in relation to the RAP is discussed on pages 4-30 and 4-31 of the Stage I document.

In addition, New York State is developing a 25-year plan for its portion of the Great Lakes Basin. This is a comprehensive, multi-agency plan that will address Great Lakes environmental quality and natural resource management issues. The 25 year plan will be discussed in greater detail in Chapter 10 (Other Policies and Program Initiatives).

AIR TOXICS

Pollutants released to the atmosphere eventually fall back to earth. Such pollutants may be deposited directly to waterbodies or deposited on the landscape, where they eventually are carried to waterbodies during runoff events. The evidence has been mounting that air emissions from man-made sources may significantly contribute to the loadings of certain pollutants, such as PCB's, into the Great Lakes[1]. Therefore, atmospheric deposition may be a significant nonpoint source of pollution to the Great Lakes basin.

Program Description

The EPA has established a national program to develop control requirements for the sources of air toxics. In addition to establishing National Emission Standards for Hazardous Air Pollutants (NESHAP) under Section 112 of the Clean Air Act, EPA provides technical and financial support to State agencies for the development and implementation of air toxics programs.

The New York State DEC has a comprehensive air toxics program. NYSDEC's Bureau of Air Toxics mission is to provide a coordinated, technically current regulatory approach for the control of emissions of chemical substances for which no federal ambient air quality standards have been developed. The New York State regulation, 6 NYCRR Part 212, and New York's Air Guide-1, entitled "Guidelines for Control of Toxic Air Contaminants", provide the regulatory base upon which New Yorks's air toxics program is built.

Air Guide-1, an engineering document, contains specific chemical control guidance for over 240 chemicals separated into three categories: high toxicity air contaminants, moderate toxicity air contaminants, and low toxicity air contaminants. The higher the toxicity, the more stringent the control requirements become.

Air Guide-1 provides New York's regionalized air pollution control program staff with a screening mechanism to determine the control requirements necessary for a source seeking a new or renewed permit. As part of this review, the applicant must evaluate the predicted maximum ambient impact of the chemical contaminant with the acceptable ambient level for the chemical contaminant in Air Guide-1 to determine acceptability or the amount of emissions reduction required.

The NYSDEC Division of Air conducts routine air monitoring through its Ambient Air Monitoring System. The system is designed to measure compliance with ambient air quality standards and provide long-term air quality trend data. In 1985 New York created two new statewide air monitoring networks: air toxics and acidic deposition.

The NYSDEC is using the networks to gather information and understand the levels of specific pollutants that travel through the
the atmosphere. The network will help identify the amounts of certain airborne heavy metals and volatile and semivolatile organics present in New York State air. Data from the network will also assist in understanding transport and conversion mechanisms as they relate to the movement of airborne toxics in the atmosphere. Such knowledge is essential if effective control programs to protect the Great Lakes and other areas from airborne toxics are to be developed.

There are currently eight toxic monitors statewide, three of which are in the Great Lakes basin (Buffalo, Niagara Falls, Rochester). There are also seventeen atmospheric deposition monitoring stations in New York, including one in Oswego County. In addition to ambient monitoring, the NYSDEC may require stack testing at specific air emission sources to assure compliance with appropriate standards.

Current Initiatives

A fugitive emission is an air discharge that is not captured by a pollution control system and thus is released to the atmosphere at the source rather than through a stack. In some cases such emissions may be a significant source of atmospheric pollution. Therefore, the NYSDEC is promulgating a fugitive emission regulation which calls for a 50% reduction of all unregulated air releases from a 1987 baseline emmission inventory.

The recently adopted Federal Clean Air Act will significantly strengthen existing air regulations as the Act's conditions are administered in the future. Provisions affecting the Great Lakes include:

- An EPA study on the toxic pollution of the Great Lakes resulting from atmospheric deposition. By November, 1995 the EPA must use the results of this study to develop regulations, if necessary, to combat the air toxics problem.

- EPA must list sufficient area source categories to regulate 90% of emissions of the 30 most hazardous area source pollutants. Regulations requiring generally available control technology for the sources must be adopted by the year 2000.

- EPA must propose a national urban air toxics strategy by 1995, which contains specific actions designated to reduce cancer risks from urban sources by 75%. This strategy must be fully implemented by 1999.

The EPA is currently undertaking a computer modeling initiative to estimate nonpoint source loadings (including atmospheric deposition) to the Niagara River basin. This modelling effort may ultimately be expanded to other Lake Ontario basins such as the Oswego River drainage basin.

The Great Lakes Commission, an eight state compact agency, and its member states, will be developing a regional air toxics emissions inventory under a grant from the Great Lakes Protection Fund. The Great Lakes Protection Fund is a $100 million environmental endowment formed in October 1989 by the Governors of the Great Lakes States. The regional inventory will be used as to evaluate the impact of 25 priority pollutants (including mercury, PCBs and lead) and store information on point sources (stacks), mobile sources (vehicles) and area sources (small individual sources collectively contributing from a geographic area). The inventory will be available by computer link-up to all Great Lake States: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin.

Conclusions

Air toxics do not recognize established boundaries such as the Area of Concern, drainage basins etc. Pollutants may travel great distances in the atmosphere before their effects are manifested. Therefore, the determination of atmospheric sources of pollutants to the surface waters of the Area of Concern and the Oswego River drainage basin is outside the scope of this plan.

The air toxics problem should be solved at the State and regional level if appreciable progress is to be made. The initiatives discussed above are some examples of current activity that will impact facilities in the Area of Concern and the drainage basin. Additional measures will be proposed in the international Lake Ontario Lake Management Plan and other State, regional and national initiatives.

References

[1] Strachan and Eisenreich, 1988. Mass Balancing of Toxic Chemicals into the Great Lakes: The Role of Atmospheric Deposition, IJC.

OTHER PROGRAMS

All sources of contamination to the Area of Concern have not been identified due to the complex nature of toxic contamination in the environment. In addition, the contaminants of concern used in the RAP originated from the Lake Ontario Toxics Management Plan list of substances of special concern to Lake Ontario. This list is evolving and may be changed as our knowledge of toxic substances increases. Such changes will be reflected in future RAP updates.

The regulatory programs discussed in this chapter are not all inclusive of the current programs in operation in the Oswego River drainage basin. Instead, the chapter focuses on regulatory and control programs specific to sources identified in Stage I. There are other regulatory and control programs in effect however, including programs for:

Waste reduction
Solid waste
Oil and hazardous material spills
Storm water discharges
Other nonpoint sources
Sludge disposal
Hazardous waste treatment, storage and disposal facilities

For the purposes of drawing conclusions for this RAP, there is no current evidence that sources regulated by these programs are significantly contributing Oswego RAP chemicals of concern to the Area of Concern.

CHAPTER 9

INVESTIGATIONS

INTRODUCTION

The Stage I RAP showed there are many data gaps in our knowledge of water quality in the Oswego River drainage basin. Chapter 8 of this report also identifies areas where our knowledge is limited. Such limited data restricts our ability to make sound judgments on remedial actions.

Therefore, further investigations are needed to understand the water quality problems in the Area of Concern. This chapter will identify and establish priorities for potential investigations needed in the Oswego River drainage basin.

INVESTIGATIONS FOR A MORE THOROUGH DEFINITION OF IMPAIRMENTS

The Great Lakes Water Quality Agreement (GLWQA), Annex 2, lists 14 indicators of beneficial use impairment (page 3-2). Chapter 4 examined data from the Area of Concern to determine the existence of such impairments. Six indicators of impairment could not be determined with high confidence due to inconclusive evidence or lack of data. Therefore, these six beneficial use impairment indicators will require further study. Potential investigations derived directly from these indicators are described below and summarized in Table 9-1. Such investigations would provide a more thorough definition of the use impairments in the Area of Concern.

Survey of Fish or Wildlife Tainting

Objective: To determine if fish or wildlife tainting exists in the Area of Concern.

Background: The Stage I report concluded GLWQA indicator #2, tainting of fish and wildlife flavor, may not exist. However, this conclusion was made with low confidence (page 4-7) due to lack of evidence. NYSDEC currently monitors the water column throughout the basin for anthropogenic substances (phenols and chlorinated benzenes) suspected to cause tainting. These chemicals have not been detected and no complaints of tainting have been received. However, there are likely to be additional substances not currently recognized that cause tainting. Such unknown substances could not be chemically analyzed and, therefore, an investigation may be needed in the Area of Concern to determine whether or not tainting exists.

Table 9-1

Investigations for a More Thorough Definition of Impairments

Data Gap	GLWQA[1] Impairment Indicator #	Reasoning
Survey of fish or wildlife tainting	2	Impairment definition made with low confidence because conclusions are not confirmed by an investigation.
Tumor survey of bullheads and suckers	4	Impairment definition made with low confidence because surveys have not been performed.
Bird and animal deformity/reproduction investigation	5	Impairment definition made with low confidence because investigations have not been performed.
Benthos investigation	6	Impairment definition made with low confidence because recent studies have not been performed.
Aesthetics survey	11	Impairment definition made with low confidence because a survey has not been conducted.
Phytoplankton/ zooplankton investigation	13	Impairment definition is unknown because recent data does not exist.

[1] GLWQA - Great Lakes Water Quality Agreement

Proposal: A fish and wildlife tainting investigation consisting of a scientifically conducted taste panel administered by experienced tainting researchers. The samples used for this investigation should be those that spend the majority of their time in the Area of Concern. Therefore, larger lake fish (i.e., salmon) would not be included in this study.

Usefulness: The study will further define one of the 14 GLWQA indicators of impairment.

Fish Tumor Investigation

Objective: To determine if fish tumors exist in the Area of Concern.

Background: The Stage I report concluded GLWQA indicator #4, fish tumors or other deformities, may exist. However, this conclusion was made with low confidence due to the lack of evidence (page 4-14). Therefore, a study to confirm or deny the presence of neoplastic and pre-neoplastic liver tumors in bullheads and suckers may be needed in the Area of Concern.

Proposal: A study to confirm or deny the presence of neoplastic and pre-neoplastic liver tumors in bullheads and suckers in the Area of Concern. These fish species are used because they are bottom dwelling and most likely to be affected by environmentally induced tumors. The bullheads should be favored since they move around less than suckers, thus increasing the likelihood that the results are indicative of conditions in the Area of Concern. Fish should be captured from specific target areas within the Area of Concern: east harbor, west harbor, lower river, upper river (below the first dam). The fish must be analyzed by a histopathologist with experience with fish liver tumors. Liver tumors must be used as the indicating factor because lip and surface abnormalities may be virally induced and, therefore, not necessarily related to environmental contamination. Results should be correlated with sediment/surface water concentrations. This investigation should be done in cooperation with NYSDEC Region 7 fisheries staff and may also be coordinated with the Department's contracted fish pathology services at Cornell University's College of Veterinary Medicine.

Usefulness: This study will further define a GLWQA indicator that may exist but has not been confirmed with adequate evidence. However, determination of a causative agent and relating the incidence of tumors to a specific contaminant or source is very difficult.

Bird and Animal Deformity/Reproduction Investigation

Objective: To determine if bird or animal deformities or reproductive problems exist and result from contamination originating in the Area of Concern.

Background: The Stage I report concluded GLWQA indicator #5, bird or animal deformities or reproductive problems, may exist due to levels of PCBs, octachlorostyrene and dioxin in fish flesh exceeding NYSDEC criteria for the protection of fish-eating wildlife. However, this conclusion was made with low confidence because a definitive study had not been performed (page 4-17).

Proposal: A study to compare bird or animal deformities or reproductive problems in the Area of Concern to a control area. Fish eating birds may show the greatest effects from RAP area contaminants. However, their mobility makes identifying contamination specifically related to the Area of Concern difficult. Consequently, an investigation should be designed to include sensitive wildlife indicator organisms with a small, localized territorial range.

Usefulness: The study will further define one of the 14 GLWQA indicators of impairment. However, it may be more economically advantageous to look at fish flesh and relate it to known affects resulting from consumption of fish by humans or wildlife.

Benthos Investigation

Objective: To determine if the degradation of benthos exists in the Area of Concern.

Background: The Stage I report concluded GLWQA indicator #6, degradation of benthos, may exist. However, this conclusion was made with low confidence because the benthic macroinvertebrate community structure data is dated (1970s) and it has not been compared to unimpacted control sites. Recent (1987) toxicity tests conducted by the U.S. Army Corps of Engineers have suggested that a problem may exist (p. 4-18).

Proposal: A benthic macroinvertebrate community structure (abundance and diversity) investigation which includes toxicity or bioavailability testing of sediment-associated contaminants. This investigation could include size/age demographic studies and examination of fecundity. Any benthos investigation conducted should compare the Area of Concern to a similar unimpacted control area. The chosen control invertebrate communities should possess trophic group distributions (e.g. suspension vs deposit feeders) similar to those of AOC study sites.

Usefulness: A benthos investigation would further define one of the 14 GLWQA indicators of impairment.

Aesthetics Survey

Objective: To determine if the water quality is aesthetically pleasing.

Background: The Stage I report concluded, GLWQA indicator #11, degradation of aesthetics, may not exist. However, this conclusion was made with low confidence because an extensive survey of Area of Concern users has not been performed (p. 4-24).

Proposal: An aesthetics survey designed to determine if the water quality in the Area of Concern has any persistent objectionable deposits, unnatural color, turbidity, unnatural odor, scum, oily sheens, algal mats, etc. The survey should be given randomly in the Area of Concern and it must be carefully designed and administered to avoid bias. Since aesthetics is a highly subjective indicator, the results should be carefully interpreted.

Usefulness: This survey would further define one of the 14 GLWQA indicators of impairment.

Phytoplankton/zooplankton Investigation

Objective: To determine if phytoplankton or zooplankton are being affected by the water quality in the Area of Concern.

Background: The Stage I report concluded GLWQA indicator #13, degradation of phytoplankton and zooplankton populations, was unknown. This is because the data collected is nine years old and may not be indicative of water quality due to recent improvements in the basin (p. 4-26).

Proposal: A phytoplankton and zooplankton community structure investigation which includes bioassays (Ceriodaphnia and other indigenous species) to determine relative toxicity. Results from the Area of Concern should be compared to an unimpacted control area with similar chemical and physical characteristics. This will determine if the water quality in the Area of Concern is affecting the phytoplankton and zooplankton community structure and the extent of ecological toxicity due to environmental contaminants.

Usefulness: This investigation would further define one of the 14 GLWQA indicators and would determine if recent improvements in the Area of Concern (p. 4-26, 4-27) have had an impact on water quality.

OTHER POTENTIAL INVESTIGATIONS

This section describes other potential investigations that are derived from the Stage I RAP or Chapter 8 of this document. Such investigations are indirectly related to the 14 GLWQA indicators or will assist in identifying potential pollution sources to the Area of Concern. These potential investigations are described below and summarized in Table 9-2.

Dissolved Oxygen Survey

Objective: To determine if dissolved oxygen levels are adequate throughout the Area of Concern.

Background: Dissolved oxygen levels currently are monitored quarterly at Lock 7 within the Area of Concern by the United States Geological Survey (USGS). In addition, the NYSDEC monitoring program includes dissolved oxygen measurements at Lock 7 (Chapter 8). In general, these samples meet or exceed the IJC objective of 6 mg/l of dissolved oxygen. However, the Lock 7 sampling station is in the main river water flow and may not be indicative of other more stagnant locations within the Area of Concern.

Proposal: An investigation of dissolved oxygen levels throughout the Area of Concern to determine if eutrophic conditions exist. Since dissolved oxygen levels may be seasonably variable, sample collection should be done over a one-year period. Sample locations should be scattered throughout the Area of Concern and include the eastern and western sections of the Harbor, the Oswego Marina, Wrights Landing and Coast Guard docking area, the Port Authority area and the main river flow. If anoxic bottom waters are encountered during the dissolved oxygen survey, redox potential (Eh) and/or free sulfide concentrations could be recorded.

Usefulness: The results could be used to determine if remedial measures are needed to prevent eutrophication in the Area of Concern. Also, correlation of dissolved oxygen levels in the main river flow to other areas may be attempted.

Nonpoint Source Loading Study

Objective: To determine the nonpoint source loading of phosphorus to the Oswego River Area of Concern.

Background: The Stage I RAP determined agricultural runoff to be a potential source of phosphorus to the Area of Concern. However, the extent of this problem in the Oswego River drainage basin is unknown due to a limited data.

Table 9-2

Other Potential Investigations

Investigation	Reasoning
Dissolved oxygen survey of AOC	Previous sampling was in the main river flow and may not be representative of stagnant areas.
Nonpoint source loading study	More information is needed on the contribution of agricultural nonpoint sources to the Area of Concern.
Municipal system toxics investigation	To determine the toxic loadings that may presently go undetected and enter basin waterways through treatment plants or combined sewer overflows.
*Dioxin investigation	Elevated levels of dioxin were found in one sample of carp. There are no known sources.
*PCB source identification investigations: Oswego River between Fulton and Phoenix Owasco Lake Drainage Vicinity of Village of Skaneateles Falls	Identified as potential PCB problem areas due to elevated levels of PCB in fish.
Mirex sediment investigation	Mirex contaminated sediments exist in the Oswego River. The biological significance is unknown.
Toxic Sediment Deposition	Sediments within the basin are known to be contaminated and thought to be migrating to the Area of Concern.
AOC Sediment Investigation	To determine if critical contaminants exist in the sediments above emerging guidance levels.

* Before source investigations are conducted, the indicators of a potential problem (fish) should be sampled more extensively to determine if a problem truly exists.

Proposal: First it must be verified that an algal problem still exists in the Area of Concern. If it does, then this investigation can proceed. The measurement of nonpoint source runoff is very difficult. However, it may be possible to determine nonpoint source loadings by establishing a monitoring station at the mouth of the Oswego River (at the Lock 7 USGS gauging station). Sampling should be conducted for one year with particular emphasis on storm events and high flow periods. A total tributary load for the AOC could be established from the concentration and flow data. Known point source loadings could then be subtracted from the total tributary load to make an assessment of as to the relative contribution of nonpoint source vs. point source loading.

Usefulness: The results could be used to determine if this potential problem is significant. If nonpoint source loading is significant, then the investigation could focus on specific sub-basins and specific sources through monitoring and modeling. Therefore, remedial actions could be targeted where they would have the greatest effect.

Municipal System Toxics Investigation

Objective: To determine if toxics are present in significant quantities within municipal systems and may thus be entering the drainage basin through municipal treatment plants or combined sewer overflows.

Background: As discussed in Chapter 8, it is presently unknown what types and quantities of toxic materials may pass through a municipal treatment plant or may enter the waterways basin through combined sewer overflows. Past investigations of these sources have focused on traditional pollutants (nontoxics and heavy metals). Therefore, an investigation of one or more municipal systems may be needed to determine if municipal systems are significant sources of toxics to the Area of Concern.

Proposal: Conduct sediment sampling within municipal storm drain systems. Such sampling is more efficient than stormwater discharge monitoring because it is not dependent on storm events and toxics are easier to detect in the sediment samples. At a minimum, the samples should be analyzed for critical RAP pollutants. Analysis also should include other chemicals determined to be important by a review of industrial dischargers. This investigation should compliment previous sampling conducted in Onondaga County. It may be appropriate to initiate such sampling through the SPDES process.

Usefulness: This investigation will determine the significance of this potential toxic source.

Dioxin Investigation

Objective: To ascertain if dioxins are present in the Oswego River and to determine the source if dioxins do exist.

Background: Composites of six smallmouth bass and three carp were analyzed for the presence of dioxin by EPA in 1987. The smallmouth bass levels are similar to those found in fish from other parts of Lake Ontario. However, the carp values are high (28.3 pg/g) compared with fish from other areas. Four sediment samples taken from the harbor in July 1990 showed no detection of 2,3,7,8-tetrachlorodibezodioxin at 1.8-2.8 ppt. There are no known sources of dioxin to the Oswego River.

Proposal: Additional fish analyses should be performed to determine if dioxins are present at abnormal levels. If the analyses confirm dioxins at abnormal levels, then the second phase of this investigation should be performed. The second phase would include water column (Pices), bottom sediment and forage fish tissue analyses in various locations throughout the basin in an attempt to locate a potential source of dioxins. Special sampling consideration should be given to potential sources in the basin such as pulp and paper mill discharges, municipal and sludge incinerators, etc.

Usefulness: This investigation will determine if dioxins are a problem in the Area of Concern and will attempt to locate the source(s) if the problem does exist.

PCB Source Identification Investigations

Objective: To determine the source of PCBs in potential problem areas.

Background: The Stage I RAP has identified the following potential problem areas due to elevated levels of PCBs in fish flesh: the Oswego River between Fulton and Phoenix (1986 channel catfish analysis), Skaneateles Creek below Skaneateles Falls (1984 Brown Trout analysis) and Owasco Lake (1982 lake trout analysis). However, these analyses were limited (two analyses in each location) and they are somewhat dated. It is unknown if present conditions reflect these results.

Proposal: A two-part study to identify potential sources is proposed. The first part of this study will consist of collecting fish for PCB analysis to confirm the existence of a problem in the three areas. Brown trout samples have already been collected from Skaneateles Creek (1988), however, the chemical analyses have yet to be conducted. In addition, additional fish samples were taken from the basin in 1989 (to be analyzed in 1991) via the RIBS. If a PCB problem is confirmed, then Part 2 of the study will proceed. Part 2 should consist of a source identification study in each of the confirmed PCB problem areas. Water column (Pices) and sediment samples should be collected and analyzed for PCBs. Sample locations should be chosen to be in the vicinity of potential sources such as industrial outfalls, inactive hazardous waste sites, landfills, industrial runoff, etc.

Usefulness: This investigation will confirm or deny the presence of PCB problem areas and will attempt to locate the potential sources of such problems.

Mirex Sediment Investigation

Objective: To determine the location and loading of mirex contaminated sediments.

Background: In the mid 1960s mirex was discharged from Armstrong Cork (Fulton). The chemical contaminated the 14 km stretch of the Oswego River from Armstrong to Lake Ontario. It is believed most of the contamination is limited to sediments that are buried beneath more recent, cleaner sediments (pages 5-29 to 5-32). Previous studies have shown the Oswego River to be one of two tributaries (the other is the Niagara River) contributing mirex to Lake Ontario. Also, Stage I documented mirex detection in four of ten channel catfish taken near Fulton (p. 5-31). The highest mirex value in fish flesh from this sampling effort was 0.017 ug/g, which is well below the fish consumption guideline of 0.1 ug/g. This level of mirex in fish did not significantly differ from an upstream sampling of ten fish of the same species (the upstream samples were taken at Phoenix which is separated from Fulton by a series of dams). Mirex has been reported to be approximately 15 pg/L in water column samples of the Oswego River. This is well below the New York State water quality standard of 0.001 ug/L (1000 pg/L) for mirex. However, the IJC objective for mirex in water is less than the best scientifically available detection level (Annex I, GLWQA).

Proposal: An investigation to determine the loading of mirex to the Area of Concern and Lake Ontario from the Oswego River contaminated sediment source. Such an investigation should evaluate all existing data, include river sediment sampling, behind the dams between Fulton and Oswego, and conduct water column (Pices) sampling. Sampling should be conducted at various times since contaminant loading is likely to be event related.

Usefulness: The data from this investigation could be used to determine the effect of the Oswego River load on the Area of Concern and Lake Ontario. It may also be used in modeling the fate of mirex in Lake Ontario as part of the Lake Ontario Toxics Management Plan implementation. Therefore, this investigation would supply data to assist in the determination of the significance of the mirex problem and thus help determine if remedial action is necessary.

References

[1] Yin, C. and Hasset, I.P. and Mudambi, A.R. (1987). Ph.D. Thesis, To be published, SUNY college of Environmental Science and Forestry, Syracuse, New York.

Toxic Sediment Deposition

Objective: To quantify contaminated suspended sediment transport to the Area of Concern.

Background: Sediments within the basin are known to be contaminated with substances such as PCBs (Ley Creek and Onondaga Lake), mercury (Onondaga Lake) and mirex (lower Oswego River). There may also be other, unknown contaminated sediment areas within the Oswego River basin. Sediments are dynamic and may move within an aquatic system due to turbulence from waves and boats, currents, etc. It is currently unknown to what extent contaminated sediments from upstream sources are transported to the Oswego Area of Concern.

Proposal: An investigation to determine the quantity of suspended sediment transported to the Area of Concern and the extent such sediment is contaminated with toxic chemicals. Chemical analysis of the suspended sediments should include PCBs, mercury, mirex, PAHs, etc.

Usefulness: This investigation will not help with the trackdown of specific sources of contamination, but it will determine if new sediments to the Area of Concern are contributing to the pollution problem. This will assist in assessing the need for sediment remediation and address the issue of potential recontamination of remediated areas.

AOC Sediment Investigation

Objective: To determine the nature and extent of all potential contaminants in the Oswego AOC.

Background: The Stage I RAP concluded that Oswego Harbor Sediments contain a mean mercury value of 0.50 ug/g. However, additional sediment sampling is needed. There has been minimal sampling/analysis conducted within the AOC for dioxin, mirex, and PAHs and no sampling/analysis for PCBs. There has not been an adequate determination of what exists in the bottom sediments.

Proposal: A comprehensive investigation of the AOC sediments to adequately characterize the nature and extent of all potential contaminants. Sediment cores should be taken at various locations in the AOC to determine contaminant levels at various depths. At a minimum chemical analysis must include Oswego RAP contaminants of concern: PCBs, dioxin, mercury, mirex, octachlorostyrene and phosphorus. Analyses should also include PAHs and organic carbon content. Consideration should be given to combining this investigation with other similar studies such as the proposed benthos investigation, and/or the proposed toxic sediment deposition study.

Usefulness: This investigation will determine the extent of contamination for comparison with sediment standards which are presently being developed and use with ARCs program guidance (see Bottom Sediment sections of Chapters 8 & 10).

INVESTIGATION CRITERIA FOR PRIORITY RANKING

Many investigations are needed to assist in the remedial work related to the Oswego Area of Concern. These include further work to determine if problems exist, source trackdown investigations and remedial investigations. NYSDEC, in consultation with the citizens advisory committee and local water quality experts, has developed a set of objective criteria that will assist in assigning a priority value to each proposed investigation discussed in the previous section. This will allow resources to be allocated to the higher priority investigations.

NYSDEC-proposed criteria were discussed at a one day workshop held in Syracuse on May 22, 1990. This workshop resulted in final criteria in the form of a matrix (Table 9-3). This matrix creates a system for reviewing and assigning priority to each proposed investigation based on objective criteria.

In the first column of the matrix are categories of general study characteristics (A-E). These are aspects of an investigation which need to be considered when assessing its value to completing the RAP process.

To complete the matrix, scores must be assigned to each characteristic (A-E) for each individual study. Each study characteristic can be given a score based on the need for completing and implementing the RAP. The scores range in value from 1-3 points.

To calculate the priority level of a proposed investigation, find the score for each characteristic in Table 9-3 that best describes the investigation. Total the score for all five characteristics (A-E) for each investigation. This figure is the priority value. The priority ranking score may range from 5 - 15 priority points, with 15 points being the highest priority investigation.

TABLE 9-3

Investigation Prioritization Matrix

Study Characteristics	3 High Priority	2 Medium Priority	1 Lower Priority
A) Known or potential significance	High; well documented or extremely likely problem	Medium	Low; problem unlikely to exist
B) Water quality indicators	Health Effects (fish consumption advisories)	Biotic Effects	Others (aesthetics)
C) Need to identify data gap	Available data indicates a study is needed	A similar study has never been completed. (data not available)	A similar study has been completed more than five years ago (data may not be indicative of present conditions)
D) Usefulness of results (to remediation)	Very useful to RAP implementation (likely to lead to remediation)	Useful to RAP implementation	Results unlikely to lead directly to remediation
E) Timeliness (duration of study including start-up and completion)	Can be done now	Will take approximately six months to complete	Will take more than one year to complete

PRIORITY RANKING

Following the development of the investigation priority matrix, it was used to rank the twelve proposed investigations to determine their relative priority. The priority rankings, shown in Table 9-4, are split into two groupings: potential investigations relative to a more thorough definition of impairments, and other potential investigations.

As a group, the potential investigations relative to a more thorough definition of impairments received fewer priority points than the other potential investigations. This is because the former are seen as problem definition investigations that may not draw conclusions leading to remediation of the Area of Concern. Therefore, such investigations are not the highest priority. The highest priority is given to those investigations that will help to correct known problems.

This does not mean impairment definition investigations should be ignored. All investigations described in this chapter are considered important to complete the goals of the RAP. But, due to limited funding, difficult choices must be made. However, since it is important to make progress toward defining indicators of impairment in the AOC, at least one such investigation will always be high priority.

The investigations described in this chapter should be used by regulatory agencies, research organizations, academia, etc., as an indication of the type of data that is needed in the Oswego River drainage basin. As RAP implementation progresses consideration should be given to the highest ranked impairment definition investigations remaining on this list.

RECOMMENDATION: **The mirex sediment investigation described on page 9-11 is the highest priority investigation and every effort should be made to secure funding for its completion.**

RECOMMENDATION: **The AOC sediment investigation (page 9-12), PCB source investigation (page 9-10), and the fish tumor investigation (page 9-4) are also considered to be high priority and should receive top consideration for funding.**

As our knowledge of the Oswego River basin and the Area of Concern increases, new potential investigations undoubtedly will surface. When this occurs, the ranking method described in this chapter may be used to establish the relative priority of the investigation.

Table 9-4

Priority Ranking of Potential Investigations

Investigation	A Known or Potential Significance	B Water Quality Indicators	C Need	D Usefulness	E Timeliness	Total Priority Points
Potential Investigations relative to a more thorough definition of impairments:						
Fish tumor investigation	2	2	2	1	3	10
Benthos investigation	2	2	1	1	3	9
Phytoplankton/zooplankton investigation	2	2	1	1	2	8
Bird & animal deformity/ reproduction investigation	2	2	2	1	1	8
Fish or wildlife tainting survey	1	1	2	1	3	8
Aesthetics survey	1	1	2	1	3	8
Other investigations:						
Mirex sediment investigation	3	3	3	3	1	13
AOC Sediment Investigation	2	3	3	2	2	12
PCB source investigation	3	3	1	3	2	12
Dioxin investigation	2	3	3	2	1	11
Municipal systems toxic investigation	2	3	2	3	1	11
Toxic Sediment Deposition	2	3	2	1	2	10
Dissolved oxygen survey	2	1	3	1	1	8
Nonpoint source loading study	2	2	2	1	1	8

CHAPTER 10

RECOMMENDED REMEDIAL STRATEGY

INTRODUCTION

The Remedial Action Plan (RAP) water quality goal was identified in chapter 3 of the RAP. The goals jointly developed by NYSDEC and the Oswego River Citizens Advisory Committee are:

1. To achieve the purposes of the Great Lakes Water Quality Agreement within the Oswego River Area of Concern (AOC);

2. To restore the water quality of the AOC so that it is capable of supporting swimming and an edible and self-sustaining fishery, and

3. To eliminate adverse impacts to Lake Ontario arising from the Oswego-Oneida-Seneca basin.

This goal is embodied within the federal Clean Water Act and the New York State Environmental Conservation Law.

The recommended remedial strategy to restore the beneficial uses to the Area of Concern and to meet the RAP goals is described in this chapter. Each potential source to the Area of Concern is discussed separately, with recommendations made for the remediation of each source. The recommendations are discussed in a logical sequence but are not arranged in any priority order.

The first two recommendations, related to investigations needed in the Oswego River drainage basin, are discussed at the end of Chapter 9. Specific commitments to begin implementation of this remedial strategy will be discussed in the following chapter.

The recommendations for the remedial strategy are made as specific as possible based on current knowledge within the Oswego River basin. As additional information becomes available this strategy will be updated to reflect the necessary changes.

REMEDIAL STRATEGY SUMMARY

The RAP has concluded that further investigation is needed to fully understand the impairments and sources of pollutants to the Oswego Area of Concern. The investigations receiving the highest priority (see Recommendations on page 9-15) are those that relate to mercury, mirex, dioxin (2,3,7,8-TCDD) and PCBs, which have been identified as substances causing impairments in Lake Ontario that may be transported through or out of the Oswego Area of Concern into Lake Ontario in significant amounts.

The identification of necessary investigations is considered to be a critical element of the Oswego Stage II RAP. In order to move forward with remediation, fully developed impairment definition and source identification is necessary. Where appropriate, the Oswego Stage II RAP makes recommendations regarding needed investigations and commitments where resources have been identified to conduct the investigations.

The ongoing Rotating Intensive Basin Study (RIBS) will result in a 1991 report that should substantially add to our knowledge in the Oswego River drainage basin. The RIBS should develop a baseline by which to evaluate future improvements, assist in locating and identifying water quality problems, investigate water quality cause and effect relationships, etc.

Remedial action will not stop while additional evidence of impairment is gathered. It is critical to continue to remediate known sources and correct known problems while seeking the additional evidence that is needed. Therefore, remedial and control programs will continue in all program areas as the recommended investigations are implemented. Additional funding will be sought to implement the recommendations outlined in this chapter.

All of the recommendations discussed in this chapter are considered to be important to improve conditions in the Oswego Area of Concern. However, certain components of this plan are considered to be crucial to restoring beneficial uses. **Crucial components include the Onondaga Lake clean-up, inactive hazardous waste site remediation and combined sewer overflow abatement.** All remedial components must properly evaluate the potential effects on Lake Ontario and the Area of Concern. The specific actions currently under way or planned to implement this remedial strategy are discussed in the next chapter.

Perhaps the biggest obstacle in implementing this RAP will be funding the numerous investigations and remedial actions that will be required in the Oswego River drainage basin. Numerous sources of funding will be pursued by NYSDEC to implement the necessary recommendations. These include the State and Federal Superfund programs (including responsible party payment for clean-up) for hazardous waste sites, the State Water Pollution Control Revolving Loan Fund for municipal sewer system upgrades, etc.

Another potential source of implementation funding is the use of natural resource damage lawsuits. Such suits hold liable those responsible for damages to natural resources resulting from the release of hazardous substances. Natural resources include land, fish, wildlife, biota, air and ground and surface waters owned, managed and controlled by or appertaining to the State of New York. Recovered funds may be used to restore, replace or acquire the equivalent to the injured resource.

NYSDEC is implementing a statewide natural resource damage Strategy to determine priority areas for executing natural resource damages in New York State. Problem areas across the state, including those in the Oswego River drainage basin, will be reviewed as part of this strategy to determine priority for litigation. A natural resource damage suit already has been filed seeking the remediation of the Onondaga Lake bottom and recovery of damages (see Appendix 1).

New policy initiatives may be needed to assist in the total recovery of the Great Lakes basin. Such initiatives which will affect the Oswego River drainage basin and all New York State areas in the Great Lakes basin are being developed in a 25 year plan (see other policy and program initiatives). Also, pollution prevention will play a major role in the future to limit the quantity of pollutants discharged to the environment.

The recommended remedial strategy is discussed by source-type on the following pages.

INDUSTRIAL DISCHARGES

As was discussed in Chapter 8, current point source discharges are considered to be relatively minor sources of RAP pollutants of concern when compared to other sources. For example, the current loading from PCB dischargers in the Oswego River basin is 0.0051 lb/day. This load should be compared to the estimated 3.4 lb/day of PCB that the Lake Ontario Toxics Management Plan (1989) estimated to be entering Lake Ontario from all sources.

The conclusion made in this document for industrial discharges under permit is that, with the possible exception of the Syracuse Metropolitan Treatment Plant, further action on current dischargers beyond that provided through the normal operation of the SPDES program will not be necessary to solve the problems in the drainage basin. The State Pollutant Discharge Elimination System (SPDES) program is gradually tightening discharges under permit and will continue to do so in the future. Since the Syracuse Metropolitan treatment plant is a municipal facility, it will be discussed in the following section on municipal discharges.

SPDES Program

The current SPDES program generally controls discharges to the full extent of the law, and industrial point source discharges are often at the limits of current technology. However, one of the goals of the Great Lakes Water Quality Agreement (GLWQA) is the virtual elimination of the discharge of persistent toxic substances (zero discharge). Therefore, additional measures could be taken to assure current point source discharges will meet this goal.

The renewal of SPDES permits in the Oswego River basin should reflect steps toward this overall goal by incrementally lowering discharge limits. Such an action would not only decrease the loadings to the Area of Concern, but would also decrease the loadings to Lake Ontario and the St. Lawrence River as well.

RECOMMENDATION: **Continue to lower allowable discharges in SPDES permits (especially for RAP critical pollutants: PCBs, Phosphorus, and mercury) whenever feasible as analytical detection limits, pollution control technologies and/or waste reduction techniques improve.**

This may be accomplished by incorporating improved detection limits into permits (thereby allowing the use of water quality based permit limits) and more stringent technology based limits as they become feasible. Also, water quality standards must continue to be revised as scientific knowledge advances.

Treatment Technology

The lowering of allowable SPDES discharges can be achieved by the continued development and updating of Best Available Technology (BAT) guidelines by the federal Environmental Protection Agency. These BAT guidelines outline the "Best Available Technology that is economically achievable" for industrial wastewater treatment in various industrial categories. They must be updated as pollution control technology advances.

RECOMMENDATION: **Best Available Technology (BAT) guidelines for industrial facilities should continue to be developed and periodically updated.**

NYSDEC uses Best Professional Judgement (BPJ) to determine discharge limits in the absence of BAT guidelines. The possibility exists that BAT limits will be less stringent than the previously imposed state BPJ limits. However, such a development will not automatically result in a greater allowable discharge. If a BAT number is less stringent than a previously imposed BPJ number, state and federal anti-backsliding provisions would prevent the less stringent discharge limit unless a process change occurs at the facility.

Water Quality Enhancement and Protection

The virtual elimination of persistent toxics goal of the Great Lakes Water Quality Agreement will be assisted by the NYSDEC water quality enhancement and protection policy presently being developed. This policy, which is the first of its kind in the Great Lakes basin, will assure that the existing uses and quality of waters will generally be maintained and protected. The policy is discussed in more detail in the policy and program initiatives section of this Chapter.

MUNICIPAL DISCHARGES

Due to documented reports of algal blooms, municipal discharges under permit, including combined sewer overflows, were identified in Stage I as major sources of phosphorus to the Area of Concern.

All major municipal wastewater treatment plants (design wastewater flow greater than 1 mgd) in the Great Lakes basin are required to comply with a 1.0 mg/L phosphorus effluent limit. This requirement has greatly reduced the phosphorus loading to the basin. However, combined sewer overflows continue to be a significant short-term pollution source within the Oswego River drainage basin.

Combined Sewer Overflows

Combined sewer system investigations and remedial actions are being implemented in problem areas throughout the Oswego River drainage basin (Table 8-3). This action is required under the authority of existing SPDES permits.

RECOMMENDATION: **Implement required upgrades and remediation as needed based on the results of ongoing investigations and modeling of municipal systems including combined sewers.**

Combined sewer overflow remedial actions may result in significant financial requirements that must be addressed by federal, state and local governments. For example, the combined sewer overflow abatement project in Rochester was estimated to cost $474,749,000 in 1981 dollars. Such a financial burden would be difficult for state and local governments to fund in the Oswego River drainage basin.

In the past, combined sewer overflow abatement projects in priority water quality areas have been funded by the EPA and NYSDEC construction grants program. Although this grant program ended in 1990, a revolving loan program has been established as a source of funding for remedial activity.

The New York State Water Pollution Control Revolving Fund will provide low interest loans to municipalities to assist in the construction of water pollution control facilities. The fund will be supported by combined Federal (80%) and State (20%) resources totalling $1.05 billion. These funds will support 20 year loans at a subsidized interest rate of 2/3 of the market rate. There are also provisions for small, lower interest loans in financial hardship situations. Repayment of these loans will maintain a perpetual source of financing for future water pollution control projects.

Pretreatment

Chapter 8 concluded that the implementation and enforcement of local pretreatment programs may be inconsistent among municipalities. In addition it was concluded that a study was needed to determine if contaminants are passing undetected through local treatment plants.

Therefore, Chapter 9 proposed the municipal system toxics investigation to determine if a toxic load presently goes undetected in municipal treatment plants and combined sewer overflows. The purpose of this investigation is to evaluate the effectiveness of local pretreatment programs and evaluate the significance of this potential source. It is the fourth highest priority investigation of the twelve potential investigations identified in Chapter 9.

Only two (phosphorus and mercury) of the six Oswego RAP contaminants of concern presently are monitored in the local pretreatment programs. The others (PCBs, dioxin, mirex, and octachlorostyrene) are not subject to pretreatment monitoring.

RECOMMENDATION: **Additional pretreatment monitoring is needed in the drainage basin to determine the program's effectiveness. This should include biological toxicity testing and expanded analytical parameters where necessary.**

Such requirements would be implemented through the SPDES permit process. It is likely that many of the RAP parameters of concern will not be found at most facilities. Therefore, the additional monitoring costs should be weighed with the likelihood of finding a parameter at a particular facility. Substances such as dioxin and mirex are unlikely to be found at most facilities. However, phosphorus, mercury, and PCBs are likely to be found at many facilities. Consequently, monitoring for these parameters should be expanded.

Mercury Control

The load of mercury under permit in the current SPDES permit for the Syracuse Metropolitan Treatment Plant is based on obsolete guidance for analytical detectibility and an assumed variability factor. This coupled with the large permitted flow results in a relatively large mercury action level. Decreasing the permitted limit will require improved analytical detection levels and may require improved pretreatment.

RECOMMENDATION: **Pursue methods to reduce the permitted mercury load from the Syracuse Metropolitan Treatment Plant during the permit renewal process. This should be based on compliance with current New York State standards, use of current analytical detectibility guidance, and possibly a site specific detection study.**

Chapters 7 and 8 discussed the new discovery that refuse powered sludge incinerators can be a significant source of mercury to the environment. The majority of mercury reaching the environment from this type of source results from air pollution control scrubber wastewater passing through a municipal treatment plant. Although there are no refuse-powered sludge incinerators within the Oswego River drainage basin, it may be prudent to examine the two facilities in the basin that incinerate sludge.

RECOMMENDATION: **Examine the air pollution control wastewater of the Auburn and Oswego municipal wastewater treatment facilities to determine if pretreatment for mercury may be needed.**

The Oswego River drainage basin contains a refuse-powered incinerator (The Oswego County Energy Recovery Facility), however, it uses electrostatic precipitators for its emission control. This facility does not have liquid scrubbers and does not directly contribute to water pollution through discharge. The only direct liquid discharge from this plant is noncontact cooling water and sanitary wastes.

AGRICULTURAL RUNOFF AND OTHER NONPOINT SOURCES

As was discussed in Chapter 8, phosphorus pollution from agricultural runoff continues to be a concern within the Oswego River drainage basin. Since phosphorus is considered to be the limiting nutrient needed for excessive algal growth within the basin (see Chapter 4), its discharge has been linked to the algal blooms found in the Area of Concern and nearshore Lake Ontario. The current status of algal blooms needs to be investigated to determine if a problem still exists.

Nonpoint Source Management

New York State is combatting this and other nonpoint source pollution problems through its nonpoint source management program. This multi-agency cooperative plan makes many recommendations to control nonpoint source pollution within the state.

The Nonpoint Source Management Program, which was approved by EPA in January 1990 has yet to receive the funding necessary to accomplish all of its objectives. However, NYSDEC, in cooperation with the State Soil and Water Conservation Committee and the county districts, has completed nonpoint source assessment reports (June 1990) for each individual county within New York State.

These reports, which were one of the objectives of the management program, identify waterbodies perceived or known to be affected by nonpoint source pollution. For each affected waterbody the pollution problem is described, including the degree of the problem, the type of pollutants and the sources. These countywide assessments will be used in the development of the Priority Water Problem (PWP) list. The PWP is used to rank impaired waterbodies to guide in the management of statewide water quality programs.

RECOMMENDATION: **Implement New York State's Nonpoint Source Management Program, with special emphasis given to problem areas identified in NYSDEC Soil and Water Conservation District assessment reports.**

Excessive nutrients (phosphorus) and sedimentation (erosion) from agricultural related activities are thought to be the most important nonpoint source related problems within the Oswego River drainage basin. Soil erosion and sedimentation not only degrades water quality and fish and wildlife habitat, but also reduces agricultural productivity. Therefore, the implementation of the nonpoint source management program in the Oswego River drainage basin must be targeted to reduce the level of nutrients and sedimentation.

Implementation will be complicated by the fact that most farms are small businesses that have a small return on investments. Therefore, any loss in income is significant. If significant cooperation is to be obtained from such landowners it will be important to demonstrate benefits requiring a minimum of investment or loss in productivity.

Implementation of the nonpoint source program can only be accomplished through a comprehensive, coordinated, interagency approach in which local agencies and officials play a key role.

RECOMMENDATION: **Develop county water quality strategies that establish local roles and responsibilities to identify and address nonpoint source pollution.**

County soil and water conservation districts are in an unique position to assume the lead role in integrating and facilitating the establishment of such strategies. Local water quality strategies should be linked to the goals of the RAP and the Great Lakes Water Quality Agreement.

Best Management Practices

The use of best management practices can reduce the impact of agricultural runoff by providing for erosion control, reducing excess fertilizer usage on cropland, and controlling runoff through such areas as barnyards, animal waste disposal areas, etc. However, education of local farmers, landowners, and governments is necessary if such practices are to be widely adopted and thus benefit the environment.

RECOMMENDATION: **Increase educational and training opportunities for local landowners and governments to learn best management practices that will decrease the environmental problems associated with agricultural runoff and other types of nonpoint source pollution.**

Increasing educational and training opportunities may be accomplished in many ways. Public informational programs using meetings, workshops, direct mailings, local newspapers, radio, agricultural bulletins, etc., may be used to distribute information on best management practices. On-site demonstrations and tours of farms using best management practices have proven to be an effective educational tools. Knowledgeable speakers can visit local organizations (Farm Bureaus, Granges, etc.) as well as encourage the formation of new organizations to promote sound land use practices.

Such opportunities will only occur through the cooperative efforts of landowners, the private sector, the general public and federal, state and local agencies. Adequate resources will be required from all levels of government to implement necessary informational and educational programs. Additional agency staffing may be needed to conduct informational meetings and workshops and to provide technical recommendations for best management practice installation and implementation.

It is clear that education alone will not eliminate nonpoint source pollution. Financial incentives, additional regulatory controls and adequate enforcement will be needed. The cost of pollution must be made internal to the polluter before widespread benefits will be seen. Successful implementation will require a broad understanding of the problem and public support for the necessary controls. It will also require coordination and cooperation by the public and from agencies at all levels of government. This direction will be provided by the New York State Nonpoint Source Management Program as it is beyond the scope of this RAP.

Other Nonpoint Sources

Although agricultural runoff is considered to be a major nonpoint source problem in the Oswego River drainage basin, urban runoff is also a problem in some areas in the basin. This problem can often be critical in developing areas where changing the land cover may reduce soil infiltration and decrease vegetative interception of water. Without proper controls, these actions may lead to increased erosion, water quality degradation and possible flooding.

The effects of development can be minimized by the use of erosion control measures, detention ponds, recharge basins, trenches, diversion ditches, vegetative swales, artificial wetlands, etc. As part of its Technical and Operations Guidance Series (TOGS) the NYSDEC Division of Water has developed guidance entitled: "Stormwater Management Guidelines for New Development" (April 1990) and "Erosion and Sediment Control Guidelines for New Development" (April 1991).

RECOMMENDATION: **The suggested practices outlined in the NYSDEC TOGS for new development should be adopted by local governments and planning boards in the basin for the review of new development projects.**

Development pressures along waterfront areas are strong throughout the country and the Oswego River drainage basin is no exception. Strong laws, policies, and guidelines are important at the local level to ensure future development will coexist with this precious resource.

The extensive use of pesticides and herbicides for parks, residential and commercial properties, industry, etc. is likely to contribute to the nonpoint source pollution problem. Although the extent of such a problem is difficult to determine, steps may be taken to reduce overuse of such chemicals.

RECOMMENDATION: Local governments in the Oswego River basin must use environmentally sound approaches to pesticide management.

A combination of education programs and local ordinances could be used to achieve this objective. Public agencies (cities, villages, schools, parks, etc.) should set an example by adopting environmentally sound practices. This could include integrated pest management, pesticide application management, pesticide switching and other methods to assure the least damaging methods of pest control are used. Every effort should be made to use pest management practices that are the least hazardous to human health, least toxic to non-target organisms and least damaging to the general environment.

Computer Modeling

The EPA is developing computer modeling methodology for estimating nonpoint source loadings to the Niagara River basin. The methodologies developed are ultimately envisioned for use in other tributaries to Lake Ontario.

This effort will make use of existing information and models to compile nonpoint source loads from four nonpoint source categories:

1. Surface water runoff (agricultural and urban stormwater)

2. Groundwater infiltration (waste sites)

3. Contaminated sediments

4. Atmospheric deposition

The fate and transport of nonpoint source pollution will be explored by a combination of this modeling and extensive sampling efforts.

RECOMMENDATION: Following completion of the modeling effort in the Niagara basin, it should be evaluated for possible expansion to the Oswego River drainage basin.

Due to the expansive nature of this type of undertaking, it is impossible to test the models validity or test its predictions. Therefore, modeling results should be carefully evaluated and use of such basin-wide models should be limited.

HAZARDOUS WASTE SITES

NYSDEC has an ongoing program for the remediation of hazardous waste sites. This program is described in Chapter 8.

This remedial program has completed all the required Phase I investigations (existing data accumulation and assessment) at sites within the Oswego River basin that contain contaminants of concern. All required Phase II investigations (preliminary field investigations to obtain additional data for site assessment) at contaminant of concern containing sites, either have been completed or are in progress. Many sites have advanced to the remedial investigation\feasibility study and beyond to actual site clean-up (Table 8-5).

The RAP looked at evidence gathered in these investigations for all sites considered to be potential sources of contaminants of concern to the Area of Concern. The sites were categorized based on their likelihood to be a source of contamination to the Oswego River Area of Concern (Table 5-2). Seven hazardous waste sites were determined to be likely sources to the Area of Concern in Stage I.

Since that time, Phase II investigations have been completed at the two Armstrong landfill sites. These investigations concluded that contamination is not presently migrating from the landfills. Therefore, these two sites will receive lower priority for remediation than others within the basin where contamination is migrating offsite. Although the Phase II investigation took a few sediment samples, past contamination of the sediments is not a hazardous waste issue and will be handled separately (page 10-14).

In addition, investigations have shown the Clothier site (Granby) and Fulton Terminals (Fulton) have not had an effect on the Oswego River (see the source update section of Chapter 7 and the hazardous waste section of Chapter 11).

Hazardous Waste Site Remediation

Three hazardous waste sites have been determined to be likely sources to the Area of Concern:

Ley Creek PCB dredgings(Syracuse)
Onondaga Lake (Syracuse)
Volney Landfill (Volney)

Remediation of these sites is considered critical to meet the goals of the RAP.

RECOMMENDATION: **Give high priority for clean-up to the three hazardous waste sites thought to be likely sources of contaminants to the Area of Concern.**

BOTTOM SEDIMENTS

The Stage I report identified three areas that contain or are suspected to have elevated levels of contaminants in sediments:

Onondaga Lake (mercury & PCBs)
Oswego Harbor (mercury)
Oswego River below Fulton (mirex)

Onondaga Lake

The sediments of Onondaga Lake have been determined to be an inactive hazardous waste site. A Phase II investigation that included contaminated sediment mapping has been completed at this site. Negotiations are under way with the potentially responsible party to complete the required remedial program. This remedial project and other related projects, which have received considerable public attention, are more fully described in Appendix 1.

Although Onondaga Lake was identified as a source to the Area of Concern, its remedial strategy is not being developed through the RAP process. As described in Chapter 8 and Appendix 1, the Onondaga Lake project has developed its own advisory committee and remedial strategy that is separate from the RAP process.

RECOMMENDATION: **Continue the Onondaga Lake project as planned. Any remedial technologies selected must fully consider the downstream impacts on the Oswego River Area of Concern and Lake Ontario.**

Monitoring

The Stage I report concluded that mercury from past discharges exists in the sediments of the Oswego Harbor. However, the extent and significance of the contamination is presently unknown. Fish contaminant data suggests that Onondaga Lake is the main source of mercury to the Area of Concern (page 5-25).

It would be prudent to remediate Onondaga Lake and other upstream sources prior to undertaking remedial actions on contaminated sediments in the Oswego Harbor (if a need is demonstrated) to prevent recontamination by downstream transport of contaminants. It will be necessary to demonstrate there are no continuing upstream sources of unacceptable levels of contamination with the potential to recontaminate the harbor.

RECOMMENDATION: **Continue the routine monitoring of different media (water column, sediment, biota, etc.) for mercury and other contaminants and increase such monitoring (if possible) in the Oswego Area of Concern.**

Continued monitoring will allow the Onondaga Lake remediation and other upstream remedial actions to progress. Once these upstream sources are reduced or eliminated, the potential for recontamination of the harbor is reduced. Thus, any necessary remediation need only be completed once and a duplication of effort and resources is avoided. Also, continued monitoring will allow a baseline to be established for eventual comparison to sediment criteria being developed by the EPA.

Sediment Criteria

Sediment criteria are required to determine the horizontal and vertical extent of sediment remediation that may be necessary. The NYSDEC Division of Fish & Wildlife has developed sediment criteria for a number of contaminants including PCBs. This criteria is currently being evaluated by the NYSDEC clean-up standards task force and will soon be available for public review. The EPA has also been working to develop criteria that will determine unacceptable levels of contaminants in sediments. The completion of this work and the application of the criteria to the sediments of the Oswego River drainage basin are essential to assist in the evaluation of sediment data.

RECOMMENDATION: Criteria for the evaluation of contaminated sediments must be completed as soon as possible.

Mirex

The mirex contaminated sediments in the Oswego River below Fulton are believed to have originated from Armstrong World Industries. This company has two inactive hazardous waste landfills that are presently being investigated. It is unknown what effect, if any, previously contaminated mirex sediments are having on the Oswego River system. A recommendation in Chapter 9 calls for a mirex sediment investigation of the Oswego River. This investigation is considered to be top priority to achieve RAP goals.

UNKNOWN PCB SOURCES

The Stage I report identified the following areas as having high levels of PCBs in local fish: Owasco Lake drainage, Skaneateles Creek below Skaneateles Falls, Onondaga Lake, and the Oswego River between Phoenix and Fulton.

As was discussed in Chapter 8, there is not a specific program to remedy unknown sources. However, existing remedial programs could become involved if a specific source (i.e. contaminated sediments, industrial outfalls, etc.) can be identified.

PCB source identification investigations were proposed in Chapter 9. Such investigations would be carried out in two parts: fish sampling in the three suspect areas to confirm the existence of a problem and source identification studies to find the source of PCBs, if they exist. These proposed investigations did not include Onondaga Lake because the problems in this urban lake are being addressed separately (Appendix 1). However, it should be recognized that the contaminated sediments of Onondaga Lake are a likely source to the Area of Concern.

The Chapter 9 priority ranking criteria resulted in the PCB investigations receiving the second highest priority score. As such, they are recommended for completion as soon as possible. Future source elimination measures will be implemented if the contamination is confirmed and the source is identified.

The NYSDEC is committed to routine monitoring of fish, macroinvertebrates, sediments and water column, as well as bioassays to assist in the identification of potential problems in the basin. The NYSDEC Rotating Intensive Basin Study (RIBS) program and Toxic Substances Monitoring Program (TSMP) are described on pages 8-32 and 8-33. The NYSDEC Division of Fish and Wildlife conducts trend studies for Onondaga Lake and Lake Ontario. Monitoring is also the subject of recommendations (pages 10-14 and 10-22) in this strategy.

The RIBS should provide a more comprehensive evaluation of any potential geographic pattern of contamination in the basin. It may also assist in obtaining a better understanding of the relative contribution of various sub-basins to the overall pollutant picture in the Area of Concern.

POTENTIAL DIOXIN SOURCES

The Stage I RAP determined 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) to be a contaminant of concern due to its presence above New York State Department of Health guidelines in a single composite sample of three carp taken from the Oswego Harbor. Subsequent sediment samples in the harbor failed to show the presence of 2,3,7,8,-TCDD.

Due to these conflicting results and the toxic nature of the dioxin compounds, a proposed investigation of dioxins received the second highest priority score in Chapter 9. Such an investigation would be carried out in two phases: confirmatory fish analyses, followed by a source identification study, if needed.

Therefore, a two-phase dioxin source investigation is recommended for completion in Chapter 9. If a source of dioxins is found within the Oswego River basin, then future remedial measures will be necessary.

AIR TOXICS

Chapter 8 concluded that the solution to the air toxics problem is beyond the scope of this RAP. However, there are numerous air toxics initiatives in the Great Lakes basin including the EPA nonpoint source modeling effort (page 10-12) and the EPA study on the pollution of the Great Lakes basin from atmospheric deposition (page 8-41).

New York State currently has three air toxics monitors in the Great Lakes basin (Buffalo, Niagara Falls and Rochester). To properly evaluate the effects of atmospheric deposition on the Great Lakes it would be prudent to have a monitor in a drainage basin as large as the Oswego River drainage basin.

RECOMMENDATION: **Develop a new air toxics monitoring station in the lower Oswego River drainage basin.**

Such a station would help to identify airborne contamination in the Oswego River drainage basin. This data could be used to assist the EPA's studies on the Great Lakes. Data gathered could be used in the expansion of the nonpoint source model currently being developed for the Niagara River basin and planned for eventual use in other Lake Ontario basins. Data from a new monitoring station could also be used to assist in more fully understanding the relationship between sources of toxic airborne contaminants and their impacts on land and water.

HABITAT IMPROVEMENT

Background

The fish community in the Oswego Area of Concern is unusually rich with seasonally high abundance and diversity because of: a) intensive use by Lake Ontario indigenous species for reproduction, feeding, and rearing; b) large numbers of NYSDEC-stocked Lake Ontario salmonids returning to or near their stocking sites on spawning migrations; c) transient abundance of both warm and cold water species from Lake Ontario occurring at

other seasons, likely in response to favorable food or temperature conditions; d) substantial downstream movement of fishes from remote upstream sub-populations into the section, and e) the presence of abundant fishes comprising the resident population.

Lake Ontario species dominate in the section and, though the upstream movement of adults is seasonal by species, the group is adequately diverse so that there is a significant presence, by at least one life stage, of Lake Ontario species year-round (Table 10-1).

The Area of Concern is a major spawning and nursery area for Lake Ontario warm and cool water fishes including walleyes, smallmouth bass, rock bass, white sucker, freshwater drum, smelt, alewives and brown bullhead. It may be important for the reproduction of white perch and the State-designated threatened species, lake sturgeon. All except smelt and alewives migrate up to the first barrier, Varick Dam, where they are blocked, often heavily concentrated and vulnerable to mortality through stranding during dewatering in the bypass reach.

The resident sport species complex is similar with the notable addition of channel catfish, bluegill, pumpkinseed sunfish and an occasional northern pike. Associated species in the river include carp, American eels, yellow perch, sea lampreys, gizzard shad, log perch, brook silversides and transients such as white crappie from upstream. The status of smaller species, i.e., cyprinids and darters, is not well known.

The lower Oswego River and Harbor is also a major stocking site for Lake Ontario salmonids due in part to excellent public fishing access available. Several species (steelhead, Atlantic salmon, chinook and coho salmon) require short-term residence for growth prior to smoltification and outmigration.

Fish Habitat in the Bypass Reach

The Oswego Area of Concern is defined as the area within the harbor breakwalls to the first dam of the Oswego river (Figure 7-2). The Oswego (Varick) Hydroelectric project is within the AOC at the first dam creating an area known as the bypass reach (Figure 10-1).

Under current conditions the bypass reach is dewatered about 60% of the year with only leakage flow plus about 30 cfs released from the intake canal at the hydroelectric plant intake structure. This regime does not permit year-round residence of any significant fish species. Further, while resident and migrant spring spawning species (i.e., walleye, white sucker) may successfully spawn in the bypass reach in most years, the adults, eggs and/or progeny are vulnerable to low flow events which strand them. Summer and fall spawners are precluded from successful spawning in the bypass reach because it is normally dewatered in these seasons, though the adults quickly migrate up to the dam (to their peril) when flow permits.

Table 10-1

Fish Species in the Oswego Area of Concern

LAKE ONTARIO SPECIES	SEASONAL PRESENCE	REASON
Smallmouth Bass Adults	April-July	Reproduction
Rock Bass Adults	May-July	Reproduction
Brown Bullhead Adults	March-May	Reproduction
Freshwater Drum Adults	April-July	Reproduction
White Perch Adults	May-July	Reproduction
Alewife Adults	May-July	Reproduction
Smelt Adults	March-May	Reproduction
White Sucker Adults	April-May	Reproduction
Lake Sturgeon Adults	?-May-?	Reproduction
Walleye Adults	July	Feeding?
Walleye Adults	April-May (possibly October-May)	Reproduction
Walleye Juveniles	Year Round	Feeding
Chinook Salmon Adults	August-November	Spawning migration
Chinook Salmon Juveniles	May-June	Growth & outmigration (stocked)
Coho Salmon Adults	September-November	Spawning migration
Coho Salmon Juveniles	April-June	Growth & outmigration (stocked)
Domestic Rainbow Trout Adults	October-November	Spawning migration
Steelhead (Chamber's Ck) Adults	October-May	Spawning migration
Steelhead (Chamber's Ck) Juveniles	April-June	Growth & outmigration (stocked)
Steelhead (Skamania) Adults	September-June	Spawning migration
Steelhead (Skamania) Juveniles	March-June	Growth & outmigration (stocked)
Brown Trout Adults	September-December	Spawning migration
Brown Trout Adults & Juveniles	April-June	Feeding, Temperature
Lake Trout Adults	November-December	Spawning migration
Lake Trout Adults	December-March	Feeding
Atlantic Salmon Adults	October-November	Spawning migration
Atlantic Salmon Juveniles	April-June	Growth & outmigration (stocked)
Sea Lamprey Adults	May-June	Spawning migration
Sea Lamprey Juveniles	Year Round	Feeding
Resident Species		
Channel Catfish	Year Round	
Bluegill		
Pumpkinseed Sunfish		
Carp		
American Eeel		
Yellow Perch		
Gizzard Shad		
Log Perch		
Brook Silversides		

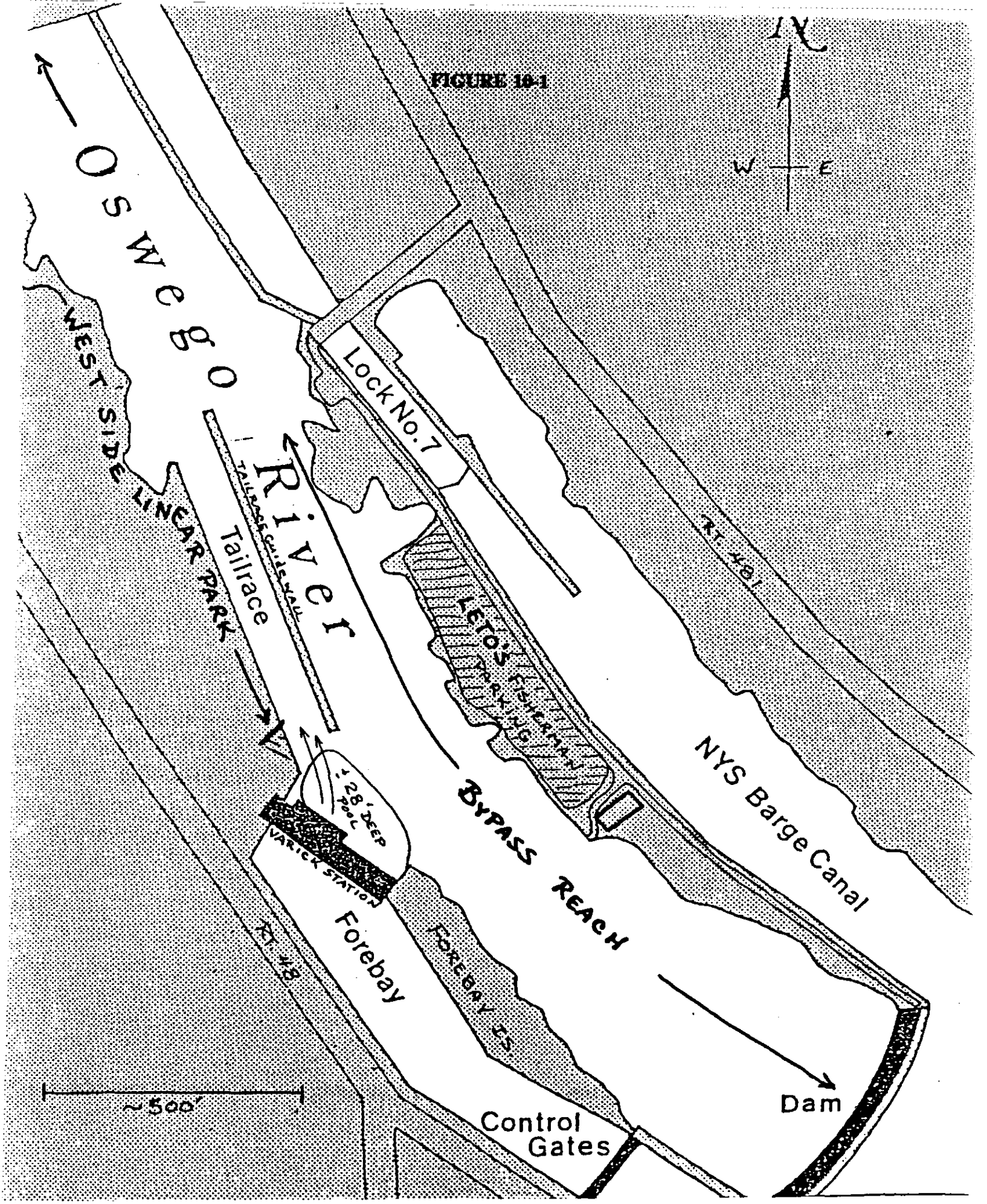
FIGURE 10-1
N
W
E
Oswego River
Lock No. 7
WEST SIDE LINEAR PARK
Tailrace
TAILRACE CONCRETE WALL
LETO'S FISHERMAN'S TRAINING
RT. 481
NYS Barge Canal
~28' DEEP POOL
BYPASS REACH
VARICK STATION
Forebay
FOREBAY I.S.
RT. 48
~500'
Dam
Control Gates

The current operational pattern of alternate spilling and dewatering in the existing Varick plant bypass reach strands and kills fish. There is no minimum flow provided (though since October 1988 about 30 cfs is released through flashboards at the state intake gate structure) and dam leakage (plus the ± 30 cfs) is inadequate to prevent stranding and mortality.

A major salmon stranding mortality on September 15, 1988, included a significant portion of the fall chinook salmon run and resulted in appreciable negative economic impact to the City of Oswego[1]. Other fish stranding events have also occurred including the stranding of several adult lake sturgeon, an indigenous and state-threatened species, which had concentrated at the base of the Varick dam in an apparent spawning attempt.[2]

RECOMMENDATION: **A combination of minimum flow, habitat modification and appropriate flow release point(s) (based upon adequate flow and habitat studies) are needed to permit fish survival at the Varick dam when the bypass reach flow drops to a minimum in the Area of Concern. These remedial actions should be completed as part of the present hydroelectric project licensing proceedings.**

There is also concern with potential mortality to downstream migrating fish, resulting from the cumulative impacts of entrainment on the hydroelectric utilities on the Oswego River. For example, the Oswego River facilities could produce a combined mortality level of 27% or greater to downstream migrants, assuming an optomistic 95% safe passage at each facility. Therefore, additional quantity of flow revisions may be necessary to divert fish from the intakes of the various hydroelectric facilities, including the Oswego (Varick) project.

Fish Passage

The fishery of the entire Oswego River basin may be improved by allowing the passage of certain species to upstream areas. For example, one of the goals of the Onondaga Lake clean-up effort is to return Atlantic salmon to that lake by the year 2000. The Onondaga Lake advisory committee already has indicated to the Federal Energy Regulatory Commission the need for Oswego River fish ladders.

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[1]Syracuse Herald-Journal, September 20, 1988

[2]NYSDEC internal memo from Cliff Creech to J. Douglas Sheppard, October, 15 1982.

However, fish passage to upstream areas is not without controversy. It is feared that passage will permit the introduction of alien species to upstream areas with unknown ecological consequences. NYSDEC is proceeding in the interim to consider aspects of the feasibility of upstream passage in both the near and long term. It is clear that full, unrestricted passage at any time for all species present would be inappropriate due to concerns for upstream fisheries resources. Restricted passage, however, may be appropriate and is worthy of further study.

It is possible, for example, to avoid passage of sea lampreys by operating a fish ladder (or alternative) only during the fall salmonid run. Similarly, Atlantic salmon can be hand-sorted from a trap incorporated into the passage facility. Region 7 NYSDEC personnel operate a selective-passage fish ladder on Cayuga Inlet, tributary to Cayuga Lake. All migrant fish, including adult salmonids and sea lampreys, are trapped and sorted. Studies upstream reveal that the blockage of upstream migrant adult sea lampreys is 100% effective while desirable species are passed. Other feasibility aspects remain to be investigated.

RECOMMENDATION: **The hydroelectric utilities should explore the feasibility of allowing restricted fish passage at its Oswego River facilities.**

If fish passage is determined to be feasible, fish could be allowed to upstream areas by providing functional fish ladders at the Oswego facility. It may also be demonstrated that alternative fish passage (i.e., through the navigation locks) is, or will be, effective.

Harbor Habitat

The Oswego Harbor provides habitat for large numbers of wintering waterfowl and has therefore been designated as a New York State significant coastal fish and wildlife habitat. However, previous harbor development and other shoreline disturbances have greatly reduced the area suitable to such wildlife.

The North American Waterfowl Management Plan (NAWMP) was completed in 1986. NAWMP is a federal, state/province and private cooperative venture in the U.S. and Canada to increase waterfowl production through waterfowl management. This plan established objectives to maintain or increase the population of specific waterfowl species.

Within the NAWMP is the Great Lakes/St. Lawrence Basin Joint Venture (JV). The objectives become further defined within this JV. The JV is further sub-divided into focus areas. Four Focus Areas (FA) are located in the Oswego River Basin: The Montezuma Complex, Oneida Lake-Verona Marsh, Finger Lakes Highlands and the Lake Shore Marshes (which includes the Area of Concern). A management plan to meet the NAWMP objectives is currently being developed for the Lake Shore Marshes FA.

Benthic macroinvertebrates act as integrators of chemical inputs to an aquatic ecosystem. Therefore they may be used as an index of aquatic community health.

RECOMMENDATION: Biennially monitor benthic macroinvertebrates within the Oswego Area of Concern.

Benthic macroinvertebrate samples should be analyzed for abundance and diversity (community structure), as well as contaminants. Results from the Area of Concern should be compared to an unimpacted control site of comparable physical and chemical characteristics. In addition, it may also be instructive to compare results between the Lake Ontario dominated Area of Concern and a site immediately upstream. NYSDEC has developed proposed macroinvertebrate criteria which may be useful in this monitoring effort.

POLLUTION PREVENTION

The environmental control programs established over the years have brought improvements in water quality to the Oswego Area of Concern. The implementation of this Remedial Action Plan will bring further improvements in water quality. However, it has become evident that it is not sufficient to rely solely on end-of-the-pipe pollution controls and after-the-fact clean-ups. Preventing pollution generation at its source must become more prevalent if appreciable progress is to be made toward the goals of the RAP and the goals of the Great Lakes Water Quality Agreement.

Pollution Prevention practices may include changes in production, operations, raw material usage, etc. It may also include reduced use of harmful substances and waste reduction. State and federal initiatives to prevent pollution are described below.

New York State Initiatives

NYSDEC is putting emphasis upon reducing or eliminating hazardous wastes at their source: the commercial or industrial processes where they are generated. In the preferred sequence of hazardous waste management techniques, as outlined in state law (1989), source reduction ranks first. Wastes that cannot be reduced are to be reused or recycled. Any remaining wastes must be detoxified, treated or destroyed. Only treated residual wastes can be landfilled; all other land burial of hazardous waste must be phased out.

New York State has established a goal of reducing hazardous waste generation by 50% by 1999. The 1989 Hazardous Waste Reduction and RCRA Conformity Bill in New York State subjects hazardous waste generators to new stringent waste reduction requirements including the submittal of hazardous waste reduction plans. Failure to meet the standards set in this law can mean losing certification to generate hazardous wastes.

To help commercial and industrial enterprises in New York State comply with the laws for managing hazardous wastes, NYSDEC's Division of Hazardous Substances Regulation has developed technical assistance programs and a series of publications. Technical experts are available to visit individual plants and to present information to trade and professional associations. NYSDEC program staff also provide telephone assistance for industries, using up-to-date waste reduction information through a computerized bibliographical clearinghouse.

In addition to NYSDEC's programs, the New York State Environmental Facilities Corporation (EFC), a public benefit corporation, is actively involved in providing on-site technical assistance. EFC helps small and mid-sized industries comply with regulations and apply waste reduction and waste treatment technologies.

In New York State there are an estimated 50,000 small quantity generators of hazardous wastes. Many are service industries such as auto repair, dry cleaning, painting and printing. Since few of these generators have trained environmental or technical staff, New York's small quantity generator regulatory program emphasizes regulatory requirements and waste reduction. This program includes workshops on regulatory compliance and pollution prevention, publication of manuals and technical assistance booklets and the operation of a toll-free hotline (800-462-6553).

In addition to hazardous waste management, New York State will require Toxic Reduction Implementation Plans (TRIPs) to be prepared and implemented by many facilities. These plans will be submitted to NYSDEC by each facility required to hold an air or water permit that emits or discharges to the environment, toxic chemicals:

- greater than 40,000 lbs/yr fugitive and stack emissions
- greater than 12,000 lbs/yr to a SPDES discharge or POTW.

TRIPs will cover greater than 95% of discharges to air, water and land from a total of approximately 400 facilities. They will be a multi-media approach to pollution prevention.

As discussed in Chapter 8 (Air Toxics section), NYSDEC is developing fugitive emission regulations that require a 50% reduction of unregulated or fugitive emissions. These regulations will require the submission of a reduction plan to NYSDEC.

NYSDEC's Division of Water is developing a Water Quality Enhancement and Protection Policy which will assist in the development of pollution prevention strategies and incorporate them into water quality management decisions. This policy is discussed in detail in the "other policies and program initiatives" section of this chapter.

Federal Initiatives

Congress passed the Pollution Prevention Act of 1990 which established the following hierarchy of options to reduce the risks to human health and the environment from pollution:

1. pollution should be prevented or reduced at the source whenever feasible;

2. pollution that cannot be prevented should be recycled in an environmentally safe manner;

3. pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and

4. disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

The EPA has initiated a national pollution prevention strategy that includes efforts to eliminate barriers to pollution prevention in existing and future regulatory programs and to encourage voluntary prevention initiatives by industry. This plan targets 17 high risk chemicals for prevention. EPA is seeking voluntary reduction efforts from hundreds of companies who have reported releases of these chemicals. Therefore, this strategy will require the combined efforts of innovative private sector initiatives and a refocussing within the existing regulatory and enforcement programs. The EPA has also developed a Pollution Prevention Action Plan for the Great Lakes which highlights EPA prevention activities within the Great Lakes basin.

RECOMMENDATION: **Pollution Prevention practices should be incorporated at all sources to the Oswego River drainage basin to the maximum extent practicable.**

OTHER POLICY AND PROGRAM INITIATIVES

The 25 Year Plan for the Great Lakes

New York State is currently developing a 25 year plan for the Great Lakes basin (Lakes Erie and Ontario). This is a comprehensive multi-agency plan (NYSDEC lead) which will address Great Lakes environmental quality and natural resource management issues.

This plan is a cooperative effort between:

- State agencies - eleven agencies representing various aspects of the Great Lakes ecosystem.
- Great Lakes Basin advisory Council - 17 members appointed by the Governor, who advise the state on Great Lakes issues.
- Public - comments received through a public participation process.

The 25-year plan will help to provide for the long-term vitality of the New York Great Lakes ecosystem and will guide state actions to remediate, enhance and preserve its components. Its goals integrate the needs of environmental protection, natural and cultural resource management, economic development, recreation, tourism, agriculture, transportation, emergency management and energy.

Water Quality Enhancement and Protection Policy

As guardian of the State's waters, the Department continuously seeks ways to refine its programs to advance further towards the overall goal of eliminating the discharge of pollutants. The water program has evolved steadily over the past 40 years. At first, water quality standards were used to set discharge permit limits. A second phase of development added minimum technology requirements, including secondary treatment. Now it is time to develop pollution prevention strategies and incorporate them into water quality management decisions. The proposed Water Quality Enhancement and Protection Policy is intended to help the Department move in this direction by focussing on these specific goals:

1. Protect sensitive waters that cannot assimilate the effects of general or specific discharges.
2. Maintain the high quality of waters that are cleaner than standards require.
3. Protect all waters from specific persistent toxic substances.

Integral to achieving these goals is a commitment that environmental protection and natural resource management decisions will be made in such a way that water quality is enhanced and maintained.

Proposal

This proposed policy will carry out the laws of the State of New York to enhance and protect water quality through:

- Amending the classification regulations to add discharge restriction categories that prohibit some or all discharges;

- Refining the State's Antidegradation policy by establishing processes to review individual proposed actions that might affect water quality and ensuring that water quality is not degraded unless there is compelling social or economic need;

- Banning certain persistent toxic substances;

Advancement toward the water quality goals will be supported by a commitment to integrate environmental protection and natural resource management decisions in NYSDEC and to expand and clarify the public's role in making decisions that affect water quality.

Scope

This policy will apply statewide to all proposed actions within the regulatory jurisdiction of the Department. It will address point sources and nonpoint sources, surface water and groundwater. However, implementation of the policy will be phased according to staff and funding availability.

Rationale

The public and private sectors have invested considerable time and money in protecting and achieving high quality waters in New York. Ambient water quality standards and treatment technologies have been instrumental in getting this far.

Although ambient standards and treatment technologies are powerful tools to preserve water quality, they cannot, by themselves, achieve complete protection of all water resources.

For example, ambient standards and treatment technologies are not effective in protecting water quality from risks such as spills, accidents and lapses in treatment plant operations. Nor can they totally protect against synergistic, long term, migratory or cumulative effects of substances. And they generally are not useful for control of nonpoint source pollution.

Additional tools are needed to supplement traditional pollution control mechanisms. The Water Quality Enhancement and Protection Policy proposes new decision-making processes that will supplement current programs and move New York toward the goal of eliminating the discharge of pollutants. The policy proposes:

- Discharge Restriction Categories

  Some waters, as well as some uses of waters such as water supply, are particularly sensitive to discharges in general or to discharges of specific pollutants. Certain others may be of such intrinsic value in their natural state that discharges to them should be restricted. It is important to provide a means of special protection for these waters.

- Antidegradation

  The people of New York will decide whether waters that are cleaner than standards require can be degraded to levels allowed under existing standards. (In no situation would the waters be allowed to go below standards.)

- Substance Bans

  Some substances are so harmful to human health and the ecosystem that they cannot safely be discharged to any amount. These persistent substances, which bioaccumulate in organisms, should not be allowed to be manufactured, imported, or used in New York State.

Sometimes decisions about environmental protection or natural resource management are made from too narrow a perspective, causing unwanted or negative impacts for people or the environment. This can also cause conflicts between program goals. The decision-making perspective must be broadened and integrated so that decisions affecting other sectors of the environment also specifically protect water quality. Appropriate involvement of all relevant parties will also help ensure that effective and efficient decisions are reached and that water quality is indeed protected.

Local Waterfront Revitalization Program

The City of Oswego and cooperating state and federal agencies have invested considerable resources in the development of a program to restore and redevelop waterfront areas within the Oswego Harbor for commercial, industrial, cultural, recreational and other compatible uses. The City of Oswego Local Waterfront Revitalization Program was developed in consultation with an advisory committee consisting of elected officials, public agencies, private industry, private groups, and citizens. This program was adopted by the City of Oswego Common Council and subsequently approved by the New York State Secretary of State in 1986.

This program identifies potential sites for water dependent or water related activities, proposes specific projects and identifies techniques for local implementation. It also describes policies and provisions to protect coastal fish and wildlife habitats, including protection from hazardous wastes and other pollutants which threaten fish and wildlife resources.

The RAP AOC lies entirely within the City's waterfront revitalization area. Therefore, changes that occur in the AOC as a result of the waterfront revitalization program will affect the RAP, and vice versa. During implementation, both the Waterfront Revitalization Progrm and the RAP must fully consider the consequences of any changes in relation to each programs objectives in order to successfully integrate environmental enhancement/protection with economic development.

CHAPTER 11

COMMITMENTS

INTRODUCTION

The remedial strategy outlined in Chapter 10 includes some recommendations that will require funding in excess of what is currently available. Therefore, commitments are based on current availability of funds and existing programs for remedial actions. Further remedial actions will proceed on an incremental basis as information from investigations and the necessary funding becomes available.

Although all of the recommendations in the strategy outlined in the previous chapter are considered to be important, certain remedial elements are considered to be critical for achieving the goals and objectives of this RAP. These critical elements, such as Onondaga Lake, other hazardous waste sites and combined sewer overflows, are reflected in the current commitments of this chapter.

The New York State Department of Environmental Conservation will provide the general coordination for the implementation of the remedial strategy. However, the participation of other agencies and groups at the local, state and federal level will be required.

An overview of commitments describing objectives, anticipated completion dates and responsible agencies is shown in Table 11-1. A more detailed description of the RAP commitments to complete each recommended remedial action is described in the following text. Each commitment contains the next step which shows the subsequent action needed to fulfill the overall remedial strategy.

INVESTIGATIONS

1. Mirex Sediment Investigation

The mirex sediment investigation described on pages 9-11 is the highest priority investigation and every effort should be made to secure funding for its completion.

Efforts are under way to obtain funding for this investigation for the federal fiscal year 1990/91 through a federal grant to NYSDEC.

Completion date: Unknown
Responsible agency: NYSDEC

Next step: Seek and obtain funding to begin remedial efforts if the investigation results warrant such action.

2. Other Investigations

The AOC sediment investigations, PCB source investigation, and the fish tumor investigation are also considered to be high priority and should receive top priority for funding.

Efforts are underway to obtain funding for these investigations for the federal fiscal year 1990/91 through a federal grant to the NYSDEC.

Completion date: Unknown
Responsible agency: NYSDEC

Next step: Seek and obtain funding to begin remedial efforts if a source can be identified.

INDUSTRIAL DISCHARGES

1. SPDES Permit Limits

Continue to lower allowable discharges in SPDES permits (especially for RAP critical pollutants: PCBs, Phosphorus, and mercury) whenever feasible as analytical detection limits, pollution control technologies and/or waste reduction techniques improve.

NYSDEC is committed to continue to lower allowable discharges whenever feasible. This may be accomplished by incorporating improved detection limits into permits to allow the use of water quality based permit limits. Reductions may also be accomplished by revised technology based limits (when feasible) and revised water quality standards (as scientific knowledge dictates) in the future. NYSDEC currently is defending its new detection limit for PCBs (0.065 ug/L) in administrative hearings.

Completion date: Ongoing
Responsible agency: NYSDEC

Next step: Incorporate revised PCB limit into SPDES permits when regulatory authority is finalized.

2. Best Available Technology

Best Available Technology (BAT) guidelines for industrial facilities should continue to be developed and periodically updated.

Wastewater treatment guidelines for the Best Available Technology that is economically achievable (BAT) are developed as the minimum enforceable level of pollution control for various industrial categories. EPA is scheduled to promulgate new BAT effluent guidelines on the following schedule:

- Pesticides chemicals manufacturing subcategory (1992)
- Offshore oil and gas extraction category (1992)
- Pesticides chemicals formulating/packaging subcategory (1994)
- Hazardous waste treatment facilities category (1995)
- Machinery manufacturing and rebuilding category (1995)
- Coastal oil and gas extraction category (1995)

Revised BAT effluent guidelines are scheduled to be promulgated as follows:

- Organic chemicals, plastics and synthetic fibers category (1993)
- Pharmaceutical manufacturing category (1994)
- Pulp, paper and paperboard category (1995)

Completion date: Varies - see above dates.
Responsible agency: EPA

Next step: When the new guidelines will result in a lower allowable load, industrial permits will be modified to reflect the new guidelines.

3. Industrial Wastewater Discharge Permit Monitoring and Renewal

NYSDEC monitors industrial discharges to assure compliance with permit limits by reviewing self-monitoring reports from dischargers, inspecting facilities and independently samples effluent to verify the validity of self-monitoring data. Significant violations of permit conditions results in compliance or enforcement measures.

Completion date: Ongoing
Responsible agency: NYSDEC

Next step: Discharge permits are issued on a five year cyclical basis.

MUNICIPAL DISCHARGES

1. Municipal System Remediation

Implement required upgrades and remediation as needed based on the results of ongoing investigations and modeling of municipal systems including combined sewers.

Investigations and remedial actions are being implemented throughout the Oswego River drainage basin under the authority of existing SPDES permits, consent orders or court orders:

a. Auburn - Currently under a consent order to study alternatives to combined sewer overflows. A report which will include an implementation schedule is due by January 1, 1992.

b. Canastota - Currently under a court order to upgrade sewer system and prevent plant overflows. The work has been partially completed, but the municipality is presently in violation of this order.

c. Oswego Eastside Treatment System - The current SPDES discharge permit requires a sewer system evaluation survey to determine the remedial work needed to reduce combined sewer overflow (CSO) frequency. The permit also requires the survey's recommended remedial actions be implemented. In addition, the permit requires a one-year study of CSO discharges after which the discharge permit may be modified to dictate an implementation schedule for the treatment and/or the elimination of CSOs. All surveys and studies must be completed by August 1991.

d. Onondaga County - The county is under a court order to develop alternatives to combined sewer overflows (CSOs) and to determine the loading from its system to Onondaga Lake. The loading information will be used in the Upstate Freshwater Institute's Onondaga Lake Water Quality Model which is to be developed by December 1991. This model then will be used to evaluate the CSO alternatives by early 1992. A CSO alternative subsequently will be chosen and an implementation schedule will be developed at that time.

e. Ley Creek and Liverpool Pump Stations - Onondaga County is upgrading these two pump stations as part of a negotiated court order settlement (see Appendix 1) to reduce raw sewage overflows to Onondaga Lake and its tributaries. These projects are being funded under the last phase of the construction grants program. The Liverpool pump station project is scheduled to be substantially completed by May 1991, while Ley Creek should be substantially completed by November 1991.

f. Waterloo - The Village is under a consent order to eliminate illegal stormwater connections. This action is to prevent future combined sewer overflows will be completed by December 1991.

Completion date: varies - see above dates
Responsible agency: the municipalities listed above

Next step: Monitoring of the sewer systems and local ambient water quality will be needed following the implementation of combined sewer overflow remedial measures. This will assure the remedial measures were effective.

2. Pretreatment Monitoring

Additional pretreatment monitoring is needed in the drainage basin to determine the program's effectiveness. This should include biological toxicity testing and expanded analytical parameters where necessary.

Revisions have been proposed to the Federal Pretreatment regulations to implement recommendations from the 1986 Domestic Sewage Study. These proposed revisions would improve local pretreatment program's ability to control hazardous waste by requiring additional pretreatment monitoring including whole effluent biological screening or testing.

Completion date: Unknown
Responsible agency: EPA

Next step: Implement program through the SPDES permit process whereby additional pretreatment monitoring is used to evaluate the effectiveness of pretreatment programs.

3. Syracuse Metropolitan Treatment Plant Mercury Discharge

Pursue methods to reduce the permitted mercury load from the Syracuse Metropolitan Treatment Plant during the permit renewal process. This should be based on compliance with current New York State water quality standards, use of current analytical detectibility guidance, and possibly a site specific detection study.

A preliminary water quality analysis indicates that the allowable discharge to Onondaga Lake is a maximum of 0.27 pounds of mercury per day. A review of current guidelines on analytical detectibility (TOGS 1.3.7) shows the final effluent limitation for the Syracuse Metro Plant is likely to fall between:

- The Method Detection Limit of 0.2 ug/L which translates to a load of 0.133 lb/day. This value is based on mercury in distilled water, therefore, no analytical interferences are present.

- The Practical Quantitation Limit of 0.8 ug/L which translates to a load of 0.53 lbs/day. This value is based on the lowest level measurable from most effluents within specified limits of precision and accuracy.

Completion date: April, 1994
Responsible agency: NYSDEC

Next step: To ensure compliance with the new SPDES permit limits.

4. Air Pollution Control Wastewater

Examine the air pollution control wastewater of the Auburn and Oswego municipal wastewater treatment facilities to determine if pretreatment for mercury may be needed.

The Oswego plant currently monitors mercury annually in its influent and effluent. Mercury monitoring should also be added to the Auburn permit during this year's permit renewal process.

Completion date: September 1, 1991
Responsible agency: NYSDEC

Next step: If monitoring detects significant mercury, then the air pollution wastewater should be examined for potential corrective action.

5. Municipal Discharge permit monitoring and renewal

The NYSDEC monitors municipal discharges to assure compliance with permit limits by reviewing self-monitoring reports from dischargers, inspecting facilities and independently sampling effluent to verify the self-monitoring data. Significant violations of permit conditions results in compliance or enforcement measures.

Completion date: Ongoing
Responsible agency: NYSDEC

Next step: Discharge permits are issued on a five year cyclical basis.

AGRICULTURAL RUNOFF AND OTHER NONPOINT SOURCES

1. Nonpoint Source Management Program

Implement New York State's Nonpoint Source Management Program, with special emphasis given to problem areas identified in NYSDEC Soil and Water Conservation District assessment reports.

NYSDEC has a nonpoint management program in place and in June 1990 completed a nonpoint assessment report for every county in the state. These documents, which were produced in cooperation with the county districts and the State Soil and Water Conservation Committee, will be used to update the Priority Water Problem (PWP) list. The PWP is used to establish priority for funding to address water quality pollution problems in New York State.

Completion date: April 1991
Responsible agency: NYSDEC

Next step: Refer to NPSM Program

2. County Water Quality Strategies

Develop county water quality strategies that establish local roles and responsibilities to identify and address nonpoint source pollution.

County water quality strategies should be developed by local soil and water conservation districts. Strategies may be developed with assistance from: "Guidelines for Establishing County Water Quality Strategies" (June 1990), developed by the New York State Soil and Water Conservation Committee and NYSDEC. Oswego, Ontario and Yates Counties each have formed a Water Quality Coordinating Committee to develop a water quality strategy.

Completion date: Unknown
Responsible agency: County soil and water conservation districts

Next step: Implement the strategies developed in the county plans.

3. Education and training

Increase educational and training opportunities for local land owners and governments to learn best management practices that will decrease the environmental problems associated with agricultural runoff and other types of nonpoint source pollution.

a) A Best Management Practices Catalog is being developed which will contain one page summaries of best management practices for all categories of nonpoint sources. It will be produced one source category at a time. An agriculture section will be completed by July 1991 and an urban/stormwater runoff section will be completed by October 1991. Sections dealing with other source categories will be developed in the future, but exact deadlines have not been established.

b) A manual entitled, Controlling Agriculture Nonpoint Source Pollution in New York State: A Guide to the Selection of Best Management Practices to Improve and Protect Water Quality, is being developed. It will be completed by April 1991.

Completion date: Varies - see above dates
Responsible agency: NYSDEC

Next step: Publicize and distribute these manuals and assist in the application of best management practices in the basin.

4. Stormwater Management

The suggested practices outlined in the NYSDEC TOGS for new development should be adopted by local governments and planning boards in the basin for the review of new development projects.

Guidance has been developed by the NYSDEC to assist regional water staff in the review of land development projects which should also be used at the local level to prevent degradation of water quality:

a) Stormwater Management Guidelines for New Development - April 1990 (TOGS 5.1.8)
b) Erosion and Sediment Control Guidelines for New Development - April 1991 (TOGS 5.1.10)

Completion date: Ongoing
Responsible agency: Local governments and planning boards

Next step: The EPA/NYSDEC will develop a stormwater management program to prevent flooding and protect water quality in developed and developing areas. These TOGS are only one component of this evolving program.

5. Pesticide Management

Local governments in the Oswego River basin must use environmentally sound approaches to pesticide management.

A combination of educational programs and local ordinances could be used to achieve this objective.

Completion date: Unknown

Responsible agency: Local governments

Next step: Following the development of such programs they should be implemented throughout the drainage basin.

6. Nonpoint source computer modeling

Following completion of the modeling effort in the Niagara basin, it should be evaluated for possible expansion to the Oswego River drainage basin.

A two-phase investigation has been proposed to determine the loading to the Niagara River and Lake Ontario from nonpoint sources, including agricultural runoff. The first phase of this study which developed the appropriate methodology was completed in November 1990. Phase II will apply the appropriate nonpoint source models to the Niagara River basin.

Completion date: Unknown
Responsible agency: EPA

Next step: Expand the modeling effort to the Lake Ontario basin to include the Oswego River drainage basin, if appropriate.

HAZARDOUS WASTE SITES

1. High Priority Clean-ups

Give high priority for clean-up to the three hazardous waste sites (Ley Creek, Onondaga Lake and Volney Landfill) thought to be likely sources of contaminants to the Area of Concern.

NYSDEC has modified its priority ranking system for hazardous waste site remedial actions (investigation and clean-up). This new system will assist in directing remedial resources to the most serious sites. The new ranking system contains a number of priority conditions including preference given to sites identified as a component of a RAP.

Completion date: Ongoing
Responsible agency: NYSDEC

Next step: To complete the hazardous waste site investigations and remedial actions outlined below.

2. **Phase I investigations (existing data accumulation and assessment) of sites determined to be potential sources to the Area of Concern are being completed for the following sites:**

- Salina Landfill
- Brighton Landfill

Completion date: December 1991
Responsible agency: NYSDEC

Next step: Either delist site due to lack of hazardous waste disposal evidence or continue with program (RI/FS, etc.) if a need is demonstrated.

3. **Phase II Investigations**

Phase II field investigations to obtain additional data for site assessments are being completed at the following sites:

- Canastota Landfill
- Quanta Resources
- Val's Dodge
- Alpha Portland (Otisca)
- Colture Property

Completion date: December 1991
Responsible agency: NYSDEC

Next step: Once Phase II investigations are complete, the sites will be ranked and determinations made as to the need for Remedial Investigation/Feasibility studies (RI/FS). Once an RI/FS is determined to be required, remedial action can be initiated by the responsible party under the direction of a Consent Order or directly by the NYSDEC (State superfund) in the absence of a known responsible party.

4. **Remedial Investigation/Feasibility Studies**

An RI/FS will be conducted at each site to determine the full extent of contamination and to assess alternative remedial measures. Such studies are being conducted at the following sites:

a. Onondaga Lake - Consent order negotiations are continuing with a potentially responsible party (PRP) to develop an RI/FS for the lake. The RI/FS is planned from November 1991 to April 1995.

b. Ley Creek PCB dredgings - Consent order negotiations are continuing with a PRP. The RI/FS is planned from August 1991 to December 1992.

c. Clay Landfill - An RI/FS funded under the 1986 Environmental Quality Bond Act began in May 1991 and is scheduled to be completed by November 1993.

d. Syracuse Fire Training - The RI/FS began in February 1990 and is planned for completion in June 1992. Work at this site is funded by the 1986 bond act.

e. Old Syracuse Die Casting - An RI/FS is underway and scheduled for completion in January 1993. Contaminated soil is scheduled to be removed from the site as an IRM in late 1991.

f. Columbia Mills - The PRP began an RI/FS in March 1989. A Phase I RI has been completed and Phase II RI field work began in February 1991 and is scheduled to be completed in December 1991. Interim remedial measures have included drum removals (1986-87) and soil tilling for aeration (1989-91).

g. Winkleman - The U.S. Army is responsible for remedial measures at this site as a PRP. No dates have been set for action.

Completion date: Varies - see dates above
Responsible agency: NYSDEC

Next step: Following the required remedial investigation/ feasibility studies, site remedial measures can be designed.

5. Remedial Design

The remedial alternatives chosen and described in a Record of Decision must undergo a design phase in order to tailor the remedial concept to the specific site parameters. Remedial designs are being developed for:

Fulton Terminal - The chosen remedial alternatives are low temperature thermal extraction (soils), air stripping and carbon adsorption (groundwater). In September 1990, a consent decree was signed by the EPA and the potentially responsible parties for the performance of the remedial design and construction of the site remedy. The consent decree was lodged with the U.S. District Court for the Northern District of New York by the U.S. Department of Justice (DOJ) on March 14, 1991. DOJ provided notice of the decree in the Federal Register on March 26, 1991 and a 30-day public comment period was initiated. The public

comment period concluded on April 24, 1991. The court will review the public comments and EPA's responses. Upon approval, the consent decree will be entered as a final judgement of the court. Once the consent decree is entered by the court, the design will commence. It is anticipated that the design will commence by June 1991 and will be completed by June 1992.

Completion date: June 1992
Responsible agency: EPA

Next step: Following the design phase, the remedial measures will be implemented.

6. Remedial Implementation

Remedial measures are implemented through the construction and operation of necessary elements to properly decontaminate a hazardous waste site. Implementation is under way at the following sites:

a. Volney Landfill - The site has been capped and a leachate collection system installed. Currently evaluating leachate (treatability study) to determine proper disposal. Side slopes still must be installed at the landfill and the need for a slurry wall is being evaluated. The potentially responsible parties have signed a consent order to determine the nature and extent of contamination migrating from the site and to evaluating remedial alternatives (contaminant pathways study). It is anticipated that this investigation will be completed by December 1992. It is also anticipated any necessary additional remedial designs will be completed by June 1993.

b. Clothier - Twenty-two hundred drums of hazardous substances and visibly-contaminated soil were removed from the site in 1986-88. As a result of these activities only low levels of residual contamination are present on-site. A remedial design to address remaining residuals is scheduled for completion in May 1991. It is anticipated that a soil cover will be constructed by August 1991.

c. Quanta Resources - Interim remedial measures consisting of waste removal measures began in February 1990 and are planned to be completed by August 1991. Field work for a Phase II investigation to determine if additional remedial work is necessary is scheduled to begin in August 1991.

Completion date: Varies - see dates above
Responsible agency: EPA

Next step: Monitoring of the site to assure the chosen remedial measures are effective.

BOTTOM SEDIMENTS

1. Onondaga Lake

Continue the Onondaga Lake project as planned. Any remedial technologies selected for the lake must fully consider the downstream impacts on the Oswego River Area of Concern and Lake Ontario.

Although the sediments of Onondaga Lake are considered to be an inactive hazardous waste site (page 10-15), there are many other remedial activities planned or ongoing related to this project. Appendix 1 describes these activities more fully. The Onondaga Lake Management Conference was created to assist in coordinating the myriad of activities being conducted. Supported by a $500,000 federal appropriation, this conference has met several times and formed a citizens advisory committee and a technical review committee. In addition, the U.S. Corps of Engineers has obtained appropriations of $237,000 for the preparation of a Reconnaissance Report on the Lake (draft report available as of May 1991).

Completion date: Unknown (multi-year project)
Responsible agency: Numerous federal, state and local agencies

Next step: All planned activities must be implemented.

2. Routine Monitoring

Continue the routine monitoring of different media (water column, sediment, biota, etc.) for mercury and other contaminants and increase such monitoring (if possible) in the Oswego Area of Concern.

The NYSDEC Rotating Intensive Basin Studies (RIBS) program discussed in Chapter 8 (pages 8-31 to 8-34) is being completed for the Oswego River drainage basin. It includes water column, sediment, macroinvertebrate and fish samples, as well as bioassays throughout the basin. This program will be repeated in the basin every six years to document changing environmental conditions. In addition, routine water quality monitoring will be conducted throughout the basin on an annual basis.

Completion date: RIBS report, December 1991; monitoring, annually
Responsible agency: NYSDEC

Next step: Sampling will allow a baseline to be established for comparison to pertinent standards and criteria. Results may be used to direct remedial actions and/or establish contaminant loadings.

3. Sediment Criteria Development

Criteria for the evaluation of contaminated sediments must be completed as soon as possible.

The NYSDEC Division of Fish and Wildlife has developed sediment criteria for a number of contaminants. These criteria will be included in the NYSDEC publication entitled "Cleanup Policy and Guidelines". This publication will be available in draft form for public review in Summer 1991.

The federal Environmental Protection Agency has been working for several years on developing and validating tests and associated acceptance criteria that would allow decisions on the likely environmental impacts of contaminated sediments. This work will conclude with a report on recommended tests and criteria on the following schedule.

- criteria for 6 nonpolar compounds (September 1991)
- criteria for 6 additional nonpolar compounds and interim criteria for 2 metal compounds (September 1992).
- criteria for 4 nonpolar compounds and 3 metal contaminants (September 1993).

Completion date: Varies (see above dates)
Responsible agency: EPA

Next step: When a criteria methodology has been developed, it may be applied to sediments within the Oswego River drainage basin to determine the need for sediment remediation.

4. Assessment and Remediation of Contaminated Sediments (ARCS)

The ARCS program is a five year study and demonstration program being conducted in five Great Lakes areas including New York's Buffalo River. The program will include risk/hazard assessments, modeling, treatability studies, concept planning for full scale remediation and planning for pilot (field) scale sediment treatability studies.

Completion date: 1992
Responsible agency: EPA

Next step: The guidance documents and case studies generated by this project will be used to assist in the evaluation of contaminated sediments in the Oswego River drainage basin.

AIR TOXICS

Develop a new air toxics monitoring station in the lower Oswego River drainage basin.

Although the solution to the air toxics problem is beyond the scope of this RAP, atmospheric data should be collected to determine loading components. NYSDEC will work to obtain funding for this recommendation.

Completion date: Unknown
Responsible agency: NYSDEC

Next step: Use the data collected to predict impacts on aquatic resources, possibly in the nonpoint source loading investigation discussed on page 11-11.

HABITAT IMPROVEMENT

1. Bypass Reach

A combination of minimum flow, habitat modification and appropriate flow release point(s) (based on adequate flow and habitat studies) are needed to permit fish survival at the Varick dam when the bypass reach flow drops to a minimum in the Area of Concern. These remedial actions should be completed as part of the hydroelectric project licensing proceedings.

NYSDEC is working to obtain commitments for this recommendation.

Completion date:
Responsible agency: NYSDEC

Next step:

2. Fish Passage

The hydroelectric utilities should explore the feasibility of allowing restricted fish passage at its Oswego River facilities.

NYSDEC is working to obtain commitments for this recommendation.

Completion date:
Responsible agency: NYSDEC

Next step:

3. Harbor Habitat

a. Develop a draft management plan for the Lake Shore Marshes Focus Area of the Great Lakes/St. Lawrence Joint Venture within the frame work of the North American Waterfowl Management Plan.

Completion date: May 1, 1991
Responsible agency: NYSDEC

Next step: Form an implementation committee to implement the objectives of the plan.

b. Biennially monitor benthic macroinvertebrates within the Oswego Area of Concern.

Benthic macroinvertebrate monitoring is needed in the Area of concern, including, contaminant trend analysis and community evaluations (abundance and diversity).

Completion date: Unknown
Responsible agency: NYSDEC

Next step: Use monitoring results to evaluate current activities and to determine the need for additional remedial measures.

POLLUTION PREVENTION

Recommendation - Pollution prevention practices should be incorporated at all sources to the Oswego River drainage basin to the maximum extent practicable.

1. Annual Conference

NYSDEC cosponsors an annual hazardous waste reduction conference in Albany, where participants can learn about techniques for reducing and recycling hazardous wastes.

Completion date: Ongoing
Responsible Agency: NYSDEC

2. Company Recognition

NYSDEC is publishing a series of success stories to recognize companies that have achieved significant reduction of hazardous wastes.

Completion date: Ongoing
Responsible agency: NYSDEC

3. Hazardous Waste Reduction Plans

The Hazardous Waste Reduction and RCRA Conformity Law specifies a phased schedule for submittal of hazardous waste reduction plans:

- Generators of more than 1,000 tons by July 1991
- Generators of more than 500 tons by July 1992
- Generators of more than 50 tons by July 1993
- Generators of more than 25 tons by July 1996

Waste reduction plans must consider technically feasible and economically practicable waste reduction alternatives. The law allows industries to choose their waste reduction approaches, but requires that the approach chosen actually result in progress. NYSDEC will report by January 1993, on the possibility of requiring plans from smaller quantity generators.

Completion date: See above dates
Responsible agency: NYSDEC

Next Step: State law requires the prepared plans be approved by NYSDEC and implemented by each generator. Generators must also monitor reduction effectiveness and submit annual reports describing progress. Any company failing to comply risks losing certification as a hazardous waste generator.

4. Toxic Reduction Implementation Plans

Regulations are currently being developed that will require the submission of these plans from certain facilities holding air or water discharge permits during a five year phase-in schedule.

Completion date: January 1992
Responsible agency: NYSDEC

Next Step: Following promulgation of the regulations, affected companies must develop the plans over a five year period. Failure to develop or implement the plans may lead to revocation of environmental discharge permits.

5. Pollution Prevention Strategy

A voluntary federal initiative is underway to reduce the industrial discharge of the following toxic chemicals: benzene, cadmium, carbon tetrachloride, chloroform, chromium, cyanide, dichloromethane, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, nickel, tetrachloroethylene, toluene, 1,1,1-trichloroethane, trichloroethylene, xylene.

Completion date: 33% reduction goal - December 1992
50% reduction goal - December 1995
Responsible Agency: EPA

Next Step: To expand this prevention strategy beyond industry to include other sectors of society: farming, energy consumption, transportation, municipalities, municipal waste disposal, etc.

6. Pollution Prevention Action Plan for the Great Lakes

This federal action plan is designed to compliment the federal pollution prevention strategy (see #5 above) and efforts underway at the state level. It will target specific geographic locations and key pollutants such as the 17 toxics identified in the national strategy and others of specific importance to the Great Lakes (as identified in lake management plans, RAPs, etc.). Although participation in this plan will be voluntary, it will include technical assistance, research and regulatory efforts.

Completion Date: 33% reduction goal - December 1992
50% reduction goal - December 1995
Responsible Agency: EPA

Next Step: Begin implementation of this plan.

OTHER POLICY AND PROGRAM INITIATIVES

1. The 25 Year Plan for the Great Lakes

Eleven state agencies in cooperation with the Great Lakes Basin Advisory Council are developing a 25 year plan to address environmental quality and natural resource issues in New York's Great Lakes basin.

Completion Date: Fall 1991
Responsible Agency: NYSDEC

Next Step: The Plan will be submitted to the Governor by the Great Lakes Basin Advisory Council as a recommended course of action.

2. Water Quality Enhancement and Protection Policy

New York State is developing a water quality enhancement and protection policy which will include discharge restriction categories, antidegradation and substance bans. In addition, NYSDEC, the Great Lakes States and EPA Regions II and V are participating in the Great Lakes Water Quality Initiative to develop an antidegradation policy for the entire Great Lakes basin.

Completion Date: Discharge Restriction Regulations - December 1991
Antidegradation Proposals - 1992
Substance Ban Proposals - 1992
Responsible Party: NYSDEC

Next Step: Following the development of the water quality enhancement and protection policy it will be implemented not only in the Oswego River basin, but also across the entire state.

TABLE 11-1

Oswego River Remedial Action Plan
Summary of Commitments

Objective	Completion Date	Responsible Agency
A. Investigations		
1. Mirex sediment investigation	Unknown	NYSDEC
2. Fish tumor, AOC sediment, & PCB source investigations	Unknown	NYSDEC
B. Permitted Industrial Facilities		
1. Continue to lower allowable discharges	Ongoing	NYSDEC
2. Develop BAT guidelines	1992-1995	EPA
3. Monitor and renew industrial permits	Ongoing	NYSDEC
C. Permitted Municipal Facilities		
1. Implement required upgrades and remediation in the following systems • Auburn • Canastota • Oswego Eastside • Onondaga County • Ley Creek & Liverpool pump stations • Waterloo	Ongoing (completion dates vary, please see text)	Local Governments
2. Pretreatment monitoring	Unknown	EPA
3. Syracuse Metro mercury reduction	April 1994	NYSDEC
4. Determination of the need for pretreatment at the Oswego & Auburn facilities	September 1991	NYSDEC
5. Monitor and renew municipal permits	Ongoing	NYSDEC

D. Agricultural Runoff and Other Nonpoint Sources		
1. Implement nonpoint source management program	April 1991	NYSDEC County SWCD
2. County water quality strategies	Unknown	NYSDEC
3. Education and Training		
a) BMP Catalog	April 1991	**COMPLETED**
- Agriculture	July 1991	
- Urban/Stormwater	October 1991	NYSDEC
b) Agricultural BMP Catalog	April 1991	NYSDEC
4. Stormwater management	Ongoing	Local
5. Pesticide Management	Unknown	governments
6. Nonpoint source modeling	Unknown	EPA
E. Hazardous Waste Sites		
1. Priority to likely source sites	Ongoing	NYSDEC
2. Conduct Phase I investigations	December 1991	NYSDEC
° Salina Landfill		
° Brighton Landfill		
3. Conduct Phase II investigations	December 1991	NYSDEC
° Salina Landfill		
° Canastota Landfill		
° Quanta Resources		
° Val's Dodge		
° Alpha Portland		
° Brighton Landfill		
° Colture Property		
4. Conduct remedial investigations/ feasibility studies	1990-1995	NYSDEC
° Onondaga Lake	April 1995	
° Ley Creek	December 1992	
° Clay Landfill	November 1993	
° Syracuse Fire Training	June 1992	
° Old Syracuse Die Casting	January 1993	
° Columbia Mills	December 1991	
° Winkleman	Unknown	
5. Complete remedial designs		
° Fulton Terminal	June 1992	EPA
6. Complete remedial implementation		
° Volney Landfill	(see text)	EPA
° Clothier	August 1991	EPA
° Quanta Resources	August 1991	EPA

F.Bottom Sediments		
1. Complete Onondaga Lake project	Unknown	Numerous agencies
2. Conduct routine monitoring and complete first RIBS report	1991	NYSDEC EPA
3. Develop sediment criteria	1991-93	EPA
4. ARCS	1992	
G. Air Toxics		NYSDEC
1. Monitoring in drainage basin	Unknown	
H. Habitat Improvement		
1. Habitat improvements		NYSDEC
2. Fish passage feasibility		NYSDEC
3. Harbor Habitat		
a) Waterfowl Management Plan	May 1991	NYSDEC
b) Monitoring	Unknown	NYSDEC
I. Pollution Prevention		
1. Annual Conference	Ongoing	NYSDEC
2. Company Recognition	Ongoing	NYSDEC
3. Hazardous Waste Reduction Plans	1991-96	NYSDEC
4. Toxic Reduction Implementation Plans Regulations	January 1992	NYSDEC
5. Pollution Prevention	1992-95	EPA
6. Pollution Prevention Plan for the Great Lakes	1992-95	EPA
J. Other Policy and Program Initiatives		
1. 25 Year Plan	Fall 1991	NYSDEC
2. Water Quality Enhancement & Protection Policy		NYSDEC
- discharge restriction regulations	December 1991	
- antidegradation proposals	1992	
- substance ban proposals	1992	

CHAPTER 12

IMPLEMENTATION

Remedial implementation activities will be completed by the jurisdictions or organizations identified in this remedial action plan. Most commitments are the responsibility of the New York State Department of Environmental Conservation (NYSDEC), with several different program divisions playing a role (e.g. water, hazardous waste remediation, fish and wildlife,). Other responsible parties include: Federal agencies, other State agencies, county and municipal governments and individual industries.

The NYSDEC Division of Water will manage the implementation of the RAP. This implementation will depend on the coordinated effort of numerous public and private organizations, agencies, special interest groups and individual citizens within the drainage basin. To assist in this effort a remedial advisory committee will be formed.

Implementation Policy

NYSDEC will work with a Remedial Advisory Committee to accomplish the goals of the Oswego River Remedial Action Plan. In doing this, the NYSDEC will carry out the following functions:

1. Actively seek funding to support RAP recommendations.
2. Ensure that specific commitments replace RAP recommendations as funds become available.
3. Work with concerned publics in an open manner and ensure general public input through a Remedial Advisory Committee.
4. Revise RAP recommendations as appropriate in light of new evidence and with the advice of a Remedial Advisory Committee.
5. Report to the public and the Remedial Advisory Committee periodically on accomplishments, remedial action effectiveness and future commitments.
6. Focus additional public attention on RAP implementation.

Remedial Advisory Committee

Continuing with its commitments to public participation in the RAP process, NYSDEC will appoint a Remedial Advisory Committee (RAC) to advise and assist NYSDEC with the implementation of the RAP. The RAC will be representative of concerned groups outside of NYSDEC that have an interest in the Oswego Area of Concern and the Oswego River drainage basin. This committee will advise NYSDEC on progress reports, plan updates, new political settings, new technical capabilities and knowledge, etc.

Eight to twelve RAC members will be selected to advise and assist NYSDEC with

Eight to twelve RAC members will be selected to advise and assist NYSDEC with RAP implementation. Representatives will be appointed who can foster and guide the implementation of the RAP either by being responsible for specific remedial actions or through constituency building in the community.

RAC members will be selected to represent a balance among:

-Elected and appointed government officials;
-Public interest groups (non-economic interests);
-Economic interests;
-Private citizens (non-economic interests).

For continuity during RAP implementation, some members of the current Citizens Advisory Committee (CAC), who helped to develop the RAP may be included on the Remedial Advisory Committee. Also, individuals with an interest in RAP implementation who may not have been CAC members, may be included on the RAC.

The RAC will be responsible for:

- Assessing RAP accomplishments, new technical capabilities and knowledge, and new funding opportunities.
- Recommending actions, including RAP revisions, to NYSDEC, other agencies, local governments, and the State legislature.
- Advising the Department on public outreach efforts.

In addition to the Remedial Advisory Committee members, agencies at all levels of government will be asked to participate and provide input to RAP implementation as needed.

Progress Report

To insure that the Remedial Action Plan continues to evolve, periodic progress reports will be issued. These reports will summarize the results of remedial investigations and research, list accomplishments, describe future commitments, and provide necessary revisions to the plan. There will be opportunities for the interested publics to comment on the updates, planned action, and the overall strategy.

Plan Updates

It is expected that major changes to the RAP will be required in the future, even though minor changes in the RAP may be reported routinely in the progress reports. For example: new information may become available during investigations in the river basin; other activities completed outside the RAP, such as major changes in land use along the river or changes in the use of the river itself may alter the setting of the RAP; and new research and development findings related to remediation may suggest changes in strategy.

As the need for these changes becomes apparent and on the advice of the Remedial Advisory Committee, NYSDEC will prepare revisions developed through an active public participation process. The proposed revisions also will be submitted to the International Joint Commission and will meet the requirements for staged reporting under the Great Lakes Water Quality Agreement.

Water Quality Monitoring

The NYSDEC Rotating Intensive Basin Studies (RIBS) will be used as an important tool to monitor changes in water quality in the Oswego River Drainage Basin. The RIBS program and sampling locations were discussed in Chapter 8 in the Unknown PCB Sources section (pages 8-32 to 8-35).

Annual routine sampling will occur at the permanent sampling locations identified in Figure 8-3. Intensive RIBS sampling will occur at all sampling locations for two consecutive years in the drainage basin, with four years in between intensive sampling events.

RIBS sampling was completed in the Oswego River drainage basin in 1989/90 with a report of the sampling results due to be produced in 1991. The second RIBS for this drainage basin is scheduled for 1995/96. This will allow analysis of long-term trends, since the effects on the environment of remediation often take several years to show significant changes within the ecosystem.

The RIBS will make use of water and sediment samples as well as biotic indicators such as fish and macroinvertabrate contaminant analysis, macroinvertabrate community structure analysis, and bioassays. Details on the sample type and analyses performed are summarized in Chapter 8.

Benthic Macroinvertebrate Monitoring

Monitoring of benthic macroinvertebrates in the Area of Concern has been proposed as part of the RAP remedial strategy (page 10-22). This proposed monitoring would include analysis of community structure (abundance and diversity) as well as contaminant burden.

Chapter 13

CITIZEN PARTICIPATION

INTRODUCTION

The Oswego River RAP public participation activities were designed to involve interested parties in development of the RAP, to raise public awareness of the RAP process, and to build support for the final product: a remedial plan for the Oswego River/Harbor and its basin. The effort to encourage citizen participation is part of the NYSDEC commitment to an open decision-making process and to public access and involvement in New York State environmental policy development.

The NYSDEC created a Citizen's Advisory Committee to work in partnership with the Department on the RAP. Through the efforts of this committee, a dialogue between Department staff and local citizens developed. Public input and public review have added a constituent perspective to the remedial plan.

HISTORY OF THE PUBLIC PARTICIPATION PROCESS

NYSDEC Commissioner, Henry Williams, named an 18 member Citizen's Advisory Committee and chaired its first meeting in April 1987. The committee consisted of government officials, industrial representatives, sports people, environmentalists, and research scientists. The full committee met regularly with regional NYSDEC staff throughout the RAP preparation, contributing ideas and reviewing materials.

Additionally, there were sub-committees formed to assist with particular aspects of the RAP. The Technical sub-committee was formed to assist the NYSDEC in gathering and evaluating the available data and in identifying the gaps or needs for additional information. A sub-committee on Uses and Use Impairments looked at current and past activities and conditions in the Area of Concern. The Public Outreach Sub-committee was designated by the Committee to prepare a plan for community outreach and to serve as liaison with the local media. The sub-committees met on an as-needed basis during development of the RAP.

A Steering Committee was formed from NYSDEC Central and Regional Office staff with three members from the Citizen's Advisory Committee in March, 1989. It was given the task of preparing the Stage I RAP. Since that time, the Steering Committee has served as the team that prepared the RAP and provided the mechanism for an interchange of information and views between the NYSDEC and the Citizen's Advisory Committee.

Following the preparation of the Stage I RAP some members of the committee expressed their desire to withdraw from the RAP process. As Stage II proceeded the participation of the public continued to dwindle. NYSDEC lacked the staff and resources to adequately support the citizen committee. During the summer of 1990, presumably due to the lack of support and competition of increased interest in the Onondaga Lake project, participation by citizen committee members reached its lowest point.

PUBLIC PARTICIPATION ACTIVITIES IN STAGE I

Information on the RAP process and progress were disseminated regularly through mailings and notices to local media. Citizens' Advisory Committee meetings were public and were held in the Area of Concern, Oswego, as well as in Fulton and Syracuse both within the basin. The media were notified of all meetings, attended most, and reported regularly on the progress and problems in the RAP preparation.

Two series of public meetings were held to encourage the general public and interested parties to participate in the RAP process. In April of 1988, meetings were held in Syracuse and Oswego. These meetings were geared toward obtaining descriptions of harbor uses from those living in the region. The sessions attracted over 75 local residents who questioned NYSDEC staff and Committee members. Their input was focused on past and future uses of the Oswego Harbor area. During the summer of 1989, a second series of two public meetings was conducted to update the public on the RAP progress and to again seek their input.

These meetings, particularly the ones in Oswego, illustrated local recognition of the importance of the harbor to the future of the city. The meetings also illustrated the lack of local consensus on future activities desired in the harbor and in the near shore area. Stage I was written on the premise that current multiple use of the harbor will continue. Formal designation of future use was not part of the RAP process. Deciding on harbor use is essentially a function of the involved governments, the affected publics, and the commercial interests.

In the final stages of the preparation of Chapters 4 (Problems and Causes) and 5 (Sources), a meeting of scientists, sponsored jointly by the Great Lakes Research Consortium and NYSDEC, was held to make sure all available information was included and to obtain the views of outside scientists on the interpretation of the information used in those chapters.

Two newsletters were prepared and distributed to a mailing list which grew from approximately 150 to over 500 interested parties. Two brochures were also prepared for distribution to local groups and at summer events in the area during 1988 and 1989.

The Citizens' Advisory Committee and its Public Outreach Sub-committee used several community events as opportunities to distribute information and to discuss the committee activities with the public. Two Harborfests in Oswego provided an opportunity to acquaint local people and visitors with the RAP process and the problems in the AOC. In 1989, a similar activity, the Fulton River Festival, was attended by Citizens' Advisory Committee members who distributed brochures and other RAP materials.

In addition to printing and distributing newsletters, brochures, and press releases, the NYSDEC, at the request of the Citizens' Advisory Committee, produced a two-color poster depicting the Oswego Harbor and its many current recreational and commercial activities. The poster has been distributed in the Area of Concern in an effort to raise awareness of the value of the harbor and the existence of the local committee working on a remedial action plan. In a similar vein, to increase local awareness of the existence of the Citizens' Advisory Committee and the upcoming issuance of the remedial action plan, a bumper sticker urging "Keep Lake Ontario Great - Support the RAP" was made available at the 1989 Oswego Harborfest and at the Fulton River Days.

PUBLIC PARTICIPATION ACTIVITIES IN STAGE II

Information on RAP meetings and progress continued to be distributed through mailings and notices to local media. The Citizens Advisory Committee (CAC) continued to work with the NYSDEC on the development of the Stage II RAP by commenting on the format and content of the plan through the Steering Committee. Starting with a proposed outline of the document, the RAP evolved into its present form with extensive opportunity for citizen participation. Unfortunately few took advantage of this opportunity.

On May 22, 1990 a workshop was held in Syracuse to discuss NYSDEC's criteria for prioritizing investigations proposed in Stage II (see Chapter 9). The final criteria for ranking the relative priority was developed with the assistance of the workshop participants. Nine individuals including representatives of NYSDEC, CAC, and local experts participated.

The CAC and its Public Outreach Subcommittee continued their effort to reach interested parties by attending the 1990 Oswego Harborfest and Fulton River festival.

The Public Outreach Subcommittee developed a public outreach proposal which was designed to be implemented in both the Oswego and Massena Areas of Concern. This proposal was submitted to NYSDEC with the request of a $50,000 grant for implementation. However, the State does not presently have the funds to support such a proposal. To date when funding has been made available for RAP activities NYSDEC has used them for technical activities necessary to support RAP goals in Areas of Concern in New York State.

This lack of funding for public outreach activities led to a formal protest by the four Public Outreach Subcommittee members (one of the four was a CAC member, the others were public members of the Public Outreach Subcommittee) who walked out of a CAC meeting. These four individuals refused to comment on the RAP due to perceived inadequacies in the document that they enumerated in a short letter to NYSDEC. This action was not a result of a formal action by the full CAC. There are several members who continue to be actively involved in reviewing the RAP and who have worked with the Department throughout the RAP process. Such participation has resulted in many valuable contributions to the RAP.

Onondaga Lake is considered to be an important source of pollution to the Oswego Area of Concern. The RAP development team has coordinated with the Technical Review Committee of the Onondaga Lake Management Conference. A preliminary draft of the Oswego Stage II RAP was sent to the Onondaga Lake's Technical Review Committee for review. In addition, some Oswego CAC members are also members of the Onondaga Lake CAC

A draft Stage II RAP and an executive summary were made available to the public for review and comment in March 1991. An eight page newsletter was developed to announce the availability of the draft RAP. The newsletter included sections on RAP development, summaries of Stage I & II, and issues for discussion. It also announced the public availability session which was held in Oswego on May 21, 1991 from 3:00 - 8:00 pm. This session allowed citizens an opportunity to informally discuss RAP issues with NYSDEC personnel.

EVALUATION OF CITIZEN PARTICIPATION IN THE RAP PREPARATION

Citizen participation in the Stage I RAP preparation process proceeded on two fronts. The first effort consisted of inviting a wide spectrum of Citizens' Advisory Committee members to represent the views of as many individuals within the Area of Concern and Oswego River basin as possible. The goal was to obtain a diverse group of volunteers to research, compile, review, and assist the NYSDEC with preparation of the Oswego River RAP.

The core group also helped to get information about the process and pollution problems to the public at large. Despite efforts on several occasions to obtain more active participation from under-represented segments of the community, a number of important community interests did not participate.

The second effort included asking for public input in defining the scope of the problem and determining the future direction the RAP process. Information about the Oswego River basin and the relationship of pollutants to humans and other organisms was also made available. Despite public involvement efforts of the Citizens' Advisory Committee during the two years leading to the production of Stage I of the RAP, additional citizens did not participate in large numbers.

The consensus of the Citizens' Advisory Committee is that certain community segments and individuals did not participate because they did not perceive a pollution crisis. This is because the harbor looks cleaner than it has in the past and a thriving sport fishery indicates to the public that there must not be a problem. Also, the long-term nature of the RAP process does not lend itself to creation of a sense of urgency which could generate wider or more intense local involvement.

This trend persisted in Stage II of the RAP as attendance at CAC meetings continued to decline. The public expressed frustration at not being able to understand the complex nature of the problems and their solutions and at the apparent lack of support within NYSDEC for the RAP. Some also felt that the NYSDEC did not make a strong enough statement about the problems that exist in the Oswego River drainage basin. Also, members of the CAC became increasingly frustrated over what they perceived as a failure to reach the public and to receive local support for the goals and recommendations of the RAP.

In spite of these problems the CAC and the Steering Committee did provide many valuable ideas and comments that have been incorporated into the Stage II RAP. This has resulted in a more complete and comprehensive document.

FUTURE ACTIVITIES

NYSDEC will continue to build a base of support for the Oswego RAP through discussions of the Stage II report with local agencies and organizations such as the Soil and Water Conservation Districts, Environmental Management Council, Cooperative Extension, County Planning and Development Boards, etc.

The purpose of these discussions is to gather comments from these groups and to encourage them to express their views on the RAP. The groups provide expertise for dealing with water quality issues. Additionally, they should play a role in the implementation of the RAP. They are facilitators at the local level and focus points of a network for communication to local government and to local individuals.

New information materials will be developed to distribute in the community, explaining the background of the RAP and where we go from here.

Once the RAP document is submitted to IJC, preparations can be made for the public's role in implementation. A Remedial Advisory Committee (RAC) of citizens, industry, and local government officials will be created to advise the Department on the implementation of the recommendations in this report and to assist in the preparation of periodic updates.

Public participation will also occur during implementation of other NYSDEC programs such as hazardous waste remediation, stream reclassification, etc.

Despite some problems, the NYSDEC has done its best to go beyond the requirements of the GLWQA in developing the Oswego RAP. The RAP is not intended to be a static document, rather it is a dynamic process that will include updates and improvements as our knowledge of the use impairments and their sources increase in the future. NYSDEC will continue to work on building public support and participation for the RAP as it also implements remedial actions, continues investigating for additional sources and seeks additional remedial recommendations. Therefore, this Stage II RAP is seen as a good start toward the ultimate goal of restoring all beneficial uses to the Oswego Area of Concern.

APPENDIX A

ONONDAGA LAKE

Introduction

Onondaga Lake (Figure A-1) is a 4.5 square mile lake with a watershed of 240 square miles, almost all of which is within the County of Onondaga. The watershed, much of which is heavily urban and industrial, contains a population in excess of 450,000.

The lake is adjacent to the northern boundary of the City of Syracuse and the urbanized towns of Geddes and Salina. Two villages, Liverpool and Solvay, are located nearby. Current land use along the immediate shoreline is a mixture of public recreation and industrial. Much of the shoreline is owned by Onondaga County and is maintained by the County's Department of Parks and Recreation which has actively pursued park and shoreline trail development. Thousands of persons attend a variety of lake-oriented events in the park, including rowing regattas and speedboat races.

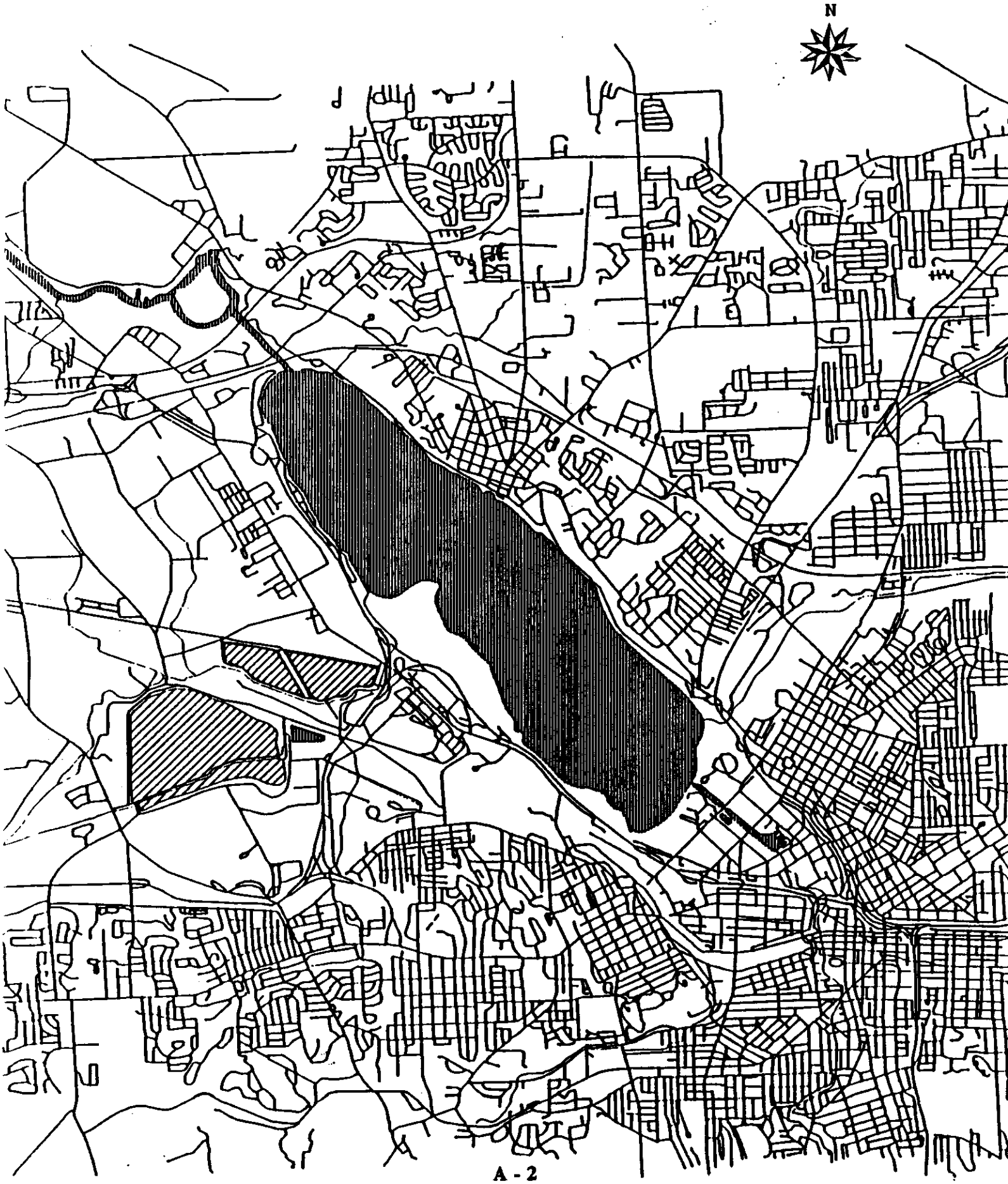
The shoreline of Onondaga Lake at the turn of the century was dotted with major tourist attractions including hotels, restaurants and amusement parks. But the same lake that was the center for this recreational activity was also the recipient of municipal and industrial pollution. Over time this abuse devastated the lake to the degree that it has been described as the most polluted lake in the world. Environmental issues impacting the lake's quality have been studied since the 1920s. Numerous studies have been completed and continual testing takes place to assess the damage and to suggest ways to improve the lake. The complexity of the lake's problems has, until recently, led to great skepticism regarding the possibility of restoration.

The public and private segments of the community have invested over $280 million during the last decade to improve the lake through construction and operation of pollution control facilities and implementation of pretreatment, monitoring and regulatory programs.

Construction (in 1979) and operation of the County's upgraded Metropolitan Sewage Treatment Plant, which treats sewage from the city and some surrounding towns, and implementation of wastewater effluent standards through the SPDES program have brought about improvements in the lake's water quality. The closure of the Allied Signal Corporation plant in 1986 meant a major reduction in discharges from that facility into Onondaga Lake, although significant residual loads are still being contributed. These factors have resulted in improvements in water quality, but a complex set of pollution problems still remains.

The lake, which had been subject to a prohibition on fishing since May 15, 1970, was reopened to fishing on May 15, 1986, with an advisory from the State Health Department that no fish be eaten (the fishery was closed for 10 years). Concurrently, Onondaga Lake Park has been heavily and successfully promoted by the County as a site for numerous major public recreation events. The Pyramid Corporation has a massive redevelopment plan for the area at the southeastern end of the lake which involves part of the lake's shoreline and its major tributary, Onondaga Creek.

FIGURE A-1
ONONDAGA LAKE
(scale: 1" = 1 mile)



The plan includes a shopping mall located on a former junkyard (opened in October 1990), relocation of the large Oil City tank farm to make way for residential and commercial development, a marina (all still in the planning stages), and residential areas along the creek which connects the development to downtown. All of these factors, coupled with the recent shutdown of Allied Chemical, perceived as a major historical polluter of the lake, have led to renewed interest in cleaning up the lake and heightened optimism that a cleanup could actually succeed.

NYSDEC appointed the Onondaga Lake Advisory Committee in 1986. The committee provides valuable public input into state and local governments' decision making on lake issues. In addition, the committee is involved in public education and development of a public consensus on the lake's future usage. The regular monthly meetings of this committee also serve to maintain and enhance the increasing public interest in lake cleanup.

Water Quality Problems in Onondaga Lake

The water quality problems of Onondaga Lake have been described in detail in a variety of scientific and water quality planning reports over the years. Figures 2 and 3, adapted from material prepared by the Onondaga Lake Advisory Committee, provide an overview of the principal water quality parameters involved, and their known or suspected relationship to major categories of pollutant sources.

The location of Onondaga Lake gives it a high recreational resource potential. However, prevailing water quality problems have prevented the full utilization of the lake's potential. The lake supported a cold water fishery until the late 1880's. Discharges of municipal effluents and industrial wastes over the last 110 years have left the lake grossly polluted and hypereutrophic. Swimming is not permitted because of poor transparency (usually less than 4 feet) and high fecal coliform levels. The fishery is impacted by chlorides, mercury contamination of fish flesh, inadequate dissolved oxygen, and destruction of habitat.

The fishery may also be impacted by the high ammonia concentrations that prevail in the lake. It is not yet clear whether the high ammonia levels are due to current pollution inputs alone or a combination of current inputs and the residual from past abuses.

Oxygen depletion is so severe in the lake that concentrations adequate to support fish are often limited to the upper 20% (4 to 5 meters) of the water column in the summer. Oxygen-demanding reduced chemical species that accumulate in the bottom waters during the summer subsequently cause lake-wide violations of the New York State standard for dissolved oxygen (4 mg/l) during the fall mixing period.

FIGURE 2

ONONDAGA LAKE:
Environmental Analysis Matrix

	Use-Limiting Water Quality Conditions								
	Contact Recreation		Fishery					Other Related	
Conditions * / ENVIRONMENTAL ISSUES	Transparency* Stratification	Bacteria* Salinity	Dissolved Oxygen*	Mercury*	Ammonia*	Fish Habitat	Synthetic Organics	Algae	Calcite Phosphorus
1 Raw Sewage Overflows	X	X	X		X		O	X	X
2 Combined Sewer Overflows (CSO)	X	X	X		X		O	X	X
3 Metro Sewage Plant Discharge	X	X	X		X		O	X	X
4 Allied Impact (including Nine Mile Creek)	X		X	X		X	O		XXX
5 Lake Bottom Materials			X	X	X	X	O		X
6 Oil City							O		
7 Non-point Inputs	X	X	X		X		O	X	OXO

X = Impact
O = Unknown Impact
*Involves Federal or State Regulatory Standard

Matrix prepared by the Environmental Sub-committee of the Onondaga Lake Advisory Committee

*FIGURE 3
ONONDAGA LAKE

Use - Limiting Water Quality Conditions and Related Factors

	Water Quality Parameter	Condition	Impact
1.	Dissolved Oxygen	D.O. violations occur all year. After turnover, oxygen depletion starts in the deep water and progresses upward until there is zero dissolved oxygen within five meters of the surface. Upon turnover, bottom sulfides mix with the upper waters and cause the whole lake to drop below the NYSDEC standards.	Stress on Fishery Sulfide Production
2.	Transparency	Water transparency decreases in summer and violates DOH regulatory standards for public bathing beaches.	Prohibits Swimming
3.	Bacteria	Bacteria levels following precipitation events in summer occasionally exceed DOH regulatory standards for contact recreation and NYSDEC regulatory standards.	Prohibits Swimming
4.	Ammonia	Ammonia concentrations are potentially toxic to fish and exceed NYSDEC regulatory standard.	Potential Stress on Fishery
5.	Fish Habitat	Altered bottom sediment characteristics inhibit bottom dwelling animals and establishment of rooted aquatic plant populations.	Stress on Fishery
6.	Mercury	An EPA priority pollutant known to be in bottom sediments and contaminating fish flesh. Exceeds USEPA regulatory standards for human consumption of fish (DOH advises against consumption). Economic and social value of fishery is lost.	Stress on Fishery Human Health Impacts
7.	Synthetic Organics	Involves EPA priority pollutants and NYSDEC regulatory standards and guidelines. Multiple potential sources, but not much documentation.	Potential Stress on Fishery. Human Health Impacts
8.	Phosphorus	Limiting nutrient with respect to algae production, and consequent potential indirect impacts on water transparency.	Reduced Transparency
9.	Algae	Contributes to diminished transparency. Affects D.O., and might affect ammonia concentrations in the lake.	Reduced Transparency D.O. Ammonia
10.	Calcite	Contributes to reduced transparency as suspended particulates, and is a significant constituent of bottom sediments.	Reduced Transparency Reduce Fish Habitat
11.	Stratification	Due to Ionic Inputs, the lake stratifies more strongly and for longer periods of time than typical lakes. There is some question as to how this will change over time with the closure of the Chlor-alkali plant and associated wastebeds.	Oxygen Resources Stress on Fishery Sulfide Production
12.	Salinity	Principal source was Chlor-alkali operation. Wastebeds still contribute significant amount to lake via seepage to Nine Mile Creek. Some natural sources contribute.	Stress on Fishery Reduced Transparency Alters Stratification Diminishes Oxygen Resources

* Adapted from material developed by Onondaga Lake Advisory Committee.

Contraventions of fecal coliform standards, which had occurred frequently in Onondaga Lake following wet weather events, still occur occasionally, primarily as a result of combined sewer overflows. Transparency is low in the lake because of high concentrations of phytoplankton and clays. The high concentrations of phytoplankton occur as a result of the high level of nutrient loading, particularly phosphorus, received by the lake. The principal sources of phosphorus are the Syracuse/Onondaga County Metropolitan Treatment Plant (METRO), combined sewer overflows, internal recycling from bottom sediments and nonpoint sources. Calcium carbonate, which was responsible for a major portion of the transparency problem in the past, is not currently considered a major contributor to the transparency problem due to the shutdown of the Allied Chemical operation.

Calcium carbonate production in the lake has been enhanced by elevated calcium concentrations due to seepage of ionic waste from the adjoining waste beds of Allied Chemical. Clay and other inorganic particulates are received in large quantities from the tributaries, particularly Onondaga Creek. The severe oxygen depletion conditions that prevail in the lake are largely manifestations of the lake's hypereutrophic conditions, and thus may be subject to remediation through phosphorus management efforts.

A related water quality concern is the condition of Onondaga Creek, the largest tributary of the lake. Onondaga Creek flows through the City of Syracuse, and through the Oil City area for which major redevelopment is now proposed. The creek is generally highly turbid and carries major loadings of bacteria, floatables and suspended solids, particularly during and after major storm events. This stream could provide a natural link between downtown Syracuse and the lakefront area. Instead, due to abhorrent water quality conditions and for safety reasons, it has been fenced off. Combined sewer overflows appear to be the principal source of the problems. Urban runoff and the "mud boils" which load the stream with fine sediments in the Allied solution mining area of the Tully Valley south of Syracuse may also contribute.

In addition to the documented quality problems in the lake, there are numerous known or potential contamination sites along or near the southern end of the lake which represent potential water quality threats of currently unknown impact. The shoreline area of principal concern extends from the Village of Solvay southeast through the City of Syracuse. This area has long been heavily industrial and commercial, and includes several sites now listed on the State Registry of Inactive Hazardous Waste Sites. Portions of this area, principally the Allied plant site in Solvay and the triangular Oil City area of Syracuse bounded by I-81, I-690 and the lake, have been the subject of major redevelopment efforts. In addition to ensuring proper remediation of the contaminated sites known to exist within these areas, it is important to ensure that redevelopment activities are carried out in an environmentally sound manner.

Current Program Status

The objective of restoring Onondaga Lake to swimmable/fishable status is not new to the local governments and citizens groups in the Syracuse metropolitan area. There has long been a significant level of interest in the lake. As mentioned previously, however, interest has been enhanced and rekindled since 1986.

Due to this long standing interest and as an outgrowth of the NYSDEC's responsibility to carry out the requirements of various existing environmental laws and regulations, there are a variety of initiatives under way which provide much of the framework for lake clean-up. These are grouped according to the principal categories of water quality problems in the lake.

The lake-related problems have been organized into major groupings because that is a convenient and effective means of presentation. However, in reviewing these problems it should also be kept in mind that there will likely be significant inter-relationships among the various categories of problems and their solutions. For example, lake sediments play a role with regard to several of the problems, such that a solution for the mercury contamination may exacerbate problems relating to dissolved oxygen, or vice-versa. In carrying out the various remedial actions within each category, it will be essential that the appropriate inter-relationships be considered.

SEWAGE-RELATED PARAMETERS

This category of problems includes bacteria, dissolved oxygen, transparency and ammonia toxicity. The following program initiatives have been under way.

Ley Creek and Liverpool Construction Grants

During the last phase of the construction grants program, two projects will receive state and federal funding of approximately $20 million. These projects will improve the Ley Creek and Liverpool Pump Stations and thereby cut down on raw sewage overflows to the lake. Both projects, scheduled to be completed by 1992, will contribute to the efforts to reduce bacterial contamination, and should also provide some reductions in loadings of nutrients and biochemical oxygen demand.

Lake Models

The pollution problems of Onondaga Lake are extremely complex and inter-related. Solutions for the complex of parameters primarily related to sewage (i.e., the Metro treatment plant and combined sewage overflows from its tributary sewerage system) may cost well in excess of $100 million. The complexity and the potential costs involved dictate that the best possible decision-making tools be utilized.

State and federal grants have been provided to assist with a three-year research effort to develop lake water quality models with which to evaluate pollution control options for bacteria, transparency, dissolved oxygen and ammonia. Models of Onondaga Lake and the Seneca River are being developed by the Upstate Freshwater Institute and will be used to evaluate sewage-related remedial alternatives.

Syracuse Metro NMP Settlement

The Onondaga County Syracuse Metropolitan (Metro) Treatment Plant and its service area, including the combined sewer overflows has been the subject of a National Municipal Policy lawsuit involving NYSDEC, the state Attorney General, and the Atlantic States Legal Foundation. A negotiated settlement has been signed by a federal judge and the order has been entered. The settlement requires the County to contribute to the development of and to use the models now under development (above) for selecting control alternatives for Metro and the CSOs. These will become part of an enforceable Municipal Compliance Plan (MCP) likely to involve construction costs of $150-200 million.

SALINITY AND CALCITE

Onondaga Lake has been extremely saline during the period of approximately the last 90 years, principally due to inputs from Allied Chemical. The Allied waste beds cover approximately 800-900 acres of land on the southwesterly side of the lake. Since active loading of the waste beds was discontinued in early 1986, chloride levels in the lake have dropped dramatically (from roughly 1600-1800 ppm pre-closure to 550-600 ppm now). However, more improvement is needed.

Other ions contributed in large quantities from the waste beds include sodium and calcium. Both are also down dramatically since 1986. Historically, however, the extremely high calcium inputs have reacted with naturally occurring carbonate to form a precipitate (calcite) which has coated much of the lake bottom as well as the bed of Nine Mile Creek where it flows adjacent to the waste beds. The calcium deposits provide a hostile environment for aquatic life. The littoral zone of Onondaga Lake is thus presently non-productive.

A hydrogeological study of the waste beds, which was required under a consent order signed between Allied and NYSDEC, was completed in 1989. The study was designed to evaluate contamination to ground and surface waters (particularly Onondaga Lake) from the waste beds and establish a framework for detailing any remediation necessary to properly close these waste beds. A draft feasibility study detailing remedial alternatives was submitted in April 1990. The existing lake bed calcite deposits are to be addressed through a Natural Resources Damage lawsuit which New York State has commenced (see below).

MERCURY CONTAMINATION

Due to contamination by mercury, the sediments at the bottom of Onondaga Lake are listed on the state's Registry of Inactive Hazardous Waste Sites. Fish in the lake also are contaminated with mercury at levels which have resulted in a State Health Department advisory against consumption, although catch and release fishing is permitted.

Historically, the principal source of mercury has been the chlorine manufacturing facility operated by Allied Chemical from the late 1940s through 1979, and by LCP Chemical from 1979 through 1988. At one time the facility discharged approximately 20 pounds per day of mercury. This was reportedly reduced to about one pound per day in 1976. Since the early 1980s the facility has been understood to have been meeting a discharge limit of 0.028 pounds per day. However, in mid-1988 the plant shut down in response to a NYSDEC complaint and proposed consent order alleging serious chronic violations of the permit limit. The firm was subsequently found to have had numerous exceedances of its mercury discharge limits and paid a fine of approximately $1 million. The LCP plant site is contaminated with mercury and has been placed on the state's Registry of Inactive Hazardous Waste Sites. Since the site is a treatment, storage and disposal facility it will be addressed through a RCRA Corrective Action.

As indicated above, the lake sediments themselves are also listed on the state's Registry of Inactive Hazardous Waste Sites. The NYSDEC has collected extensive sediment core data from the lake and completed a Phase II investigation report on the lake sediments in 1989. This investigation has provided the most comprehensive mercury sediment data to date and will provide a solid base for the development of a remedial investigation work plan as well as providing information leading to the completion of a federal Hazard Ranking System score for this site.

The mercury contamination in the lake sediments is being addressed through the hazardous waste program and also will be a focus of the Natural Resources lawsuit (see below).

LAKE ADJACENT CONTAMINATION

The area along the southerly portion of Onondaga Lake, from roughly the Village of Solvay southeast through the City of Syracuse, has long been heavily industrial and commercial. The extensive Allied Chemical operations in the Solvay area are only the most prominent of the many industrial and commercial operations which have existed in this area. Within the area there are numerous contaminated sites which require clean up, some of which may pose threats directly to the lake. Those immediately adjacent to the lake and of principal concern include the "Tar Beds" and the Willis Avenue site (both Allied Chemical sites), "Oil City" (which is a major concentration of oil company petroleum product storage facilities) and the Clark property, which comprises a portion of the site used by the Pyramid Corporation as the location of a major regional shopping mall.

The Willis Avenue plant and the Tar Beds are listed in the state's Registry of Hazardous Waste Sites as Class 2 sites defined as presenting a threat to the environment or public health. A consent order for the Tar Beds was signed by Allied and the NYSDEC in June 1989. It calls for Allied to prepare an RI/FS for the site, with clean up to be the subject of another order based on the RI/FS. The order for the Willis Avenue site, which will also require an RI/FS, is being reviewed by the NYSDEC.

Oil City is an area of Syracuse where ten major oil terminals are located. Over the years various spill or leakage events have occurred, which, although contained by the diked areas for each facility, have created plumes of petroleum contaminated groundwater. To date, efforts to recover these plumes have been incomplete due to the closeness of the facilities and the complexities of the underground soils and utilities.

An overall groundwater hydrogeologic study was completed in 1989. Remedial actions will be implemented at the facilities identified as contaminated. Such remedial actions may include recovery systems to remove contaminated plumes and removal or purification of contaminated soils.

The Pyramid Corporation has initiated a massive redevelopment effort incorporating the entire area between downtown Syracuse and the lake, including Oil City. One portion of this area, previously occupied by the Marleys scrapyard, is the site of the newly opened Carousel Center, a regional shopping center which is intended as the keystone of the redevelopment proposal. A portion of that site, known as the Clark property, is underlain by organic chemical contamination which requires remediation. NYSDEC has a consent order with Pyramid for carrying out a remedial program for the site, which is a class 2 site on the Registry of Inactive Hazardous Waste Sites. Contaminated soil has been removed from the mall area to a treatment cell for a vacuum extraction pilot project.

NATURAL RESOURCE DAMAGES

In March 1989, the New York State Attorney General and the Commissioner of NYSDEC joined to announce that the state will hold liable those responsible for damages to natural resources from hazardous waste pollution in Onondaga Lake. A civil suit, which seeks both remedial work and damages from companies which caused the loss of the natural resource, was filed in U.S. District Court in Syracuse on June 27, 1989. This action is viewed as an integral step in the clean up of Onondaga Lake.

REMEDIATION CONFERENCE

The Onondaga Lake Remediation Conference was held on February, 5-8, 1990 at the Sagamore Conference Center in Bolton Landing, NY. The primary purpose of the conference was to assist the State in evaluating various approaches to the study and remediation of Onondaga Lake. This conference was organizaed by NYSDEC and the NYS Attorney General's office. It was funded by a responsible party (Hanlin Group, Inc. - LCP Chemicals Division) as part of a negotiated settlement.

MANAGEMENT CONFERENCE

The problems involved in the clean up and reclamation of Onondaga Lake will take a cooperative effort between the public and private sectors and government at all levels. To assist in coordinating these activities, the federal government has committed $500,000 toward an Onondaga Lake Management conference and $237,000 for the preparation of a U.S. Corps of Engineers reconnaissance report on the lake.

The goal of the management conference is to focus efforts and direct the most efficient use of resources to bring about the reclamation of Onondaga Lake. The conference has met several times and formed a citizens advisory committee and a technical review committee.

APPENDIX B

BACTERIAL DATA

During review of the Stage I Oswego RAP the International Joint Commission Review Team requested bacterial (coliform) information be included in the Stage II RAP. This appendix includes that information.

Table B-1 includes all available NYSDEC bacterial data from the Oswego Area of Concern since 1983. NYSDEC historically has sampled for coliforms within the AOC at Lock 7 of the Oswego River. However, sampling at this station was discontinued in 1987. The local Health Department does not sample for coliforms in the AOC because there are no bathing beaches.

The New York State coliform standards currently in effect for the Oswego Harbor are:

1) The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations, and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample.

2) The monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations.

Table B-1

Oswego Harbor Bacterial Data

Sample Date	Fecal Coliform/100 ml	Total Coliform/100 ml
3/29/83	100	4,000
5/24/83	100k	4,000
7/18/83	600	2,200
8/18/83	520	6,000
9/14/83	800	9,000
10/12/83	900	10,000
11/15/83	440	30,000
3/20/84	1,300	11,000
4/16/84	250	3,400
5/17/84	100	1,000
6/20/84	10	4,700L
7/10/84	40	4,000
8/6/84	200	3,000
9/13/84	240	3,200
10/9/84	1,000L	3,900L
11/1/84	100	1,900
11/29/84	380	13,000
3/26/85	5	600
4/22/85		400
5/23/85	220	1,600
6/19/85	60	850
7/9/85	1000L	1,600L
8/12/85	400	1,800
9/12/85	100	800
11/7/85	190	3,200
5/8/86	20	1,200
6/4/86	260	2,500
7/1/86	150	900
7/28/86	140	2,000
8/21/86	400	2,900
9/23/86	2,000L	40,000L
10/20/86	500	220
5/4/87	350	2,600
6/2/87	20	100
8/5/87	30	12,000
10/6/87	80	2,800
11/25/87	1,400	6,000

L = Actual value known to be greater than value shown.
K = Present but less than method detection limit which is shown.

APPENDIX C

RESPONSIVENESS SUMMARY

NYSDEC held a public availability session to discuss the Stage II RAP in Oswego on May 21, 1991. Comments were received at that time. In addition, copies of the March 1991 Stage II RAP were distributed to the general public and other government agencies to solicit comments.

NYSDEC staff addressed editorial and informational comments. The changes were made but not included in this summary. Most comments contributed to improvement of the thoroughness and accuracy of the document. Substantive comments and NYSDEC response are listed below.

Please note that two new sections have been added to Chapters 10 & 11 entitled:

Pollution Prevention
Other Policy and Program Initiatives

These sections were not created in response to comments, but rather they were added to make the RAP easier to follow and more thorough.

General

Comment: The report is poorly organized. The reader is required to locate Stage I to understand Stage II.

Response: The Stage II RAP is a continuation of Stage I. Thus, they are designed to be read together. Stage II emphasizes this continuity by starting with Chapter 7 and including chapters 1-6 (Stage I) in the table of contents. This is explained in the introduction section of Chapter 7. No changes were made relative to this comment.

Comment: Stage II should include a discussion of the City of Oswego Local Waterfront Revitalization Program and its relation to the RAP.

Response: Agreed. A discussion of the waterfront revitalization program has been added to a new section in Chapter 10 entitled "Other Policy and Program Initiatives".

Chapter 7 - Stage II Introduction

Comment: The Winkleman site discussed in the source update section has been neither remediated nor delisted.

Response: Correct. The paragraph in question describes the Rockwell site, not the Winkleman site. This change has been made. The Winkleman site is discussed in Chapters 8-11.

Comment: The source update section describes a recently released study linking municipal sludge incineration using garbage as fuel to high levels of mercury in air pollution control wastewater. Since there are no comparable facilities in the Oswego River drainage basin, there is no need to discuss this issue in detail.

Response: Agreed. This paragraph was removed from chapter 7. A brief discussion of the issue in chapter 8 remains.

Chapter 8 - Current Programs and Remedial Options

Comment: Table 8-3 lists Miller Brewing as a source of phosphorus to the basin. However, we understand that Miller discharges to the Fulton STP. Listing of Miller and Fulton in this table, therefore, could result in double counting of the Miller phosphorus loading.

Response: Miller Brewing has a SPDES discharge permit for the Oswego River. They do not discharge to the Fulton STP. However, Miller Container discharges to the Fulton STP. No changes were made relative to this comment.

Comment: We question if it was indeed verified that pretreatment program monitoring has not been initiated (page 8-12) for the pollutant parameters mentioned (PCBs, dioxin, mirex, octachlorostyrene) by POTWs as part of their approved pretreatment program during (1) the process of performing a headworks analysis for setting local limits at the time of pretreatment program development or (2) continued monitoring performed by the POTWs to assess continued compliance and changing influent conditions.

Response: The Department reviewed current pretreatment monitoring results as part of the RAP process. Headwork analyses done at the time of setting local limits were not reviewed. Since pretreatment programs were developed before the Oswego RAP contaminants of concern were identified the RAP team feels it would be prudent to assure these contaminants are not coming from POTWs. No changes were made relative to this comment.

Comment: The following comments were received in regard to the Hazardous Waste Site Remedial Action Summary Table (Table 8-6):

a) A drum and hazardous site removal was completed at the Clothier disposal site in 1986-88. As a result of these activities, only low levels of

residual PCB contamination remain on-site (2.5 mg/kg). In addition, studies have shown this site has not had an impact on Ox Creek, therefore, it is not likely to impact the AOC.

b) Only trace amounts of PCBs have been detected at the Fulton Terminals site (maximum detected concentration was 480 ug/kg). The Record of Decision showed no impact to the river, therefore, this site is an unlikely source to the AOC.

c) The North and South Armstrong landfills should be higher than Category C (investigations incomplete; an unlikely source to the AOC). They should be Category A (Thought to be a likely source to the AOC) or Category B (insufficient information to categorize).

d) The Volney landfill is a questionable Category A (likely source to the AOC) site and should be placed lower in this table.

Response: a & b) Agreed, these sites have been placed in Category D (investigations or remediation complete; an unlikely source to the AOC). Additional information on these sites have been added to chapter 7 (source update section) and chapter 11.

c) As was described in the source update section of chapter 7, the phase II investigation for this site has now been completed. The landfill sites are not considered to be active contributors of contaminants to the River. Although there has been previous contamination of the river from this facility, it is believed that most of the contamination is limited to sediments that are buried beneath more recent cleaner sediments. The RAP is proposing additional study of the Oswego River to determine the effect of past discharges of mirex from this facility to the AOC and Lake Ontario (Chapter 9). No changes made.

d) Although this site is capped and a leachate collection system has been installed, investigations to determine off-site contaminant pathways from this facility are ongoing. Since this site is adjacent to a wetland that drains to Oswego River tributaries, it will be considered a likely source until studies show otherwise. No changes made.

Comment: Contamination has been detected offsite of the Pollution Abatement Services (PAS) site in Oswego. The RAP does not address this potential pollution source.

Response: The PAS site is beyond the scope of this RAP because it is not within the Oswego River drainage basin. It is adjacent to Wine Creek which

discharges directly to Lake Ontario approximately one mile west of the AOC. The federal hazardous waste program is currently conducting a supplemental RI/FS to determine the extent of contamination outside the containment system that was constructed at this site. For Great Lakes planning purposes this site is more appropriately handled by the Lake Ontario Toxics Management Plan.

Chapter 9 - Investigations

Comment: The RAP places too much emphasis on potential sources without first confirming what is already in the AOC. There has been minimal sediment sampling within the AOC for dioxin, mirex and PAH's and no sampling/analyses for PCBs. A comprehensive investigation to characterize the nature and extent of all potential contaminants in AOC sediments is needed.

Response: Agreed. Such an investigation has been added to the RAP.

Comment: The agricultural nonpoint source loading is too specific. Before focussing on only agricultural nonpoint sources, it should be determined what the contribution is from all nonpoint sources.

Response: Agreed. The proposed study has been modified.

Comment: The proposed agricultural nonpoint source study is not necessary since most phosphorus washed from agricultural land is tied up in particulates and largely unavailable for the eutrophication identified in Stage I. If this study is to be meaningful, it will require a major commitment, particularly during spring runoff. when all but perhaps 10-20% of the total phosphorus load is contributed. Results from other expensive and detailed studies could be extrapolated to the Oswego basin.

Response: This investigation has been modified to look at all nonpoint sources rather than only agricultural nonpoint sources. In addition, it is only recommended for completion if it can be confirmed that an algal problem does exist in the AOC. Improvements in CSOs are believed to have made a significant improvement in AOC conditions and may make such an investigation unnecessary. It is also worth noting that this investigation is one of the lowest priority of the proposed studies due to the inherent difficulties.

Comment: The pretreatment program includes investigation of many "pollutants of concern" involving more than just conventional parameters and metals. The need for a detailed investigation (municipal system toxics

investigation) is questioned.

Response: It has been shown that past disposal of wastes into municipal systems may deposit in the system, only to be gradually flushed out through CSOs and/ or the POTW during storm events. Therefore, sampling may be needed to determine if a problem exists. This investigation has been modified to emphasize sediment sampling within storm drains since toxics are easier to detect and sampling is not dependent on storm events.

Comment: The priority ranking (Table 9-4) shows two investigations with higher or equivalent scores to the fish tumor investigation. Why were these studies excluded from the recommendations?

Response: As is discussed in the text, investigations are of two major types: "impairment definition" and "other" investigations. As a group the impairment definition investigations received fewer priority points than the other investigations because they may not draw conclusions leading to remediation of the area of concern. However, the RAP team feels it is important to make progress toward the definition of indicators of impairment in the AOC. Therefore, the highest ranking impairment definition investigation was included in the recommendation for funding. Clarification has been added to the priority ranking section of Chapter 9.

<u>Chapter 10 - Recommended Remedial Strategy</u>

Comment: Regarding the recommendation to continue to lower allowable discharges as pollution control technologies and/or waste reduction techniques improve (page 10-5):

a) NYSDEC cannot impose more stringent limits than those required by technology or water quality.

b) The Great Lakes Water Quality Agreement (GLWQA) "goal" currently has no legal status.

c) It is unclear what is meant by "more stringent water quality standards as they become feasible" as a properly developed standard protects human health and/or aquatic life and has nothing to do with feasibility.

Response: a) Correct, however, technology based limits could be lowered in the future as pollution control technology advances. In addition, water quality standards may be revised as scientific knowledge advances. Such developments would allow NYSDEC to further reduce discharges. The text was clarified in response to this comment.

b) Agreed. However, achievement of the purposes of the GLWQA is a goal of this RAP. No change was made in regard to this comment.

c) Agreed. The text has been clarified.

Comment: The RAP should not rely on updated BAT numbers because most federal BAT numbers developed in recent years have been less stringent than the previously imposed (state) numbers and result in greater allowable discharges.

Response: The federal government must continue to develop and revise BAT as pollution control technology improves if progress is to be made toward the GLWQA goal of virtual elimination of toxics. New York State anti-backsliding provisions would prevent a previously imposed limit that was properly developed from being relaxed unless there is a process change at the facility. The text has been modified to clarify these points.

Comment: All the nonpoint source planning, modeling, managing, etc. will not change the fact that the Oswego River will be turbid after a rainfall. Erosion and sedimentation are natural processes.

Response: Erosion and sedimentation are natural processes, however, like eutrophication, these processes may be accelerated by some human activities. This is not an uncontrollable problem, rather, more can be done by modifying activities to help prevent nonpoint source pollution.

Comment: There is a problem with the way the nonpoint source issue is approached. It should not be justified from the water quality end since there are no standards or guidelines for most of the pollutants involved in overland runoff. Rather, it should be justified by soil conservation since retaining the soil and its nutrients are in the best interests of the farmer.

Response: The RAP is a strategy to restore water quality problems and other related use impairments. Therefore this document stresses water quality related concerns. However, it calls for a "comprehensive, interagency approach" to the nonpoint source problem. This will involve soil conservation efforts including a prominent role by local Soil and Water Conservation Districts. The Department has proposed a standard for phosphorus and nitrogen which would prevent growths of algae, weeds and slime in amounts that impair waters for their best usage.

Comment: Voluntary approaches to nonpoint source pollution work with individual landowners, but do not work well with municipalities and developers.

Many ignore guidance and it is difficult to deal with violators.

Response: It is agreed that this can be an obstacle for effective implementation. Additional text has been added to this section which declares the need for financial incentives, additional controls and adequate enforcement.

Comment: Less emphasis and trust should be placed in computer modeling. The expansive nature of the nonpoint source computer model (page 10-13) makes it impossible to test the validity of the model and, therefore, its predictions.

Response: This is a valid point. The use of modeling has been de-emphasized, however, it is still recognized as a tool for assisting in the identification of the cause and effects of nonpoint source pollution.

Comment: The following comments were received regarding Table 10-1 (fish species in the Area of Concern):

a) The table is incomplete. Suggested additions include sea lampreys and walleye juveniles, as well as slight modifications to seasonal preferences.

b) The table gives the impression that few species inhabit the AOC on other than a seasonal basis.

Response: The table has been revised to contain more species including year round inhabitants.

Comment: The following verbal comments related to habitat were received at the public availability session:

a) There must not be unlimited access to upstream areas by fish ladders since undesirable species such as sea lampreys could get through.

b) Chinook Salmon should not be allowed upstream to prevent the "people problems" seen during salmon runs on other streams (Salmon River).

c) Fish populations in the Oswego River above the AOC are not what they should be possibly due to the hydroelectric plants.

Response: a) NYSDEC and the RAP do not advocate unrestricted passage due to concerns for the upstream fisheries resource. The RAP recommends exploring the feasibility of allowing restricted fish passage at the Oswego

Varick street dam.

b) NYSDEC is working to ensure the upstream movement of pacific salmon (Coho and Chinook), Brown and Rainbow (Steelhead) Trout at all hydroelectric projects on the Oswego River. In the future, passage of Atlantic Salmon and Lake Sturgeon may also be required. NYSDEC is also attempting to phase out snagging on Lake Ontario tributaries.

c) Entrainment and turbine mortality is an issue being raised by NYSDEC during relicensing proceedings for the Oswego River hydroelectric facilities. Additional text has been added to this section in response to this comment.

Comment: The following comments were received regarding the recommendation to investigate the feasibility of creating an artificial wetland within the AOC using maintenance dredge spoils from the U.S. Army Corps of Engineers navigational channel:

a) The Oswego County Planning Board commented concerning recent meetings between U.S. Army Corps of Engineers, NYSDEC, City of Oswego, the Oswego Port Authority, and Oswego County Agencies concerning the artificial wetland project. They claim there does not seem to be local or regional NYSDEC staff support and suggest deleting the project from the RAP.

b) The Department of State pointed out it is not at all clear what the impact on the environment would be from such a project.

c) NYSDEC regional fisheries personnel were concerned that such a project could potentially enhance bioavailability of harbor pollutants and a wetland would eliminate a critical littoral zone near the mouth of the Oswego, which is currently of great importance as a fish spawning and nursery area. In addition, it may preclude some elements of local long-range planning for public use of the area.

d) NYSDEC regional wildlife personnel were concerned that the project is of questionable value to wildlife and has been deemed unfeasible with the funds available.

Response: There is not sufficient support for the artificial wetland recommendation, therefore, it has been removed from the RAP.

Comment: Most fish in the Area of Concern are Lake Ontario residents. There are many variables which effect transitory species populations and contaminant levels since they do not stay in the Area of Concern. Therefore benthic

macroinvertebrates may be a more accurate indicator of local contaminant bioavailability than fish.

Response: Agreed. Benthic macroinvertebrates are also easier to sample and have documented responses to a polluted environment. Therefore, the additional fish monitoring recommendation has been changed to benthic macroinvertebrate monitoring.

Comment: The habitat improvement section should include discussion and possible recommendations concerning the growing artificial fishery in Lake Ontario and its impacts on healthy native fish populations in the AOC.

Response: This is beyond the scope of the RAP. Lakewide conditions that may impact areas around the lake are more properly addressed in a lakewide management plan. A lakewide management plan will be developed for Lake Ontario and it will include a discussion of degraded habitat. In addition, the NYSDEC Division of Fish & Wildlife has a species management plan entitled: "Strategic Plan for Fisheries Management in Lake Ontario 1984 to 2000". This plan is currently being updated and a revised draft (1989-2005) is available.

Chapter 11 - Commitments

No Comments

Chapter 12 - Implementation

No Comments

Chapter 13 - Public Participation

No Comments