

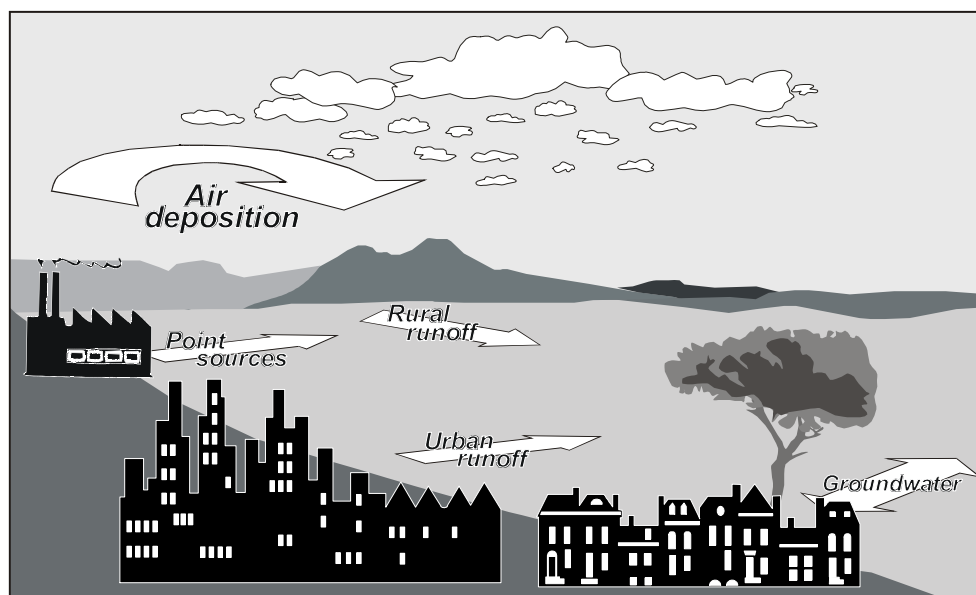
US EPA ARCHIVE DOCUMENT

CHAPTER I

INTRODUCTION AND BACKGROUND

Although water quality has improved in past years, ongoing research indicates that many of the Nation's waterbodies, including the Great Waters, are impacted by degraded water quality and associated adverse health and ecological effects. These impacts are due, in part, to inputs of pollutants from a variety of sources and through multiple pathways, including atmospheric deposition (Figure I-1). The role of air pollution as an important contributor to water pollution has long been recognized and, in recent years, has been the subject of growing scientific study and concern to regulatory agencies. Section 112 of the CAA provides the statutory basis for hazardous air pollutant (HAP) programs directed by EPA. In response to mounting evidence that air pollution contributes to water pollution, Congress included section 112(m), *Atmospheric Deposition to Great Lakes and Coastal Waters*, in the 1990 Amendments to the CAA to establish research, reporting, and potential regulatory requirements related to atmospheric deposition of HAPs to the "Great Waters."

Figure I-1
Pollutant Transport Pathways to Waterbodies



This report fulfills the requirements in section 112(m)(5), which direct EPA, in cooperation with NOAA, to periodically submit a Report to Congress including information on pollutant sources and emissions, loadings, effects, and exceedances of guidelines in the Great Waters. The biennial report is required under section 112(m) of the CAA to cover the following:

1. The contribution of atmospheric deposition to pollution loadings in the Great Waters;
2. The environmental and public health effects of any pollution attributable to atmospheric deposition to these waterbodies;
3. The sources of any pollution attributable to atmospheric deposition to these waterbodies;

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4. Whether pollution loadings in these waterbodies cause or contribute to exceedances of drinking water or water quality standards or, with respect to the Great Lakes, exceedances of the specific objectives of the Great Lakes Water Quality Agreement; and,
5. Descriptions of any revisions of the requirements, standards, and limitations of relevant CAA and Federal laws to ensure protection of human health and the environment.

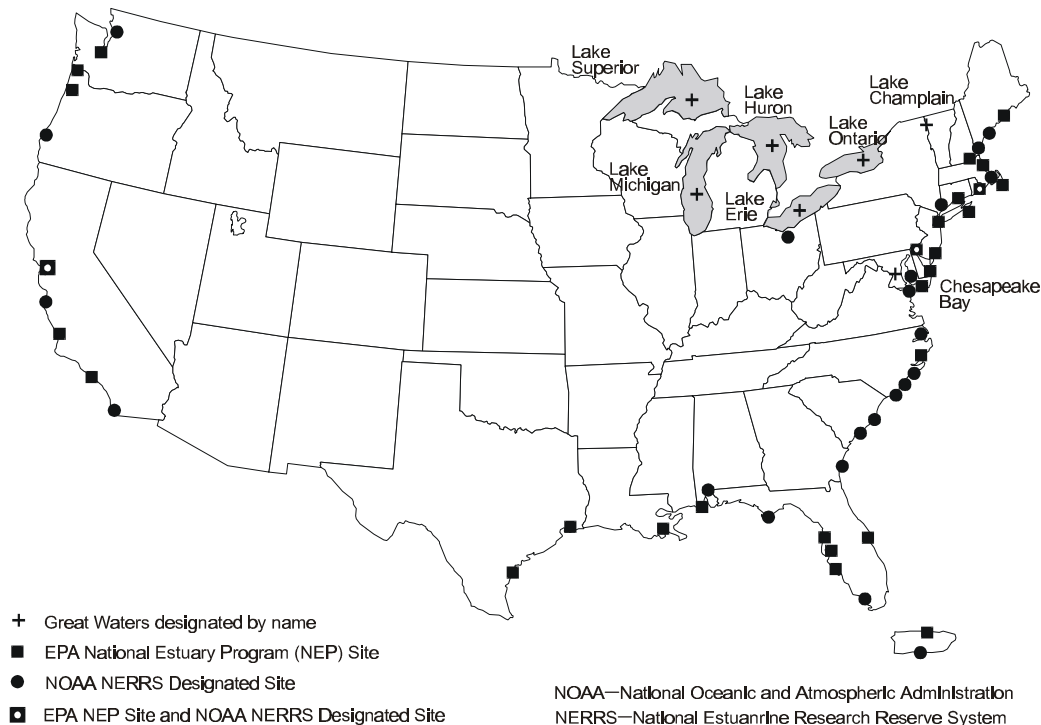
The *First* and *Second Great Waters Reports to Congress* on atmospheric deposition to the Great Waters were published in May 1994 (U.S. EPA 1994) and June 1997 (U.S. EPA 1997b). The first two reports presented the programmatic background and covered the scientific issues that are addressed by the Great Waters program. The *Third Great Waters Report to Congress* provides an update to the information presented in previous reports and specifically highlights progress made since the *Second Report to Congress*, including changes in pollutant emissions, deposition, and effects, as well as recent advancements in the scientific understanding of relevant issues. In addition, the report discusses recent activities and accomplishments of the many different initiatives that help protect the Great Waters from pollutants deposited from the atmosphere.

I.A OVERVIEW OF THE GREAT WATERS PROGRAM

DEFINITION OF GREAT WATERS

The waterbodies collectively referred to as the “Great Waters” in this report are the Great Lakes, Lake Champlain, Chesapeake Bay, and specific coastal waters defined in the statute as coastal waters designated through the National Estuary Program (NEP) and the National Estuarine Research Reserve System (NERRS). Figure I-2 displays the locations of these waterbodies. Examples of some of the coastal waters designated as Great Waters include Tampa Bay, Santa Monica Bay, San Francisco Bay, Puget Sound, Galveston Bay, Casco Bay, the New York Bight, and Albemarle-Pamlico Sounds.

Figure I-2
Locations of the Great Waters



PROGRAM PARTICIPANTS AND ORGANIZATIONS

The EPA’s Great Waters program was established to implement the provisions of section 112(m) of the CAA. In partnership with NOAA, this program is charged with examining the sources and impacts of air pollutant deposition to the Great Waters and recommending potential solutions in Reports to Congress. In addition to these two agencies, other international, national, regional, and local organizations are engaged in activities that seek to reduce sources and quantities of pollution to the Great Waters and also contribute to the body of science relevant to the Great Waters program. This Report to Congress, like the first two reports, describes the most recent activities of these programs, both within and outside of EPA.

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Increasingly, EPA is utilizing cross-program teams and partnerships with other agencies and organizations to study and solve complex, “multimedia” environmental issues (i.e., issues that cut across air, water, land, and biological resources). For example, the Clean Water Action Plan, issued by EPA in 1998, which includes many activities relevant to the Great Waters program, is a coordinated Federal effort involving EPA and the Departments of Agriculture, Defense, Interior, and Commerce, all of which have authorities affecting the quality of the Nation’s water resources. This Report to Congress describes several such collaborative efforts that support targeted data gathering and decision making for multiple objectives, including those of the Great Waters program.

Because deposition of atmospheric pollutants to the Great Waters is a multimedia problem, several media-based and geographically-based programs are part of EPA’s integrated efforts to address pollution in the Great Waters, including the following.

- C **Office of Air and Radiation (OAR)** administers the Great Waters program along with other programs under the CAA that affect the Great Waters. For example, air regulations and programs developed by OAR reduce emissions of air toxics and nitrogen from many mobile and stationary sources of Great Waters pollutants of concern. Offices within OAR responsible for air pollution control programs include (1) the **Office of Air Quality Planning and Standards (OAQPS)**, which has overall responsibility for the Great Waters, air toxics, and air quality management programs; (2) the **Office of Atmospheric Programs (OAP)**, which manages the acid rain and global climate change programs; and, (3) the **Office of Transportation and Air Quality (OTAQ; formerly the Office of Mobile Sources or OMS)**, which is responsible for regulating on- and off-road vehicles and fuels.
- C **Office of Research and Development (ORD)** undertakes and coordinates research and monitoring programs that provide information for assessment of human health and environmental risks associated with exposures to pollutants of concern in the Great Waters as well as for risk management decisions. The ORD is the lead EPA office in developing a mercury research strategy and is working closely with EPA’s Office of Prevention, Pesticides and Toxic Substances (OPPTS) in preparing a dioxin reassessment.
- C **Office of Water (OW)** leads numerous activities that are integral to the Great Waters program. For example, OW provides data on trends in fish and sediment contamination in the Great Waters and is working to factor atmospheric deposition into waterbody-specific water pollution standards. In addition, OW manages the Non-Point Source Control Program under section 319 of the Clean Water Act. Within OW, the **Office of Wetlands, Oceans and Watersheds** is responsible for, among other things, coastal protection (e.g., the National Estuary Program) and the TMDL determination. The **Office of Science and Technology** provides critical tools to help understand and reduce water pollution, and, in cooperation with NOAA and other Federal and State and tribal agencies, reviews and monitors fish and shellfish contamination across the U.S.
- C **National Estuary Program (NEP)**, which is managed by OW, was established by EPA in 1987 to implement section 320 of the Clean Water Act. The purpose of the NEP is to restore and enhance nationally significant estuaries that are threatened or impaired by pollution, development, or overuse. Management decisions are made by conferences composed of EPA and local stakeholder groups. The NEP currently includes 28 estuaries, several of which have identified air deposition as a concern and have received Great Waters program funding to address the problem.

- C **Chesapeake Bay Program Office (CBPO)** represents EPA as a partner in the Chesapeake Bay Program. This program was created in 1983 by an agreement between EPA, the State of Maryland, the Commonwealths of Virginia and Pennsylvania, and the District of Columbia. The Chesapeake Bay Program uses a cooperative, watershed approach to research and resolve public health and environmental issues affecting the bay.
- C **Great Lakes National Program Office (GLNPO)** is responsible for EPA activities specific to the Great Lakes, including responsibilities defined by the Great Lakes Water Quality Agreement with Canada, Great Lakes Program requirements under section 118 of the Clean Water Act, and the Great Lakes Critical Programs Act of 1990. The GLNPO also supports EPA's OAQPS and Region V activities specific to the Great Lakes for the air toxics program under section 112 of the CAA. In addition, GLNPO conducts and funds monitoring research in support of the Great Waters program.
- C **Gulf of Mexico Program Office (GMPO)** is a nonregulatory organization that sets environmental goals and implements projects to protect the environmental resources of the Gulf of Mexico. Partners in the GMPO include EPA, other governmental agencies (Federal, State, and local), private and non-profit sector stakeholders, and interested citizens. The Gulf of Mexico shoreline includes a substantial percentage of the Nation's estuaries and other significant coastal ecosystems.
- C **EPA Regional Offices (Regions I-X)** are responsible for working directly with States, tribes, and regional organizations to implement national environmental programs, including the Great Waters program. For instance, Region I and Region II work with the States in the Northeast to address pollution in the Lake Champlain Basin, as well as the National Estuary Programs from Maine to New Jersey.

In addition to the EPA Offices listed above, many others contribute to the integrated efforts as well. For example, the Office of Solid Waste and Emergency Response (OSWER) provides Agencywide policy, guidance, and direction for the EPA's solid waste program and emergency response program. The Office of Enforcement and Compliance Assurance is responsible for leading the Agency in ensuring compliance with the rules that limit pollution. The OPPTS leads the Agency in pollution prevention activities, among many other activities. Chapter III discusses many of the programs led by these and other offices.

The NOAA administers the 23 National Estuarine Research Reserves System (NERRS) sites – all are coastal Great Waters – which were created in 1972 by the Coastal Zone Management Act. The NERRS sites, which were selected to be representative of various regions and estuary types, are managed cooperatively with the States to provide opportunities for long-term research, education, and stewardship. Research conducted at NERRS sites includes studies of the impacts of toxic pollutants deposited from the atmosphere.

The NOAA also conducts or funds several other monitoring and research programs that contribute to the Great Waters program. For example, the Atmospheric Integrated Research Monitoring Program (AIRMoN) conducts daily deposition monitoring, the National Status and Trends Program gathers and maintains data on the environmental quality of U.S. estuaries and coastal waters, and the NERRS System-wide Monitoring Program currently gathers water quality and weather data. In addition, NOAA plays a critical role in working with EPA to jointly assess the transport and deposition of nitrogen and other pollutants on surface waters.

Other involved participants include State, tribal, and local agencies, non-profit organizations, private sector groups, industry and industry groups, universities, other countries, and international research organizations. Relevant research and other activities of these partners are described throughout the report. The combined activities of all of these partners are responsible for progress to date in identifying, assessing, and resolving Great Waters problems, including problems associated with pollutants deposited from air pathways.

GOVERNMENT GOALS SUPPORTED BY THE GREAT WATERS PROGRAM AND ITS PARTNERS

The EPA's Strategic Plan (U.S. EPA 1997c) defines ten strategic goals used by the Agency for planning and resource allocation, as required by the Government Performance and Results Act (GPRA). The efforts by EPA, NOAA, and partners support the following GPRA goals:

1. **Clean Air** -- "The air in every American community will be safe and healthy to breathe . . . Reducing air pollution will also protect the environment, resulting in many benefits, such as restoring life in damaged ecosystems and reducing health risks to those whose subsistence depends directly on those ecosystems."
2. **Clean and Safe Water** -- "All Americans will have drinking water that is clean and safe to drink. Effective protection of America's rivers, lakes, wetlands, aquifers, and coastal and ocean waters will sustain fish, plants, and wildlife, as well as recreational, subsistence, and economic activities . . ."
3. **Preventing Pollution and Reducing Risk in Communities, Homes, Workplaces and Ecosystems** -- "EPA will safeguard ecosystems and promote the health of natural communities that are integral to the quality of life in this Nation . . ."
4. **Reduction of Global and Cross-Border Environmental Risks** -- "The U.S. will lead other nations in successful, multilateral efforts to reduce significant risks to human health and ecosystems . . ."
5. **Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems** -- "EPA will develop and apply the best available science for addressing current and future environmental hazards, as well as new approaches toward improving environmental protection."

These efforts support these goals either directly or by contributing information on atmospheric deposition helpful to EPA's place-based (i.e., geographically-based programs, such as GLNPO) or media-oriented programs (e.g., programs in OW that focus on water resources). Specifically, the Great Waters program and its partners help the Agency achieve atmospheric deposition objectives outlined in the clean air and clean and safe water goals and the atmospheric transport and deposition component related to international pollution transport goal. Furthermore, the aspects of the work devoted to investigation and assessment of atmospheric deposition support EPA's efforts under the sound science goal to provide the best available science on which to base decisions on how best to reduce the presence and effects of this pollution. As shown in later sections of the report, progress toward each of these goals involves and emphasizes multimedia and multiprogram collaboration.

I.B POLLUTANTS OF CONCERN

This report focuses on the 15 pollutants of concern addressed in the *First* and *Second Great Waters Reports to Congress*. The general types of emission sources and uses (and use restrictions) of these pollutants are summarized in Table I-1. In general, sources of these pollutants can include U.S. short-range and long-range transport from stack emissions, natural emissions, re-emitted emissions from natural and human-made sources, long-range transport from foreign countries, and cycling within the global pool of each pollutant.

As in the two previous reports, these pollutants are organized into the following pollutant groups (with one change):

C **Mercury and Mercury Compounds**

C **Other Metals**

- Cadmium and cadmium compounds
- Lead and lead compounds

C **Combustion Emissions**

- Polycyclic organic matter (POM), including polycyclic aromatic hydrocarbons (PAHs)
- Dioxins (tetrachlorodibenzo-p-dioxin, 2,3,7,8-TCDD) and furans (tetrachlorodibenzofuran, 2,3,7,8-TCDF)
- Hexachlorobenzene (HCB)¹

C **Nitrogen Compounds** (including NO_x, ammonia and ammonium, and organic nitrogen)

C **Banned and Restricted Use Substances**

- Polychlorinated biphenyls (PCBs)
- Pesticides
 - Chlordane
 - DDT/DDE
 - Dieldrin
 - Hexachlorobenzene (HCB)¹
 - Hexachlorocyclohexane ("HCH)²
 - Lindane (γ-hexachlorocyclohexane, or γ-HCH)²
 - Toxaphene

This last revised grouping is based on the fact that the use and manufacture of these pollutants have either been banned or severely restricted under other Federal statutes, such as the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA).

¹ HCB is a product of incomplete combustion as well as a pesticide. In Chapter II of this report, HCB is discussed under the pesticides pollutant group.

² There are different isomers of HCH of concern that can transform into other HCH isomers that have different persistence and toxicity characteristics.

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With these pollutants, in general, historical contamination (e.g., in sediments and landfills), and not current national releases from U.S. industrial or agricultural activities, appears to be the problem. For the most part, the sources of these pollutants to the Great Waters today include resuspension of contaminated sediments, releases from contaminated soils, atmospheric deposition from long-range transport of pollutants from foreign countries where uses are still permitted, and accidental releases from stockpiles or intentional dumping. The revised grouping helps to organize research into these pollutants of concern and management of the reduction of the risks they pose to the Great Waters (e.g., work under international frameworks to reduce global releases, activities to remediate contaminated sediments).

Many programs and activities address these pollutants of concern either directly or indirectly and through statutory requirements or voluntary initiatives. The above pollutants are of concern to multiple programs because they share the problematic characteristics of toxicity, persistence, and/or potential for long-range transport in the environment (e.g., via the atmosphere). Because of these properties, many of these contaminants are ubiquitous in the environment and may accumulate to potentially harmful concentrations in water, sediments, soil, or the food web. This presents difficult challenges and places a premium on multimedia, interdisciplinary approaches for solving problems associated with these pollutants.

Table I-2 provides examples of how the Great Waters pollutants of concern are being addressed in the U.S. by closely related multimedia programs and other activities authorized by the CAA. All of the programs and activities identified in this table, along with several others, are discussed later in the report. Collectively, these programs and activities demonstrate EPA's holistic perspective and steps toward approaching the goals of clean air, clean water, and healthy ecosystems in an integrated manner.

Building strong partnerships with other governmental agencies and stakeholders is a guiding principle of EPA's Strategic Plan and one of five key attributes of EPA's reinvention plan (U.S. EPA 1997c). This report describes several ways in which EPA's progress toward the Great Waters program goals can be attributed to the collective efforts of many partners at the local, tribal, State, Federal, and international levels. Table I-3 identifies some of the programs at different levels that address Great Waters pollutants of concern. Each of these programs and activities is described later in this report.

Table I-1
Uses/Sources and U.S. Regulatory Status of Great Waters Pollutants of Concern

Pollutant	Examples of Uses/Sources
Mercury and Compounds	Naturally occurring element often used in thermometers, electrical equipment (such as batteries and switching equipment), industrial control instruments, and industrial processes (e.g., chlor-alkali plants). Released during combustion of fossil fuels (e.g., coal, oil); incineration of municipal, medical, and hazardous waste; and from numerous manufacturing and natural processes (e.g., volcanic activity). Banned as a paint additive in U.S. in both interior (1990) and exterior (1991) paint. Being phased out of batteries. Removed from catalysts, turf products, and explosives.
Cadmium and Compounds	Naturally occurring element used in metals production processes, batteries, and solder. Often released during combustion of fossil fuels and waste oil, and during mining and smelting operations.
Lead and Compounds	Naturally occurring element historically used in gasoline and paint additives, and still used in storage batteries, solder, and ammunition. Released from many combustion and manufacturing processes and from motor vehicles. Use in paint additives restricted in U.S. in 1971. U.S. restrictions on use in gasoline additives began in 1973 and have continued through the present, with a major use reduction in the mid-1980s.
POM (includes PAHs)	Naturally occurring substances that are by-products of the incomplete combustion of fossil fuels and plant and animal biomass (e.g., forest fires). Also, by-products from steel and coke production and waste incineration.
Dioxins and Furans	By-product of combustion of organic material containing chlorine, chlorine bleaching in pulp and paper manufacturing, and diesel-fueled vehicles. Also a contaminant in some pesticides.
Nitrogen Compounds	Naturally occurring substances from a variety of processes (e.g., microbial activities, lightning, biomass combustion) and by-products of power generation, industrial, and motor vehicle fossil fuel combustion processes (NO _x). Also, compounds used in fertilizers and released from agricultural animal manures (NH ₃).
PCBs	Industrial chemicals used widely in the U.S. from 1929 until 1978 for many purposes, such as coolants and lubricants and in electrical equipment (e.g., transformers and capacitors). In the U.S., manufacture stopped in 1977 and uses were significantly restricted in 1979. Still used for some purposes because of stability and heat resistance, and still present in certain electrical equipment used throughout the U.S.
Chlordane	Insecticide used widely in the 1970s and 1980s. All U.S. uses except termite control canceled in 1978; use for termite control voluntarily suspended in 1988. Use of existing stocks permitted.
DDT/DDE	Insecticide used widely from introduction in 1946 until significantly restricted in U.S. in 1972. Still used in other countries. Used in U.S. for agriculture and public health purposes only with special permits.
Dieldrin	Insecticide used widely after introduction in late 1940s. Used in U.S. for termite control from 1972 until registration voluntarily suspended in 1987.
Hexachlorobenzene	Fungicide used as seed protectant until 1985. By-product of chlorinated compound and pesticide manufacturing. Also a by-product of combustion of chlorine-containing materials. Present as a contaminant in some pesticides.
Hexachlorocyclohexane	Component of technical-HCH, an insecticide for which use is restricted in U.S., but which is used widely in other countries.
Lindane	An insecticide used on food crops and forests, and to control lice and scabies in livestock and humans. Currently used primarily in China, India, and Mexico. U.S. production stopped in 1977. Use was restricted in 1983; many uses are still registered, but are expected to be voluntarily discontinued in the future.
Toxaphene	Insecticide used widely on cotton in the southern U.S. until the late 1970s. Most U.S. uses banned in 1982; remaining uses canceled in 1987.

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Table I-2
EPA Multimedia and Cross-program Management of the Great Waters Pollutants of Concern

Great Waters Pollutant of Concern	Selected Multimedia and Air Programs				
	Multimedia Activities			Air Program Activities	
	PBT Initiative ^a	Clean Water Action Plan ^b	Contaminated Sediment Management Strategy ^c	CAA Section 112 Activities ^d	Other Major CAA Programs ^e
Mercury and Compounds	U	U	U	C Standards for Specific Pollutants C MACT Program C Urban Area Source Program C Utility Study C Mercury Study C NIEHS Fish Mercury Study	C Solid Waste Combustion
Cadmium and Compounds		U	U	C MACT Program C Urban Area Source Program C Utility Study	C Solid Waste Combustion
Lead and Compounds	U	U	U	C Standards for Specific Pollutants C MACT Program C Urban Area Source Program C Utility Study C Prevention of Accidental Releases	C Criteria Pollutant Program C Solid Waste Combustion C Fuels Program
POM (includes PAHs)	U	U	U	C Standards for Specific Pollutants C MACT Program C Urban Area Source Program C Utility Study	
Dioxins and Furans	U	U	U	C Standards for Specific Pollutants C MACT Program C Urban Area Source Program C Utility Study	C Solid Waste Combustion
Nitrogen Compounds		U	U	C Prevention of Accidental Releases	C Criteria Pollutant Program (NO _x , O ₃ , particulate matter) C Mobile Source Program C Acid Rain Program (NO _x) C Solid Waste Combustion
PCBs	U	U	U	C MACT Program C Urban Area Source Program	
Chlordane	U	U	U	C MACT Program	
DDT/DDE	U	U	U		
Dieldrin	U	U	U		
Hexachlorobenzene	U	U	U	C Standards for Specific Pollutants C MACT Program C Urban Area Source Program C Utility Study	

Table I-2 (continued)
EPA Multimedia and Cross-program Management of the Great Waters Pollutants of Concern

Great Waters Pollutant of Concern	Selected Multimedia and Air Programs				
	Multimedia Activities			Air Program Activities	
	PBT Initiative ^a	Clean Water Action Plan ^b	Contaminated Sediment Management Strategy ^c	CAA Section 112 Activities ^d	Other Major CAA Programs ^e
Hexachlorocyclohexane		U	U		
Lindane		U	U	§ MACT Program	
Toxaphene	U	U	U	§ MACT Program	

- a As discussed in Chapter III of this report, the Persistent Bioaccumulative Toxic (PBT) Chemicals Initiative is a cross-office EPA effort to coordinate actions associated with these high-priority pollutants.
- b Because the Clean Water Action Plan does not address a specific set of pollutants, any of the Great Waters pollutants of concern may be addressed (see Chapter III of this report for more detail).
- c Because the Contaminated Sediment Management Strategy does not address a specific set of pollutants, any of the Great Waters pollutants of concern may be addressed (see Chapter III of this report for more detail).
- d § Standard for specific pollutants = §112(c)(6); Sources accounting for 90 percent of the emissions of these seven pollutants (i.e., alkylated lead compounds, POM, HCB, mercury, PCBs, dioxins and furans) are subject to regulation.
 § MACT Program = §112(d)
 § Urban Area Source Program = §112(k)
 § Utility Study = §112(n)(1)(A); Emissions of certain pollutants from electric utility steam generating units are evaluated for potential regulation.
 § Mercury Study = §112(n)(1)(B); Emissions of mercury from electric utilities, municipal waste combustors, and other sources studied for potential regulation.
 § NIEHS Fish Mercury Study = §112(n)(1)(C); Report by the National Institute of Environmental Health Sciences on the "threshold" level for human health effects from mercury.
 § Prevention of Accidental Releases = §112(r)
- e § Criteria Pollutant Program = §108
 § Mobile Source Program = Subchapter II
 § Solid Waste Combustion = §129
 § Acid Rain Program = Subchapter IV-A

Table I-3
Great Waters Pollutants of Concern Addressed by Selected Waterbody, Regional, and International Activities^a

Pollutant	Regional and Waterbody-specific Programs				International Activities				
	Great Lakes Programs ^b	Lake Champlain Basin Program ^c	Chesapeake Bay Program ^d	Estuarine Initiatives ^e	Binational Strategy	International Joint Commission	LRTAP	NAFTA	UNEP
Mercury and Compounds	U	U	U	U	U	U	U	U	
Cadmium and Compounds	U	U	U	U			U		
Lead and Compounds	U	U	U	U	U	U	U		
POM (includes PAHs)	U ^f	U	U	U	U	U ^f	U ^g		U ^g
Dioxins and Furans	U	U		U	U	U	U ^g	U	U ^g
Nitrogen Compounds		U	U	U			U		
PCBs	U	U	U	U	U	U	U ^g		U ^g
Chlordane	U	U	U	U	U		U ^g	U	U ^g
DDT/DDE	U	U		U	U	U	U ^g		U ^g
Dieldrin	U	U	U	U	U	U	U ^g		U ^g
Hexachlorobenzene	U	U		U	U	U	U ^g		U ^g
Hexachlorocyclohexane	U	U		U			U ^g		U ^g
Lindane	U	U		U			U ^g	U	U ^g
Toxaphene	U	U	U	U	U	U	U ^g		U ^g

a See Chapter III of this report for information on the status of all of these and other programs addressing the Great Waters pollutants of concern.

b Integrated Atmospheric Deposition Network (IADN); Great Lakes Emissions Inventories; Lake Michigan Mass Balance Study; Great Lakes Lakewide Management Plans (LaMPs) and regional action plans (RAPs)

c Includes Group 1 through Group 4 Toxic Substances of Concern for the Lake Champlain Basin Program (LCBP). Ammonia, a Group 3 Toxic Substance of Concern, is included in the table as a nitrogen compound.

d Includes Toxics of Concern and Chemicals of Potential Concern for the Chesapeake Bay Program.

e Any of the Great Waters pollutants of concern could be a concern at a specific NEP or NERRS site.

f Benzo[a]pyrene

g Persistent organic pollutants (POPs) are included as pollutants of concern under the United Nations Economic Commission for Europe Long-Range Transboundary Air Pollution (LRTAP) initiative, as well as the United Nations Environment Program (UNEP) POPs initiative. This constituent is a POP.

I.C GOALS OF THE THIRD REPORT TO CONGRESS

The goals of the *Third Report to Congress* are to discuss the current state of knowledge regarding atmospheric deposition of pollutants to the Great Waters based on the information available and program activities since June 1996 (the end of the timeframe for information presented in the *Second Report to Congress*) and to describe any necessary revisions to requirements, standards, and limitations pursuant to the CAA and other Federal laws. The report is organized into four chapters that summarize the following:

- C Observed and anticipated **spatial and temporal changes** in airborne emissions, loadings, and effects of pollutants of concern (Chapter II);
- C **Programs and activities** that have been undertaken to address pollutants of concern since the *Second Report to Congress* (Chapter III);
- C **Advancements in scientific research methods, environmental models, and data sources** that improve our understanding of and abilities to address the public health and environmental risks posed by the pollutants of concern in the Great Waters (Chapter IV); and,
- C **Conclusions and recommendations** to help further national, regional, and waterbody-specific activities related to the Great Waters program (Chapter V).

In addition, this report identifies important remaining uncertainties, such as those that limit EPA's ability to assess the links between pollutant sources, loadings, and effects. The research findings, conclusions, and recommendations presented in this report will be used to further understand and promote reductions of overall contaminant loadings to the Great Waters.

The report focuses on the scientific and programmatic progress that has occurred since the previous report and presents information according to the major issues of concern (e.g., trends in loadings and effects, program progress, scientific tools) from a national perspective. Regional or waterbody-specific examples are presented in the context of a national-level picture of progress toward the goals of the Great Waters program. For more detail on specific regions or waterbodies, readers are referred to the many other publications or Internet sites that specifically address those areas (see Appendix A). In addition, the report includes an index of waterbodies to enable readers to identify all information related to a specific waterbody that is presented in this report.

The information in this report was collected from several sources. The references cited are generally from published peer-reviewed journals, government reports, and conference proceedings. The report uses a variety of sources that provide relevant new information on Great Waters issues and generally addresses information released in the past 2 years. In some cases, large summary reports were used and, therefore, primary sources of information are not cited. In general, literature published from the summer of 1996 to the fall of 1998 is included.

In addition to literature searches for updated information, EPA obtained current scientific and programmatic information about atmospheric deposition to the Great Waters through personal interviews with and direct input from various researchers and program participants. Many of the waterbody-specific activities highlighted in this report, for example, were provided by the EPA offices that coordinate investigation, restoration, and maintenance efforts of the waterbody (e.g., Great Lakes National Program Office, EPA Region V Air and Radiation Division, Chesapeake Bay Program Office, Gulf of Mexico Program Office).