UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

January 18, 2001

Dear Stakeholder:

Addressing water quality impacts from air deposition of toxics and nitrogen is an increasingly important environmental challenge. These pollutants can adversely impact both human health and the environment. Atmospheric deposition is a major contributor to the overall loading of mercury to U.S. waters. As many of you know, mercury is the most frequently listed reason for fish consumption advisories. As of December 1999, 41 States had issued fish advisories for mercury. Additionally, atmospheric deposition of nitrogen contributes to eutrophication in a significant number of our coastal watersheds. Roughly 10–40% of the nitrogen that reaches East and Gulf Coast estuaries is transported and deposited via the atmosphere.

To respond to these air-water interface issues the Environmental Protection Agency's (EPA) Office of Air and Radiation (OAR) and Office of Water (OW) developed the enclosed *Air-Water Interface Work Plan*. The purpose of this work plan is to outline a schedule of specific activities that we are committing to undertake using the authorities of both the Clean Air Act and the Clean Water Act. This collaborative effort will help to coordinate our Offices' programs and to track EPA's progress in reducing atmospheric deposition of toxics and nitrogen to all waterbodies in the United States. EPA will review and update the work plan every two years.

In the *Deposition of Air Pollutants to the Great Waters: Third Report to Congress*, EPA committed to developing a work plan to address problems from air deposition. To meet this commitment, EPA drafted and sent out the work plan for informal comment and stakeholder input in the summer of 2000. We received 146 comments from over 18 stakeholders. Commenters included seven State agencies, non-governmental organizations, industry representatives, other Federal agencies and the public. These comments were reviewed by both of our Offices and led to many changes for the final version of this initial work plan.

In general, commenters were supportive of the work plan and its purpose of promoting our increased interoffice collaboration. Many of the comments helped EPA clarify its strategy and activities and were incorporated into the work plan. The following is a summary of the comments received and some examples of how EPA is addressing them.

The most frequent comment was that the emissions inventories, modeling tools and monitoring networks need to be improved or expanded. EPA agrees with these comments and has identified activities in the work plan that will help to improve and expand these tools and resources.

Other commenters stressed the importance of supporting the efforts of State, Tribal and local agencies in their work in addressing air deposition issues. EPA agrees and has identified tools and outreach activities to promote the transfer of knowledge on air deposition issues. Examples include the development of a handbook

to help watershed managers understand air deposition issues, and the greater use of outreach mechanisms such as scientific workshops, regional meetings, and the use of the Internet. Activities also include efforts to help States address the challenges of developing Total Maximum Daily Loads (TMDLs) involving loadings from air deposition.

Finally, a few commenters expressed their concern that the present regulatory activities would not adequately reduce air toxics and nitrogen deposition to meet water quality needs. We believe that the Office of Air and Radiation and Office of Water have put forth a set of actions that will significantly reduce air deposition over the next several years. Many of our regulatory programs (e.g., Maximum Available Control Technology standards, NO_x reductions under the Acid Rain Program, NO_x SIP Call and mobile source controls) have not been fully implemented and the expected air emission reductions have not yet occurred. As these programs are implemented, EPA will continually evaluate the need to apply any further regulatory actions to address air deposition issues.

Most importantly, as we have discussed on a number of occasions, we encourage active engagement with stakeholders on this and future work plans. We anticipate that we will be meeting with many of you on an ongoing basis as we implement this plan and as we revise the plan in the future. We would like to thank all those who provided input into this work plan and we look forward to working with you and others as we implement it.

Questions on this effort should be addressed to Peter Murchie, OAR (919 541-1051, murchie.peter@epa.gov) or Debora Martin, OW (202 260-2729, martin.debora@epa.gov).

Sincerely,

John S. Seitz, Director
Office of Air Quality and Planning Standards

Robert H. Wayland III, Director
Office of Wetlands, Oceans, and Watersheds

Geoffrey H. Grubbs, Director
Office of Science and Technology

Enclosure

Summary of the Air-Water Interface Work Plan

The purpose of the work plan is to outline a schedule of specific activities that EPA's Office of Air and Radiation and Office of Water are committing to undertake using the authorities of both the CAA and the CWA. This collaborative effort will help to coordinate these Offices' programs and to track EPA's progress in assessing and reducing, as needed, atmospheric deposition of toxics and nitrogen to all waterbodies in the United States. The pollutants targeted are the same as the Great Waters Program pollutants of concern including air toxics and nitrogen.

General strategy

1) Continue to reduce the national loadings of pollutants of concern through implementation of existing CAA rules and promulgation of additional regulations on emissions sources.
2) Work with States to support the development and implementation of atmospheric deposition focused TMDLs.
3) Improve and expand the monitoring network for pollutants, emissions inventories and our modeling abilities.
4) Communicate about air deposition issues with a variety of audiences.

Air Toxics

How we are currently addressing the problem:

1. *Total Maximum Daily Loads (TMDLs)*
2. *National Technology-Based Standards* - Section 112 (d) of the CAA
3. *Solid Waste Combustion Standards* - Section 129 of the CAA
4. *Residual Risk Standards* - Section 112(f) of the CAA
5. *Area Source Standards* - Section 112 (k) of the CAA
6. *Seven Specific Pollutants* - Section 112(c)(6) of the CAA
7. *Utility Determination and Actions* - December 15th determination.
8. *Mobile Source Standards* - Section 202(l), EPA expects to issue a final rule by Dec. 2000.
9. *Water Quality Criteria Standards* - Under the Clean Water Act (CWA), review and revise reference dose for mercury, new water quality human health criterion for methylmercury.
10. *Persistent Bioaccumulative Toxics Initiative (PBTI)*
11. *Toxic Air Deposition Monitoring* - MDN (NADP), NEP and, IADN
12. *Air Toxics Ambient Monitoring* - Air Toxics Monitoring Strategy, NDAMN
13. *Consolidated Emission Reporting Rule (CERR)* - The rule was proposed on May 23, 2000.
14. *Tool Development* - inventories and models (TRIMfate, Models3 and etc)

Challenges to further addressing toxics problem

EPA still does not have good source-receptor relationships. There is a need for more refined emissions inventories, more and better monitoring, and national scale and local scale modeling to better identify what is the relative contribution of sources which emit pollutants, how much of each pollutant gets deposited, and how much of what is deposited creates water quality problems.

Actions to address these challenges:

1. *National Toxics Inventory (NTI)* - guidance to and working closely with State, local and Tribal agencies on how to develop an emission inventory for HAPs.
2. *National Air Toxics Deposition Assessment Activities* - modeling and support activities, and evaluation of results (monitoring).

Summary of the Air-Water Interface Work Plan

Nitrogen Compounds

How we are currently addressing this problem:

1. *Title IV Acid Rain Program NO_X reductions*
2. *NO_X SIP Call, Section 126 Petitions, and Federal Implementation Plans*
3. *New Source Performance Standards*
4. *New Source Review and RACT*
5. *Regional Haze Rule*
6. *Mobile Source Control*
7. *Total Maximum Daily Load Program (TMDL)*
8. *Water Quality Criteria for Nutrients*
9. *Concentrated Animal Feeding Operations (CAFOs)*
10. *Measuring economic and environmental benefits pilot*
11. *Consolidated Emission Reporting Rule (CERR)*

Challenges to further addressing this environmental problem.

With the increase of anthropogenic sources of nitrogen, it is often difficult to determine, on the local level, the extent to which nitrogen deposition is a problem and where the problem is originating. A primary challenge is to understand both national deposition trends, while being able to characterize the air deposition problem at the regional, state, local and watershed levels.

Actions we plan to address the challenges:

1. *Monitoring* - National Atmospheric Deposition Network (NADP), Clean Air Status and Trends Network (CASTNet).
2. *Assessment activities* - In the context of various policy analysis activities, EPA is using models to estimate nitrogen deposition in local/regional areas and to relate nitrogen deposition information to specific watersheds. Specific assessment activities planned are: NAPAP Report to Congress and Nitrogen deposition assessment

Education, Outreach and Scientific Exchange

Current education and outreach activities:

1. *Great Waters Reports to Congress*
2. *Air-Water Initiative* - OW Initiative, coordinator position and outreach activities
3. *Nitrogen Brochure*
4. *Scientific Workshops*

Challenges to Address:

Environmental managers need training to better understand how to evaluate whether they have an air deposition problem, and if so how to better characterize the air deposition problem. They also need help determining the best way to address the problem once it has been identified.

Actions we plan to address these challenges:

1. *Training* - EPA is planning to offer regional training workshops
2. *Handbook for water resource managers*
3. *Ecological Assessment Handbook for States and Tribal Nations*
4. *Website Development*
5. *Scientific Workshops*

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Air-Water Interface Work Plan

Introduction

The purpose of this work plan is to describe a collaborative effort that the EPA's Office of Air and Radiation and the Office of Water will take to assess and reduce, as needed, atmospheric deposition of toxics and nitrogen to all waterbodies in the United States. It includes a schedule of specific activities that will be undertaken using the authorities of both the Clean Air Act and the Clean Water Act. Airborne emissions from local and distant sources can be significant contributors of toxic chemicals and nitrogen compounds to waterbodies within the United States. There are numerous government and private sector programs in progress that address atmospheric deposition in the "Great Waters" and the inland waters of the United States. These programs (over 60) are described in the *Third Report to Congress on Deposition of Air Pollutants to the Great Waters* (Report), released on June 7, 2000 (available at this Internet address: http://www.epa.gov/oar/oaqps/gr8water). Most of the information from the Report will not be repeated here. Other levels of government including other EPA offices, which are not discussed here, are also addressing atmospheric deposition. In this latest Report, EPA commits to developing a work plan to address the problems of air deposition.

In most waterbodies, air pollutants are not the only source of contaminants. Contaminants may also come from stormwater runoff from urban and rural areas, discharges from point sources, seepage from ground water, or releases from contaminated sediments. While EPA has programs and activities targeting these other sources of contaminants, this plan only addresses the threats to water quality from air deposition. Also, although EPA recognizes the importance of, and is involved in, activities related to the international transport of contaminants, this plan is restricted to domestic activities. Future revisions to the workplan may include international activities.

The pollutants targeted in this Work Plan are the same as the Great Waters Program pollutants of concern listed below along with nitrogen. The pollutants of concern include mercury, lead, cadmium, polycyclic organic matter/polynuclear aromatic hydrocarbons (POM/PAHs), nitrogen compounds, dioxins and furans, polychlorinated biphenyls (PCBs) and seven banned or restricted pesticides (chlordane, DDT/DDE, dieldrin, hexachlorobenzene, lindane, toxaphene, and hexachlorocyclohexane). Some of these pollutants are single compounds while others represent categories of several or even hundreds of individual compounds (e.g., PAHs). For the seven banned or restricted pesticides, historical contamination (e.g., in sediments and landfills), rather than current national releases from U.S. industrial or agricultural activities, appears to be the source of the problem.

The relative importance of the atmospheric loading of a particular pollutant to a waterbody depends on many factors. These include the condition of the waterbody, the properties of the pollutant being deposited, other atmospheric chemical transformations of the pollutant, and the amount of pollutant deposited from air sources relative to other sources of the same pollutant. For these reasons, a variety of actions might be needed to address impairments in a particular waterbody, some controlling air-deposited pollutants and others aimed at point or nonpoint source discharges. Determining the relative impact of air deposition and identifying

appropriate control strategies requires reliable information about the sources, types, and amounts of pollutants impacting a waterbody.

The present general strategy of this work plan is to:

1) Continue to reduce the national loadings of pollutants of concern through implementation of existing Clean Air Act (CAA) rules and promulgation of additional regulations on emissions sources (as well as through various pollution prevention measures detailed in other Agency planning documents.) National regulations to control air toxics and nitrogen compounds have had a significant impact on reducing emissions and are expected to continue to play a major role.

2) Work with States to support the development and implementation of Total Maximum Daily Loads (TMDLs) for waterbodies impaired by pollutants from atmospheric deposition. The current requirements for the TMDL program are described in section 303 of the Clean Water Act and the TMDL rule published in 1985 and amended in 1992. Although revisions to the TMDL rule were published in the Federal Register on July 13, 2000, a Congressional rider in a FY 2000 military construction/supplemental appropriations bill prohibits EPA from implementing the revised rule in FY 2000 and 2001. As described in the existing TMDL rule, TMDLs determine the amount pollutant loads must be reduced to meet State water quality standards, and allocates the loads among various sources. Through the activities described in this plan, EPA will work with the States to address the challenges inherent in developing a TMDL that includes air sources. EPA will also conduct outreach to assist States in the development of TMDLs involving air deposition, such as providing the results of pilot studies, modeling data, and other information and tools.

3) Improve and expand the monitoring network for air-deposited pollutants, the inventories for toxics and nitrogen emissions inventories and our ability to model atmospheric transport and air-water interactions of key pollutants.

4) Communicate about air deposition issues with a variety of audiences.

In implementing this plan, EPA's Offices of Air and Water will continue to coordinate efforts via ongoing communication and joint projects, and to consult with stakeholders. The success of our approach will be reviewed and revised as appropriate when this work plan is updated in two years.

This work plan is divided into three sections. The first section focuses on environmental impacts from the deposition of toxic pollutants, the second on environmental impacts from the deposition of nitrogen compounds, and the third on outreach and education activities relating to atmospheric deposition. Each section addresses the strategies outlined above, including an overview of how EPA is currently addressing the problem, what challenges remain, and how EPA will try to overcome those challenges. Each section also includes a table showing the timeline for the various activities.

I. Public health and environmental problems associated with toxic pollutants:

Toxic pollutants have been shown to have adverse human health and ecological effects. These

pollutants are known or suspected to cause cancer or other serious health effects such as birth defects or reproductive effects. There is also additional evidence that suggests some of the pollutants may be "endocrine disruptors," which means they could interfere with the normal action of hormones in humans and wildlife.

At current levels of contamination, pollutants of concern in the Great Waters pose a potential threat to public health and the environment. Humans and wildlife are exposed to these pollutants through the consumption of contaminated fish. For some of these pollutants (such as mercury) fish consumption is the dominant route of exposure for humans and wildlife. However, for other pollutants (e.g., dioxins) other sources of exposure (such as consumption of animal fats) can also be important. The degree of exposure through fish consumption depends primarily on three factors: amount of fish consumed; level of contaminant in the fish; and the body weight of the individual consuming the fish. The level of contaminant in the fish varies by species, age, size of fish, and location. People who frequently eat considerable amounts of fish from contaminated waters (such as subsistence fisher populations or people from certain cultural groups) generally have the highest exposures to many of these pollutants and may be at increased risk for adverse health effects.

The developing fetus is believed to be the most sensitive to the effects of many of these pollutants (such as mercury), therefore, women of childbearing age (who are pregnant or may become pregnant) are generally the population of greatest concern for exposure to these pollutants. Young children may also be more sensitive to the effects of these pollutants than adults because their bodies are still developing.

Mercury levels in the environment remain sufficiently high to be of concern for humans and wildlife. Mercury is the most frequently listed pollutant causing fish consumption advisories. About 68 percent of all advisories issued in the U.S. have been issued on the basis of mercury contamination. As of December 1999, 41 States have issued fish advisories for mercury. Eleven of these States have issued advisories for all water bodies in their State and the other 30 States have issued advisories for 1,931 specific water bodies.

While PCB and dioxin concentrations in the environment appear to have declined, sufficient amounts still remain for fish consumption advisories in many waterbodies. In some eastern sections of the Chesapeake Bay, trends in atmospheric deposition of lead and cadmium cannot be determined, but total inputs of both lead and cadmium have increased in recent years due to the increase in population and industrial activities. Levels of these metals in the bay sediments in some areas may be high enough to cause adverse ecological effects.

A. How we are currently addressing the problem:

As detailed below, EPA has many regulations in place and is developing others which will address the emissions of pollutants of concern from many sources. Through activities such as the TMDL pilot projects, EPA is also looking at better ways to quantify the amount of a pollutant from air deposition which enters a waterbody. In addition, EPA is developing other actions to address several specific pollutants which are toxic, persistent and bioaccumulate in the environment through initiatives such as the Persistent Bioaccumulative Toxics Initiative.

1. Total Maximum Daily Loads (TMDLs) - Under the Clean Water Act Section 303(d), States are directed to identify and list waterbodies where State water quality standards are not being met and establish TMDLs for those waterbodies. These waterbodies may include those impaired by pollutants from atmospheric deposition. The current requirements for the TMDL program are described in section 303 of the Clean Water Act and the TMDL rule published in 1985 and amended in 1992. Although revisions to the TMDL rule were published in the Federal Register on July 13, 2000, a Congressional rider in a FY 2000 military construction/supplemental appropriations bill prohibits EPA from implementing the revised rule in FY 2000 and 2001.

As described in the existing TMDL rule, a TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and allocates pollutant loadings among the various sources. EPA recognizes that air deposition can be a significant source of loadings in many waterbodies; yet there are a number of technical and policy challenges in developing a TMDL with an air component. These include identifying which air sources contribute to the impairment in a particular waterbody, and developing management approaches to address those sources. A particular challenge is how a State can address deposition from sources outside its boundaries.

To help States deal with these challenges, EPA's air and water programs are working together on two pilot projects, in cooperation with the States of Wisconsin and Florida, to examine approaches that could be used in developing TMDLs for waters impaired by mercury from atmospheric sources. The waterbodies on which the pilots are being conducted are Devil's Lake in Wisconsin, and a portion of the Florida Everglades. One outcome of this effort will be a lessons learned document, which will discuss technical issues involved in developing TMDLs for air-deposited pollutants under the framework of the existing TMDL rule. Technical issues include determining how to integrate air and water modeling results, identifying sources or types of sources contributing to air deposition in a waterbody, and approaches for taking into account technical uncertainties and data limitations. The lessons learned document will discuss how the approach used in the pilot project may be relevant at other sites; at the same time, it will examine any limitations in applying the pilot approach at other locations, and the remaining data gaps and technical issues that need to be addressed.

The lessons learned document will also explore options for addressing emissions from sources or categories of sources that are determined to be impairing a waterbody. One of the key challenges is how TMDLs can address pollutants that are transported regionally and even globally. As part of the pilots, EPA will analyze existing Federal and State programs to reduce mercury emissions to the pilot waterbodies, such as the expected effects of maximum achievable control technology (MACT) standards currently being implemented as well as other programs such as residual risk. In the Wisconsin TMDL pilot in particular, EPA will be testing a modeling approach that may be used to identify the extent of deposition from within a state as compared to deposition from outside a state. Depending on the results of the pilot, EPA plans to apply a similar modeling approach nationwide, i.e, develop estimates of in-state versus out-of-state deposition for all States (lower 48), and provide the results to the States. This modeling information, along with the analysis of the State and Federal programs, will help identify the extent to which actions at a regional or national level may be appropriate. Although focused on mercury, the pilot project may provide insights on how to address other pollutants that are transported across State boundaries.

A draft modeling report for the Florida pilot was prepared in early 2000 and underwent peer review. A revised report is being prepared and is expected to be available for broader review by early calendar year 2001. The draft modeling report on the Wisconsin pilot is expected in summer 2001 and will be peer-reviewed. The lessons learned document on both pilots is expected to be completed in winter 2001. Further details on the modeling and other aspects of the two pilot projects can be found at http://www.epa.gov/owow/tmdl/madpp.html.

2. National Technology-Based Standards - Under Section 112 (d) of the Clean Air Act as amended in 1990 (CAA), EPA is required to regulate stationary sources of 188 listed hazardous air pollutants (HAPs). All but two of the pollutants identified as Great Water pollutants of concern (nitrogen compounds and dieldrin) are listed as HAPs. On July 16, 1992, EPA published a list of 174 industry groups (known as source categories) that emit one or more of these air toxics. For listed categories of "major" sources (those that emit, or have the potential to emit, 10 tons/year or more of a HAP or 25 tons/year or more of a combination of HAPs), the CAA requires EPA to develop standards that require the application of air pollution reduction measures known as MACT standards. During the process of developing standards for "major sources", EPA also determined that for some source categories standards would be needed for both major and area sources. Area sources are defined as stationary sources which emit less than 10 tons per year of one HAP or 25 tons per year of multiple HAPs. Thus far, we have developed 46 stationary source standards, addressing 82 different types of sources.

The CAA provided a 10-year schedule in which to promulgate these MACT standards with a certain percentage of these standards being promulgated within 2, 4, 7 and 10 years. Some of the 10-year standards such as those for refractory manufacturing (many sources emit POM), and commercial industrial boilers (sources emit mercury, cadmium, lead) are still under development. EPA intends to address all the originally listed source categories by May 15, 2002. While controlling HAP emissions, many of these standards also reduce nitrogen compound emissions. Reductions in Great Waters pollutant emissions are and will continue to be considered during the development of all MACT standards for sources that emit those pollutants.

3. Solid Waste Combustion Standards - Section 129 of the CAA directs EPA to establish new source performance standards and emission guidelines under section 111 of the Act to limit emissions of dioxins and furans, cadmium, lead, mercury, and NOx, as well as particulate matter, opacity, sulfur dioxide, carbon monoxide, and hydrogen chloride from solid waste incineration units burning nonhazardous solid waste. We have issued final standards and guidelines for large municipal waste combustors (MWCs), small MWCs, hospital/medical/infectious waste incinerators (HMIWIs) and commercial and industrial solid waste incinerators (CISWI). MWCs and HMIWIs account for 30 percent of the national mercury emissions to the air. By the time these rules for MWCs and HMIWIs are fully implemented, they will reduce mercury emissions from these sources by about 90 percent from baseline levels, and will reduce dioxin/furan emissions from these sources by more than 95 percent from baseline levels.

4. Residual Risk Standards - The residual risk standards program, required under section 112(f) of the CAA, is designed to assess the risk from source categories after MACT standards are implemented. It is in the residual risk phase of the air toxics program that EPA determines the adequacy of the MACT standards already in place. Within 8 years of the promulgation of the MACT standard, EPA is required to assess whether

further standards are needed to provide an ample margin of safety to protect public health, or to prevent (after considering costs, energy, safety and other factors) an adverse environmental effect. If EPA concludes that existing technology-based standards are not sufficient to meet these risk-based goals, EPA is required to promulgate additional regulations.

In analyzing residual risk, EPA will conduct risk assessments consistent with the Agency's human health and ecosystem risk assessment technical guidance and policies. EPA will use a tiered approach, usually first conducting a screening level assessment for a source category, and move to a refined assessment only where the risks identified in the screening assessment appear unacceptable. Depending on the characteristics of the hazardous air pollutants, these assessments will address single or multiple pathways of exposure (e.g., inhalation, consumption of contaminated fish) as well as human and ecological endpoints (e.g., terrestrial wildlife, fish-eating wildlife).

5. Area Source Standards - Under the urban air toxics program required under Section 112 (k) of the CAA, EPA must list at least 30 "area source" HAPs and then ensure that 90 percent of the area source emissions of the area source HAPs are regulated. The 30 HAPs were listed in the Integrated Urban Air Toxics Strategy (Strategy) published in the Federal Register on July 19, 1999. Of these 30 HAPs, mercury, PCBs, cadmium, PAHs, dioxin/furan, lead and hexachlorobenzene are also pollutants of concern in the Great Waters. In order to begin meeting the 90 percent goal in the Strategy, EPA identified 13 new categories of smaller commercial and industrial operations or so-called "area" sources for regulation. Examples of area sources are dry cleaners, gasoline service stations, and public owned treatment works.

EPA plans to finalize regulations for the recently listed 13 new area source categories by 2004. In addition, EPA has completed or nearly completed regulations on an additional 16 area source categories. By 2003, EPA will have listed enough additional source categories for regulation in order to meet the requirement to regulate 90 percent of the area source emissions from all area source HAPs.

6. Seven Specific Pollutants - Section 112(c)(6) of the CAA lists seven specific pollutants (alkylated lead compounds, POM, hexachlorobenzene, mercury, PCBs, dioxins and furans) for special attention by EPA. The Act requires that EPA assure that stationary sources accounting for 90 percent of the emissions of these air toxics are subject to regulation. EPA published a list of source categories for regulation in the Federal Register in April 1998. Most of these source categories are already being regulated under the MACT program described in #2 above. An example of an area source category being regulated under this requirement is mercury cell chlor alkali plants (sources emit mercury) which are a part of the chlorine manufacturing source category. EPA plans to complete these standards by 2003.

7. Utility Determination and Actions - As reported in the Mercury Report to Congress in 1997, utility plants (primarily coal-fired plants) emitted approximately 52 tons per year of mercury nationwide in 1994, which is almost 1/3 of the manmade mercury emissions in the United States. EPA continues to gather data on the mercury emissions from coal-fired electric utility power generation plants to evaluate the need for regulation of toxic air pollutants from these sources. EPA, in conjunction with the U.S. Department of Energy and other parties, is collecting information to assess the effectiveness and costs of various mercury pollution control

technologies and pollution prevention options. Through an agreement with EPA, the National Academy of Sciences (NAS) recently completed a review of the available data on the health impacts associated with exposure to mercury. EPA will make a determination on whether to regulate air toxics emissions from electric utilities on or by December 15, 2000.

8. Mobile Source Standards - While the toxic reductions from EPA's mobile source emission standards have been large, prior to 1990 EPA had no specific directions from Congress for a planned program to control air toxic emissions from mobile sources. However, in 1990 Congress amended the CAA adding a formal requirement to consider motor vehicle air toxics controls. Section 202(l) requires the Agency to complete a study of motor vehicle-related air toxics, and promulgate requirements for the control of air toxics from motor vehicles. EPA completed the required study in 1993, and has recently updated the emissions and analyses. EPA proposed a rule to address the requirements of section 202(l) in July 2000. EPA expects to issue a final rule by December 2000. EPA will re-assess mobile source air toxics in 2003-2004.

9. Water Quality Criteria and Standards - Under the Clean Water Act (CWA), EPA establishes water quality criteria for the protection of human health and/or aquatic life. These criteria are used by States, territories, and tribes to establish enforceable water quality standards. Water quality standards in turn are an important basis for permit discharge limits and a variety of other regulatory actions to control discharges to water. EPA will review and revise as necessary its reference dose for mercury (based on the National Academy of Sciences review of methylmercury toxicity) and then issue a new water quality human health criterion for methylmercury. The new criterion is expected to be more stringent than the current criterion and represent a more protective level for people consuming fish from mercury-impaired waters. Waterbodies not meeting the revised State standards will require development of a TMDL. Since a large proportion of the mercury in many waterbodies is deposited from the air, TMDLs for mercury-impaired waterbodies will need to consider sources of air-deposited mercury and identify actions to reduce these sources where possible.

10. Persistent Bioaccumulative Toxics Initiative (PBTI) - The PBTI also focuses on reducing environmental releases of certain Great Waters pollutants of concern. The goal of the PBTI is to further reduce risks to human health and the environment from existing and future exposure to persistent, bioaccumulative, and toxic (PBT) pollutants. The initiative seeks to accomplish this goal through increased coordination among EPA national and regional programs with the significant involvement of international, State, local, and Tribal organizations, the regulated community, environmental groups, and private citizens. This effort fortifies existing EPA commitments related to priority PBTs in the Great Lakes, such as the 1997 Canada-U.S. Binational Toxics Strategy (BNS), the North American Agreement on Environmental Cooperation, and EPA's Clean Water Action Plan.

The PBTI initially is focusing on the 12 priority pollutants identified under the BNS. The Great Waters pollutants included are mercury, PCBs, dioxins and furans, toxaphene, aldrin/dieldrin, benzo(a)pyrene, chlordane, DDT, hexachlorobenzene and alkyl lead. The initiative is developing and implementing national action plans for the priority PBT pollutants. These action plans will include regulatory and non-regulatory activities. The PBTI is also screening and will consider selecting additional priority PBT pollutants for action.

11. Toxic Air Deposition Monitoring - EPA's Offices of Air and Radiation and Water support several deposition monitoring networks by providing funding. One such national network is the Mercury Deposition Network (MDN), a component of the National Atmospheric Deposition Program Network (NADP), which measures mercury levels in wet deposition at over 40 sites. Currently, there are few MDN sites located in coastal areas. In addition, EPA provides money for local coastal monitoring and special studies through the National Estuary Program (NEP) and other programs. Monitoring has been supported in places such as Casco Bay, Maine; Tampa Bay, Florida; Santa Monica Bay and San Francisco Bay, California; Mobile Bay, Alabama; and New York/New Jersey Harbor. These networks complement other networks such as the Integrated Atmospheric Deposition Network (IADN), which is a joint U.S.- Canada program run by EPA's Great Lakes National Program Office and Environment Canada in the Great Lakes. Networks such as IADN and MDN are essential to understanding deposition of mercury and other toxics to North America. These programs are continually being improved to better assess threats to human and ecosystem health. With regard to MDN, a subset of the stations in the network should include speciated mercury samples in air and precipitation with appropriate temporal resolution to promote better understanding of source-receptor relationships. Similarly, IADN is unable to measure all of the atmospheric pathways of greatest importance, making the program less comprehensive than required to address many uncertainties about the chemicals of concern. EPA will continue to evaluate and improve its monitoring networks, by expanding geographic and pollutant coverage as needed and as resources allow.

12. Air Toxics Ambient Monitoring - EPA has been working with States and locals to develop an Air Toxics Monitoring Strategy which details on-going monitoring activities and plans for future activities. The long term goal for the strategy includes monitoring in sensitive ecosystems. Through a combination of Federal, State, local and Tribal monitoring activities, there are approximately 300 sites currently collecting ambient air data on HAPs. Pollutants to be monitored include POM, cadmium and lead. This information can be used for a number of purposes including ground-truthing models. Some of this ambient data may supplement air deposition monitoring data for some pollutants. Through a grant program with State and local agencies, four pilot efforts to improve monitoring of air toxics will begin this year in these locations: Seattle, Washington; Tampa, Florida; Providence, Rhode Island; and Detroit, Michigan. In addition, six rural and small city locations will also be monitored. The implementation of this strategy is being coordinated with other ambient air monitoring efforts. For example, EPA has also begun a research effort for ambient air monitoring of dioxin and dioxin-like compounds called the National Dioxin Air Monitoring Network (NDAMN). The first year (2000) of dioxin data collected via NDAMN will be made available to the public in March 2001. A website will be established to house the data.

13. Consolidated Emission Reporting Rule (CERR) - This proposed rule would require State and local agencies to report emission inventories for criteria pollutants, ammonia, and hazardous air pollutants. This requirement would help us to improve collection of data for future air toxic emission inventories, but many commenters have requested that we re-propose the requirements for hazardous air pollutants more specifically. The rule was proposed on May 23, 2000.

14. Tool Development - EPA is working on improving the tools used to assess the effects of air toxics on the

public and the environment. In addition to improvements in the emission inventories and monitoring already discussed, EPA is also working on ways to improve multimedia fate and transport models as well as exposure models, characterizing risks associated with air toxics exposures, and continuing research on health and environmental effects of air toxics. EPA is currently working on a National-Scale Air Toxics Assessment of air toxics which will help to characterize the potential health risks associated with inhalation exposures to 33 priority toxic air pollutants. Other exposure pathways may be evaluated in the future as information and tools improve. This assessment uses the 1996 National Toxics Inventory (NTI) and computer models to estimate population exposures in 1996 and potential health effects with each pollutant. Information from this assessment may be used to identify areas where additional air toxic emission reductions may be needed. The National-Scale Air Toxics Assessment is targeted for Science Advisory Board (SAB) peer review and completion in early 2001.

B. Challenges to further addressing toxics problem

The previous section outlined the major regulatory and voluntary programs that EPA has currently underway to address air emissions and air deposition, including MACT standards, residual risk and TMDLs. Many of these programs have resulted in significant reductions in air toxic emissions and have addressed water quality problems. Even so, EPA will not know until all the programs have been completely implemented whether these actions are enough to adequately reduce the health and environmental problems associated with deposition of air toxics. In addition, to fully utilize some of the risk-based tools provided to EPA in the CAA and CWA, EPA needs to establish linkages between sources of emissions with health and environmental effects. EPA has made significant progress in the last decade in better understanding air deposition science; however, in many cases EPA still does not have a good understanding of source-receptor relationships. Some of the continuing challenges in identifying these relationships include the need for more refined emissions inventories, the need for more and better monitoring, and the need to perform national and local scale modeling to better identify the relative contribution of sources that emit pollutants, how much of each pollutant gets deposited, and how much of what is deposited creates water quality problems.

C. Actions to address these challenges:

While there are numerous State and local efforts to evaluate the effects and causes of air deposition, there has not been an ongoing comprehensive evaluation of the air toxics deposition problem for the entire nation (nitrogen compounds have been modeled on a national scale but are not considered hazardous air pollutants). This type of a national effort is needed especially for air toxics because many of the Great Waters pollutants are transported regionally or even globally; therefore, a State may have trouble determining how much of a particular pollutant comes from sources outside of the State. In order to address some of these challenges, EPA will use what was learned in the two on-going TMDL pilot projects to help model air deposition problems on a national scale. This assessment will help EPA to devise strategies as needed to reduce emissions that lead to air deposition, and also provide information to help State and local agencies address their air deposition problems. In addition, this modeling effort will help EPA evaluate the effects of the

regulations that are currently (or soon will be) in effect by projecting what reductions are expected to occur as a result of these standards. Information developed during this national air toxics deposition assessment can also be used by States with waterbodies that exceed water quality standards as a result of air deposition. States can use the information to determine what portion of their air deposition problem is created within their State as opposed to what is transported into their State. National modeling information will also help EPA to evaluate current deposition monitoring networks, and develop a plan for improving those networks as needs dictate and resources allow.

EPA recognizes that a key component of this type of modeling effort is to develop the most accurate emission inventory possible. Therefore, for this and other air toxic pollutant efforts, we are currently in the process of beginning development of a national emission inventory for 1999.

1. National Toxics Inventory (NTI)- In addition to the CERR rulemaking activity described above, EPA is providing guidance to and working closely with State, local and Tribal agencies on how to develop an emission inventory for HAPs. Activities to prepare for the 1999 NTI include training for EPA Regional offices, preparation of questions and answers, review and comment opportunities on data incorporated into the NTI, and grant resources to help States/locals/tribes with development of the inventories. In particular, EPA has provided additional guidance on collecting speciated data for specific pollutants such as mercury. Better speciation data will be more useful for modeling purposes.

2. National Air Toxics Deposition Assessment Activities - The National Air Toxics Deposition Assessment will require a number of activities, described below and broken out by a) modeling and support activities, and b) evaluation of results. These modeling efforts will be repeated when information for the national emission inventories is updated on three year intervals. For example State-reviewed emission inventories for 1999 will be completed and available for modeling in June 2002. All activities are based on resources being available.

a. Modeling and Support Activities:

- In the first step, EPA will use the compiled national emissions inventory, called the National Toxics Inventory which estimates 1996 air toxics emissions for each U.S. county. The types of emissions sources in the inventory include major stationary sources (e.g., large waste incinerators, utilities, and factories), area sources (e.g., dry cleaners, small manufacturers, consumer products), both on-road and off-road mobile sources (e.g., cars, trucks, boats), and other sources such as wildfires. This inventory includes the 188 HAPs listed in the CAA.

- EPA has and will continue to conduct air deposition modeling on a national scale initially using the Regulatory Modeling System for Aerosols and Deposition (REMSAD). Although REMSAD will be used, EPA is aware that other models are available and new models are being developed which may be used if they are acceptable for the purposes described in this work plan. REMSAD was originally developed to provide simulations of complex long-range transport and deposition of atmospheric pollutants and to assess the relative impacts of alternative control strategies on both deposition of toxics

and ambient concentrations of fine particulate matter (PM). The REMSAD model was peer reviewed for use in regulatory applications in the fall of 1999. The REMSAD system consists of a meteorological data preprocessor, the core aerosol and toxic deposition model (ATDM), and post processing programs. In the Wisconsin TMDL pilot project described earlier, EPA is evaluating the use of REMSAD to predict atmospheric deposition for the purposes of a TMDL, and how to integrate the results with water modeling. As part of the pilot, EPA has modified REMSAD to allow emissions information to be "tagged." The goal is to allow the emissions from within a state to be differentiated from the emissions which originate from outside a state; similarly, it may be possible to distinguish the amount of deposition from different categories of sources. This "tagging" approach will be evaluated for the first time in the Wisconsin TMDL pilot project. REMSAD has been peer-reviewed and the peer-review comments have been addressed; however, there will be further peer review of the pilot project approach. Further background on the pilot project can be found at http://www.epa.gov/owow/tmdl/madpp.html.

Pollutants are being modeled based on their physical and chemical characteristics. The initial model runs include the following pollutants: atrazine, cadmium, dioxin/furans, POM, and mercury. The chemistry for other pollutants has not yet been added to the model. Upgrades to REMSAD to add additional pollutants will occur as needed and as resources allow.

- EPA will also use REMSAD modeling runs to project what future reductions would result from Federal, State and local control programs. Many reduction programs and rules have been finalized; however, they are not required to be implemented until later. For example, many of the maximum achievable control technology (MACT) standards under Section 112 and standards under Section 129 have been promulgated, but the dates by which sources have to comply have not passed. By projecting ahead, compliance dates for MACT standards, which are generally three years for existing sources, will have been implemented and EPA can evaluate what reductions are possible. This projection exercise would include looking at regulatory reductions as well as pollution prevention options.

- EPA with States and local agencies is initiating a national toxics monitoring program with a primary objective of evaluating air toxics simulation models.

b. Evaluation of Results:

- Modeling results from REMSAD will be compared with available information from ambient and deposition monitoring networks (such as the MDN, and NEP sites). This information would be used to “ground-truth” results of the model, inventory and monitoring data. In addition, based on this information, additional monitors could be added or networks revised to better characterize air deposition. To better support this activity, EPA will work towards incorporating available information from existing and new air deposition monitoring networks into an easily accessible form.

- EPA will share air deposition modeling information with State, local and Tribal governments for use in

development of TMDLs. This will include how to use air deposition information in water models to estimate the amount of air deposition that is entering the waterbody.

- EPA will use results to improve emission inventories, model development and to identify additional research needs. Additional information will be incorporated into these inventories and models from on-going research activities as appropriate.

- EPA will conduct an assessment of what additional analysis of the data would be useful and the potential policy options for reducing pollutants of concern to water quality. This could include such activities as: development of national standards (e.g., MACT standards); providing information to the Residual Risk Program for determinations and standards development; providing information to State, Tribal and local officials for development of TMDLs; and providing information to local governments to help them know where they might take action.

- EPA will monitor the results of emission reduction programs and will repeat the modeling and monitoring exercises as new inventory information becomes available. EPA proposes to schedule these activities along with the other National-Scale Air Toxic Assessment activities being planned (every three years as the inventory is updated).

Section I: Toxic Pollutants Work Plan

Element/ Sub-elements	Activities	Estimated Dates
Total Maximum Daily Loads		
Conduct two mercury TMDL pilot studies	Develop report on technical results from Florida pilot project	Winter 2000-2001
	Develop a report on technical results from Devil's Lake pilot project	Fall 2001
TMDL regulatory revisions	Final changes promulgated	July 2000 - Completed
Lessons Learned Report	Developed from TMDL pilots	Fall/Winter 2001
National Technology-Based Standards		
Standards required by the Act in 1992 and 1994 (2&4-year)	Promulgate the 2&4 year air toxics standards	Done
Standards required by the Act in 1997 (7-year)	Promulgate remaining 7-year air toxics standards	Done

Element/ Sub-elements	Activities	Estimated Dates
Standards required by the Act in 2000 (10-year)	Develop 10-year air toxics standards	May 2002
Combustion standards	Promulgate remaining combustion standards	November 2002
Residual Risk (RR) Program		
Residual risk	Finalize any additional standards needed for coke ovens	November 2001[1]
	Propose any necessary residual risk standards for 2- and 4-year technology based standards	2002-2004
Area Source Category Listing and Standards		
Update area source category list	Complete the area source list	December 2003
Develop area source standards	Promulgate 13 area source standards	2004
	Promulgate additional area source standards	2006
	Promulgate last group of area source standards	2009
Seven Specific Pollutants - Source Category List and Standards		
Standards for seven specific pollutants	Promulgate any standards necessary to meet requirement that sources accounting for 90% of emissions are subject to regulation for seven specific pollutants (to the extent not already achieved through the 2,4,7 and 10-year MACT standards).	2003
Utilities Determination and Actions		
Information collection	Collect information from the utility industry, conduct analysis of potential control technologies, and analyze health-related issues.	December 2000
Regulatory Decision/Action	Make regulatory determination for air toxics emissions (including mercury) from electric utilities	December 2000
	Develop regulation (if positive determination is made) for utilities	2001-2004

Element/ Sub-elements	Activities	Estimated Dates
Office of Transportation and Air Quality(OTAQ) -Related Activities		
Section 202(l) rule	Proposal identifies mobile source air toxics and considers control options.	Proposal completed July 2000. Final expected Dec 2000
Assessment activities	Final diesel health assessment document.	Fall 2000 - Completed
	Propose re-assessment of mobile source HAP controls	2003/2004
Water Quality Criteria and Standards		
Development of criteria and standards	Methylmercury criterion notice published	December 2000
Coordination Activities		
Persistent Bioaccumualtive Toxics Initiatives (PBTI)	Complete action plans for pollutants	Spring 2001
Consolidated Emission Reporting Rule (CERR)		
Requires State/Local/Tribes (S/L/T) to develop emission inventories for HAPs	Proposed rule	Completed
	Promulgate rule	Winter 2000/2001
Air Toxics Monitoring		
Add additional monitoring sites	Implement four urban monitoring pilots	December 2000
	Implement six rural monitoring pilots	December 2000
Tool Development		
National Scale Air Toxics Assessment	Completion	Early 2001
National Air Toxics Deposition Assessment Activities		
Emission Inventory	Complete 1996 National Toxics Inventory Summary files available (NTI)	July 2000 - Completed

Element/ Sub-elements	Activities	Estimated Dates
	Begin development of 1999 NTI	On going
Modeling on a National Scale	Use REMSAD to model toxic pollutants for nation using 1996 NTI	Summer 2001
	Model projected reductions for toxic pollutants	Fall 2001
	Compare modeling results with monitoring data	Fall 2001
	Provide information to S/L/T	Winter 2001
	Evaluate modeling results for improvements in model, research needs, monitoring network changes	Winter 2001
	Assess options for reducing pollutants of concern to water quality	Winter 2001
	Repeat modeling activity using 1999 NTI	2003

1. Depending on technical issues and resources final rule may be delayed.

II. Environmental problems associated with nitrogen compounds

During the past century, human activities have doubled the amount of nitrogen available for plant growth. There is growing evidence that this human intervention in the nitrogen cycle has dramatically changed the distribution and movement of nitrogen, and that these alterations pose risks to human health and the environment. In many coastal waters, anthropogenic sources of nitrogen now rival or exceed natural sources of nitrogen.

Major anthropogenic sources of nitrogen include runoff from fertilizer production and application, waste from agricultural and animal feedlot operations, biomass burning, and fossil fuel combustion. Sources of atmospherically deposited nitrogen include fossil fuel combustion and volatilization from agricultural sources (e.g., animal feedlot operations or fertilizer application). These sources contribute nitrogen which is deposited both directly to estuarine water surfaces and initially onto land surfaces and then carried to estuarine waters via runoff. Direct atmospheric deposition of nitrogen is an important source of new nitrogen inputs into estuarine systems and may play a significant role in eutrophication, because atmospherically deposited nitrogen is not altered by biological processes in terrestrial or estuarine systems before reaching coastal waters.

The primary effect associated with too many nitrogen inputs to the Great Waters is eutrophication. Eutrophication involves an increase in the rate of supply of organic matter to an ecosystem, and will likely have many undesirable consequences. The symptoms of eutrophication are algal blooms (both toxic and non-toxic), low dissolved oxygen concentrations, declines in the health of fish and shellfish populations, loss of

seagrass beds and coral reefs, and ecological changes in food webs. According to the National Oceanic and Atmospheric Administration's (NOAA's) National Estuarine Eutrophication Survey, these conditions are common in a significant number of our nation's coastal ecosystems. These ecological changes impact human populations by changing the availability of seafood and creating a risk of consuming contaminated fish or shellfish, reducing our ability to use and enjoy our coastal ecosystems, and causing economic impact on people who rely on healthy coastal ecosystems, such as fishermen and those who cater to tourists.

The extent of nitrogen inputs from atmospheric sources varies locally and regionally throughout the coastal areas of the United States. In general, as detailed in the *Third Report to Congress on Deposition of Air Pollutants to the Great Waters*, roughly 10–40% of the nitrogen which reaches East and gulf coast estuaries is transported and deposited via the atmosphere. In any given area, the seriousness of the problem depends on the vulnerability of coastal systems, the amount of atmospheric deposition to the estuary and its upstream watershed, and the relative importance of other sources of nitrogen. Efforts also are underway to quantify the scale and location of the regions from which atmospheric nitrogen inputs originate.

A. How we are currently addressing this problem:

Included below are on-going activities that either reduce emissions of nitrogen compounds or assess the affects of nitrogen compounds for possible future regulation. Many of these activities have or will result in significant emission reductions of nitrogen compounds.

1. Title IV Acid Rain Program NO_X reductions - Title IV CAA requires reductions in NO_X emissions from the electric power generating industry. The statutory provisions of Title IV required that NO_X emissions be reduced by 2 million tons below projected levels from coal-fired boilers by 2000 (roughly a 10% reduction of levels without Title IV); Phase I began in January 1996, and Phase II became effective in 2000. Title IV does not include a cap on NO_X emissions.

2. NO_X SIP Call, Section 126 Petitions, and Federal Implementation Plans - In October 1998, EPA finalized the "Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone" (NOx SIP Call). The SIP call limits summer season NOx emissions for 22 States and the District of Columbia that are significant contributors to ozone in downwind areas. EPA directed the 23 jurisdictions to amend their SIPs to ensure that the NOx budgets are met. EPA set these budgets by assessing the reductions that could be obtained through cost-effective controls on electricity generating units (EGUs) and large industrial boilers and certain other stationary NOx sources. In order to meet the SIP requirements, States can adopt NOx trading programs. These programs will be similar to the SO_2 trading program under EPA's Acid Rain program. The NOx SIP call, once fully implemented, is expected to reduce atmospheric nitrogen emissions by approximately 1 million tons per ozone season, which should reduce loadings into the Great Waters in the eastern U.S. The majority of the reductions must be achieved by May 31, 2004. [NOTE: In March 2000, in response to arguments made before the Court, the Circuit Court of Appeals for the District of Columbia, while upholding the majority of the rule, remanded the inclusion of Wisconsin, Georgia and Missouri, the definition of electricity generating units that includes cogeneration units, and the control level assumed for large stationary internal combustion engines.

EPA is developing a proposed rule to respond to the Court decision.]

At the same time that EPA promulgated the NOx SIP call rule, EPA also proposed NOx Federal implementation plans (FIPs), which may be needed if any State fails to respond to the final NOx SIP call. In addition, a number of northeastern States petitioned EPA, as allowed by section 126 of the CAA, to address air pollution transported from upwind States. The petitions requested that EPA make a finding that NOx emissions from certain major stationary sources significantly contribute to ozone nonattainment problems. Such a finding would authorize EPA to establish Federal emissions limits for these sources. On May 25, 1999, EPA promulgated a final rule (May 1999 Rule) determining that portions of the petitions are approvable under the 1-hour and/or 8-hour ozone air quality standards based on their technical merit. Based on the affirmative technical determinations for the 1-hour ozone standard made in the May 1999 Rule, EPA promulgated a final rule on January 18, 2000 (January 2000 Rule) making section 126 findings that a number of large EGUs and large industrial boilers and turbines named in the petitions emit in violation of the CAA prohibition against significantly contributing to nonattainment or maintenance problems in the petitioning States. In the January 2000 Rule, EPA also finalized the Federal NOx Budget Trading Program as the control remedy for sources affected by the rule. This requirement replaces the default remedy in the May 1999 Rule. The January 2000 Rule establishes Federal NOx emissions limits that sources must meet through a cap-and-trade program by May 1, 2003. The January 2000 rule affects sources located in the District of Columbia, Delaware, Maryland, North Carolina, New Jersey, Ohio, Pennsylvania, Virginia, West Virginia, and parts of Indiana, Kentucky, Michigan, and New York.

3. New Source Performance Standards - New source performance standards (NSPS) limit emissions from new, modified, or reconstructed sources in both attainment and nonattainment areas. Section 111 of the CAA requires EPA to identify "source categories" emitting criteria air pollutants (e.g., NOx and VOCs) and to establish emissions limits for new, modified, and reconstructed sources of emissions. Emission limits must be based on the "best demonstrated technology," and apply to all new, modified, or reconstructed sources. The effective date of an NSPS is the date of its proposal. To date, EPA has promulgated approximately100 NSPS, of which ten control NOx emissions.

In September 1998, EPA promulgated an NSPS limiting NO_X emissions from new fossil fuel-fired utility and industrial boilers. Specifically, the final standards revised the NO_X emission limits for electric utility, industrial, commercial, and institutional steam generating units for which construction commenced after July 9, 1997. These final revised NO_X emission limits will reduce the projected growth in NO_X emissions from new sources by approximately 42 percent (41,500 metric tons/year) from levels allowed under current NSPS.

4. New Source Review and RACT - Under the1990 CAA, States generally must apply similar requirements to major stationary sources of NO_X emissions as are applied to major stationary sources of VOCs because these two pollutants are precursors to ozone. These new NO_X provisions require (1) existing major stationary sources to apply reasonably available control technology (RACT) in certain ozone nonattainment areas and ozone transport regions, (2) new or modified major stationary sources to offset increased emissions and to install controls representing the lowest achievable emission rate (LAER) in areas that do not attain the ozone NAAQS (i.e., ozone nonattainment areas) and ozone transport regions, and (3) new or modified major

stationary sources to install the best available control technology (BACT) in ozone and NO_2 attainment areas.

5. Regional Haze Rule - In April 1999, EPA issued the final regional haze rule to address visibility impairment in national parks and wilderness areas (also known as Class I areas) caused by numerous sources located over broad regions. Implementation of the regional haze program, in conjunction with the particulate matter NAAQS, is anticipated to improve visibility across the country as well as reduce NO_X emissions and consequently nitrogen deposition to coastal waters. Implementation of the ozone NAAQS and the acid rain programs will also contribute to visibility improvements, particularly in the eastern U.S. EPA will have a better understanding of the NO_X emission reductions resulting from these programs when emissions and monitoring data are collected from the States, nonattainment areas are designated, and the States submit implementation plans.

6. Mobile Source Control - EPA started enforcing the first Federal emission standards for passenger cars in 1968. Since then, the Agency has developed emission standards for all types of highway vehicles, their fuels, and engines used in virtually all varieties of nonroad equipment such as tractors, construction vehicles, recreational and commercial vessels, and lawn and garden equipment. EPA has made the emission standards more stringent over time. Reducing emissions from land and water vehicles also reduces nitrogen deposition.

In December 1999, through the Tier 2 rulemaking, EPA adopted more protective tailpipe emissions standards for all passenger vehicles, including sport utility vehicles (SUVs), minivans and pick-up trucks. It marks the first time that SUVs and other light-duty trucks will be subject to the same national pollution standards as cars. Simultaneously, EPA set a deadline for reducing sulfur in gasoline, which will ensure the effectiveness of low emission-control technologies in vehicles and reduce harmful air pollution.

In addition, EPA has affirmed standards for heavy-duty highway vehicles and engines for 2004, and considering new emission standards for these vehicles and engines beyond 2004. EPA recently proposed standards to reduce the sulfur content in diesel fuel by 97 percent to provide for the cleanest-running heavy-duty trucks and buses in history. The proposal, if adopted, would reduce nitrogen oxides from these vehicles by 95 percent from current levels, and it would also reduce PAH-containing particulate matter by 90 percent for highway diesel engines.

7. Total Maximum Daily Load Program (TMDL) - States must identify waterbodies impaired by nutrients and develop TMDLs for these waterbodies. The current requirements for the TMDL program are described in section 303 of the Clean Water Act and the TMDL rule published in 1985 and amended in 1992. Although revisions to the TMDL rule were published in the Federal Register on July 13, 2000, a Congressional rider in a FY 2000 military construction/supplemental appropriations bill prohibits EPA from implementing the revised rule in FY 2000 and 2001. As part of the TMDL, States must account for all sources of nitrogen to a waterbody, including the contributions from atmospheric loadings. The challenges include identifying the sources of atmospheric nitrogen that are impairing a waterbody, and determining management approaches. Nitrogen deposition may include a local and regional component, and may be one of several sources of nitrogen, along with nitrogen from point sources and nonpoint sources, such as agricultural runoff.

Through the pilot projects described earlier, EPA will be exploring approaches for addressing atmospheric deposition that may be impairing a waterbody. Although the pilots are focused on mercury, they may provide insights regarding how to address other pollutants such as nitrogen that are transported regionally. EPA is also evaluating approaches for identifying the relative deposition from various nitrogen sources, such as the "tagging" approach described earlier.

8. Water Quality Criteria for Nutrients - EPA is developing water quality criteria for nutrients in rivers, lakes, estuaries and wetlands. Lakes and rivers water quality criteria are currently being publicly reviewed. Water quality criteria are essentially thresholds for protecting human health and aquatic life and are used as the basis for enforceable State and Tribal water quality standards. The criteria for wetlands will be completed by December 2000. Criteria for eight eco-regions for lakes/reservoirs and rivers and streams should be completed by December 2000, and for an additional two to four eco-regions by December 2001. The criteria for marine/estuarine eco-regions should be proposed by and finalized in 2001. These criteria will help the States and Tribes establish water quality standards based on ecological impact and to use these as a basis for developing TMDLs in nutrient-impaired waters.

9. Concentrated Animal Feeding Operations (CAFOs) - There are approximately 376,000 animal feeding operations (AFOs) nationwide. Of these, it is estimated that 8,000 operations in the livestock and poultry sectors have more than 1,000 animal unit equivalents, which is the present definition of CAFOs. Less than one third of the nations broilers, dairy cattle, hogs and turkeys are currently in CAFOs.

Pursuant to the consent decree in *NRDC et al* v *Browner* (D.D.C. Civ. No. 89-2980, January 31, 1992 as modified), EPA committed to propose and promulgate the feedlots effluent guidelines for swine and poultry CAFOs by December 1999 and December 2001, respectively and for beef cattle and dairy CAFOs by December 2000 and December 2002, respectively. Concurrent changes to the National Pollutant Discharge Elimination System (NPDES) regulations are also necessary. Presently these rules would apply only to units of more than 1,000 animals; however, EPA is considering changes to that size limitation, in either direction.

EPA received a one-year extension to the swine and poultry rules, which are now being developed on the same schedule as the beef and dairy rules. As part of the extension, EPA agreed to complete:

- an investigation into the air pollutants that are emitted from CAFOs,
- an evaluation of technologies and legal authorities available to address harmful emissions, and
- a plan for addressing emissions that have a deleterious impact on air and water quality.

10. Measuring economic and environmental benefits pilot - EPA is working to better quantify the water quality benefits of air pollution controls in order to provide decision makers with critical information on environmental strategies to reduce the extent of contamination of waters by pollutants of concern. By 2002, EPA expects to conclude a pilot study of the economic benefits of reducing nitrogen deposition in a particular estuary, developing methodologies that could be applied to other waterbodies.

11. Consolidated Emission Reporting Rule (CERR) - This proposed rule would require State and local agencies to report emission inventories for criteria pollutants, ammonia, and hazardous air pollutants. This requirement would help us to improve collection of data for future air emission inventories. The rule was proposed on May 23, 2000.

B. Challenges to further addressing this environmental problem.

With the increase of anthropogenic sources of nitrogen, it is often difficult to determine on the local level the extent to which nitrogen deposition is a problem and where the problem is originating. A primary challenge is to understand both national deposition trends, while being able to characterize the air deposition problem at the regional, state, local and watershed levels. Many officials do not have or know how to obtain the information they need in order to understand if air deposition of nitrogen is a significant issue in their area. In addition, they might not be aware of deposition monitoring conducted in their area. Even when air deposition information is available, it may be difficult to interpret relative to information the officials are more familiar interpreting on other sources of water pollution.

EPA continues to face the challenge of having enough air deposition monitoring information to help identify sources and make appropriate decisions. In part this is due to gaps in the existing monitoring networks, particularly in monitoring on coastal areas. In addition, long-term funding for some networks is uncertain. The National Atmospheric Deposition Network, originally established to characterize acid deposition, measures nitrate and ammonium deposition in rainwater and other substances. It is a multi-agency effort with over 200 sites. Yet, few of the sites are in coastal areas. EPA's Clean Air Status and Trends Network measures dry deposition at about 80 sites, but again few are in coastal areas where nitrogen deposition has become an ever increasing problem. NOAA's Atmospheric Integrated Research and Monitoring Network consists of 22 sites (although four of these are coastal, more monitoring sites in coastal areas are needed) measuring wet and dry deposition of a number of pollutants, including nitrogen compounds.

Finally, EPA does not know if the activities being undertaken today will be enough to eliminate impacts from air deposition of nitrogen given future growth in population, energy demand, and number of vehicles. For example, summertime NOx reductions to address ozone issues could be insufficient to address nitrogen deposition levels that cause other environmental problems. For this reason, some northeastern States have indicated the intent to expand seasonal NOx controls for ozone to annual controls on regulated sources. Because atmospheric nitrogen does not respect State jurisdictional boundaries, it is possible that further regional or national reduction programs may be necessary to address nitrogen deposition impacts on ecosystems.

C. Actions we plan to address the challenges:

Following are a list of activities that will help us begin meeting the existing challenges we face for air deposition of nitrogen compounds.

1. Monitoring - EPA is expanding nitrogen monitoring through the National Atmospheric Deposition Network (NADP) and the Clean Air Status and Trends Network (CASTNet). Some sites recently funded for monitoring wet deposition of sulfur and nitrogen compounds are: Peconic Bay, Maryland Coastal Bays, Indian River Lagoon, and Mobile Bay. The number of sites that will be set up in 2001 for nitrogen is not yet clear. EPA is evaluating gaps in the network and sites where there are operators and some resources to maintain the site for 5 years.

The Office of Air and Radiation (Clean Air Markets Division) held a workshop from May 22-24, 2000, entitled "Workshop on Dry Deposition in North America." The workshop gathered leading international dry deposition researchers to explore current and future functioning and organization of dry deposition monitoring networks, as well as integration and coordination with wet deposition monitoring networks. EPA and State/local/Tribal agencies are assessing the adequacy of photochemical assessment monitoring stations (PAMS) in detecting Regional NO_X concentrations to track the effectiveness of major NO_X emission reduction programs. The workshop proceedings will be used to address challenges involved in the future design and functioning of monitoring networks. Uncertainties remain regarding measurement of dry deposition, particularly in coastal environments. However, EPA will still obtain dry deposition data, while working with the research community to address uncertainties and improve measurement methods.

2. Assessment activities **-** In the context of various policy analysis activities, EPA is using models to estimate nitrogen deposition in local/regional areas and to relate nitrogen deposition information to specific watersheds. EPA has already begun to characterize the airsheds associated with key estuaries and their watersheds in order to better understand the size of the area containing sources that could contribute to eutrophication. Specific assessment activities planned are:

2. NAPAP Report to Congress – The National Acid Precipitation Assessment Program (NAPAP) is a cooperative Federal program first authorized by Congress in the Acid Precipitation Act of 1980. NAPAP was reauthorized by the CAA, Title IX to conduct acid rain research and atmospheric deposition and other ecosystem monitoring, as well as periodically assessing the costs, benefits, and effectiveness of Title IV of the 1990 CAA. In fulfilling the requirements of CAA Title IX, a primary responsibility of NAPAP is to produce reports to Congress which provide integrated assessments of the causes and effects of SO_2 and NO_X and their transformation products, including the status of aquatic and terrestrial ecosystems. An important component of the NAPAP Report to Congress involves evaluating what further reductions in deposition rates are needed to prevent adverse ecological effects. Every four years, NAPAP provides an integrated assessment Report to Congress. As an input to the 2000 NAPAP Report to Congress, EPA will use both the Regional Acid Deposition Model (RADM) and REMSAD to project nitrogen deposition resulting from various NO_X emission control scenarios.

   RADM has been developed over the last 15 years under the auspices of the NAPAP to address policy and technical issues associated with acidic deposition. RADM is a Eulerian model in which concentrations of gaseous and particulate species are calculated for specific fixed positions in space (grid cells) as a function of time. The concentration of a specific pollutant in a grid cell at a specified

time is determined by: the emissions input rate; the transport of that species by wind into and out of the grid in three dimensions; movement by turbulent motion of the atmosphere; chemical reactions that either produce or deplete the chemical; the change in concentration due to vertical transport by clouds; aqueous chemical transformation and scavenging; and removal by dry deposition. RADM is designed to provide a scientific basis for predicting changes in deposition resulting from changes in precursor emissions, to predict the influence of emissions sources in one region on acidic deposition in other geographic regions, and to predict the levels of acidic deposition in certain sensitive receptor regions.

3. Nitrogen Deposition Assessment Activities - Use RADM and REMSAD to project impacts of current control programs and scenarios depicting additional NOx reductions. EPA is using models to estimate nitrogen deposition for the nation. The REMSAD model will be used to generate estimates across 36 kilometers (km) grids for most of the country, but across 12 km grids for about 30% of the country. These estimates will be reviewed and packaged and shared with State, local and Tribal entities sometime in the Fall 2001, especially those who are working on TMDLs, and with groups who manage environmental issues in the Great Waters, such as the National Estuary Programs.

   EPA also plans to model projected nitrogen reductions for future years, taking into account changes in national emissions of nitrogen and also taking into account reductions of nitrogen that will result from implementing the regulatory activities listed in the nitrogen work plan. These analyses are expected to be completed during the winter of 2001-2002. Depending on the outcomes, the model may also be run later that year to test the potential outcomes of new strategies to reduce nitrogen deposition.

   Concurrently, EPA will also experiment with methods to "tag" sources of nitrogen in the REMSAD model, so that nitrogen deposition can be characterized according to the amount that is depositing in a state from in-state sources versus the amount that is depositing from out-of-state sources.

While some of the programs described in Section A are being undertaken to address issues other than coastal eutrophication (e.g., acid rain, ozone), they should achieve some level of benefits to coastal waters due to reduced nitrogen deposition levels. However, this is not to imply that EPA believes these measures will solve the coastal eutrophication problem. EPA hopes that RADM runs focused on additional emissions reduction scenarios beyond current CAA Title IV levels will help to facilitate the establishment of nitrogen deposition reduction goals to address coastal eutrophication issues (see national assessment activities in workplan table).

Section II: Nitrogen Compounds Work Plan

Element/ Sub-elements	Activities	Estimated Dates	Projected NOx Emission Reductions (year achieved)[1]
Title IV Acid Rain Program NOx			
Acid Rain program	Phase I: coal fired dry bottom wall fired boilers, tangentially fired boilers	January 1996	2.06 million metric tons/yr (2000) [some overlap with NOx RACT reductions]
	Phase II: Wet bottom boilers, cyclones, cell burner boilers and vertically-fired boilers (nationwide)	January 2000	
NOx SIP Call, Section 126 Petitions, and Federal Implementation Plans			
NOx SIP Call	State NOx Budget Programs (and NOx reductions) implemented (22 States and District of Columbia)	May 1, 2003	880,000 metric tons per ozone season (2007)[2]
	Budgets must be achieved	2007	
Section 126 Petition Rule	Compliance date	May 1, 2003	510,000 tons of NOx per ozone season (2007)[3]
Ozone Transport Commission Memorandum of Understanding	Agreement signed. Fossil fuel-fired boilers and indirect heat exchangers with a maximum rated heat input capacity of 250 mmBtu/hour or more (applies to northeast Ozone Transport Region, including Washington, DC and the 11 northeastern States)	Phase II started on May 1, 1999; Phase III starts on May 1, 2003	0.32 million metric tons/yr (2003) based on difference between 1990 levels and NOx budget for 2003

Element/ Sub-elements	Activities	Estimated Dates	Projected NOx Emission Reductions (year achieved)[1]
New Source Performance Standards			
NSPS for New Fossil Fuel-Fired Steam Generating Units	Promulgated	September 1998	0.04 million metric tons/yr (2002)
New Source Review and RACT			
NOx RACT		Done	Estimated 30 to 50 percent reduction from applicable sources. [some overlap with Title IV Acid Rain reductions]
Section 129 Standards for Combustion			
Emission Guidelines for Municipal Waste Combustors	Promulgated	December 1995	0.02 million metric tons/yr (2000)
Emission Guidelines for Existing Hospital/Medical/ Infectious Waste Incinerators (HMIWI) and NSPS for new HMIWI	Promulgated	August 1997	New HMIWI: 0 to 69 metric tons/yr or 0 to 52 percent per year reduction. Existing HMIWI: 0 to 390 metric tons/yr or 0 to 30 percent per year reduction

Element/ Sub-elements	Activities	Estimated Dates	Projected NOx Emission Reductions (year achieved)[1]
Regional Haze Rule			
Address visibility impairment in national parks and wilderness areas	Final rule for Class I areas	April 1999	NA
Office of Transportation and Air Quality(OTAQ) -Related Activities			
Tier 1 rule	Promulgated. Tailpipe standards: light duty vehicles and trucks	Final rule was issued in 1996	Tier 1 Tailpipe standards: 850,000 metric tons of NOx per year (2010)
Tier 2 rule	Final rule for stringent new emissions standards and gasoline sulfur controls that are expected to reduce NOx, HC, and PM emissions from light-duty vehicles and light-duty trucks	Final rule was issued in December 1999	4.049 million metric tons of NOx per year (2030)
National Low Emission Vehicle (NLEV) Standards: 1999 in NE ozone transport region	NLEV Standards: light duty vehicles and light-duty trucks	1999 in NE ozone transport region; 2001 nationwide	181,000 metric tons of NOx per year (2007)
2004 Heavy-duty diesel standards	Proposal reconfirmed 2004 standards for heavy-duty diesels which were finalized in 1997, proposed standards for heavy-duty gasoline vehicles and engines, and also to request comment on more stringent standards for beyond 2004	Proposal was in October 1999. Final rule planned for mid-2000	1 million metric tons of NOx per year (2020)
Diesel fuel sulfur control and post-2004 heavy-duty standards	Proposal to control sulfur in diesel fuel as well as establish new emission standards for heavy-duty vehicles and engines beyond 2004, based on after-treatment technologies enabled by low-sulfur fuel. Would also reduce NOx emissions.	Proposed May 2000. Final rule by the end of 2000.	NA

Element/ Sub-elements	Activities	Estimated Dates	Projected NOx Emission Reductions (year achieved)[1]
Tier 3 standards for nonroad diesel engines	Proposal expected to review test procedure and Tier 3 emission standards for nonroad diesel engines, and consider nonroad diesel fuel sulfur control. Proposed program could result in dramatic diesel PM reductions	Proposal planned for late 2000. Final rule by late 2001	1.1 million metric tons of NOx per year (2010)
Small spark-ignition engine standards, phase I: 1997 Small spark-ignition, non handheld engine standards, phase II: 2001-2007	Promulgated. Small spark-ignition engine standards, small spark-fired engines will be affected Promulgated. Small spark-ignition, non-handheld engine standards	July 1995 March 1999	9,000 metric tons of NOx per year (2020)
Locomotive engine standards: 2000	Promulgated. Locomotive engine standards: new and rebuilt locomotive engines	April 1998	449,000 metric tons of NOx per year (2010)
Water Quality Criteria and Standards			
Criteria for nutrients development	Issue final criteria for 8 eco-regions for lakes/reservoirs and rivers/streams	Dec 2000	NA
	Issue final criteria for wetlands	Dec 2000	NA
	Issue final criteria for additional 2-4 eco-regions for lakes/reservoirs and rivers/streams	Dec 2001	NA
	Issue proposed criteria for marine/estuarine eco-regions	June 2001	NA

Element/ Sub-elements	Activities	Estimated Dates	Projected NOx Emission Reductions (year achieved)[1]
	Issue final criteria for marine/estuarine eco-regions	Dec 2001	NA
Concentrated Animal Feeding Operations (CAFOs)			
Investigation	Investigate air emissions from CAFOs and evaluate technologies and legal authorities to control harmful emissions.	December 2000	NA
Effluent guidelines for swine and poultry, beef and dairy cattle (Currently apply to feedlots of more than 1,000 animal units)	Propose rule (one year extension)	December 2000	NA
	Promulgate rule	December 2002	NA
Further research	Validate emission factors and demonstrate emission reduction technologies	Begin 2001	NA
Measuring Economic and Environmental Benefits pilot			
Conduct pilot study to quantify benefits to water quality resulting from reduced N due to air pollution controls	Develop economic and fate transport model	2002	NA
Consolidated Emission Reporting Rule (CERR)			
Requires State/Local/Tribes (S/L/T) to develop emission inventories	Proposed rule	Completed	NA
	Promulgate rule	Winter 2000/2001	NA

Element/ Sub-elements	Activities	Estimated Dates	Projected NOx Emission Reductions (year achieved)[1]
National Assessment Activities			
Nitrogen Deposition Assessments	Use RADM and REMSAD models to project impacts of current control programs and scenarios depicting additional NO_X reductions	Fall 2000	NA
	Modeling runs due for release as component of NAPAP Report to Congress	Projected report release Spring 2001	
Modeling on a National Scale	Use REMSAD to model nitrogen deposition for the nation based on 1996 inventories	Winter 2000-2001	NA
	Provide information to State, local and Tribal entities	Fall 2001	NA
	Model projected reductions for future years based on more current inventories	Winter 2001-2002	NA
	Assess policy options for reducing pollutants of concern to water quality	Spring 2002	NA

1. From June 2000, Deposition of Air Pollutants to the Great Waters: Third Report to Congress; Table III-6 on pages III-20 to III-26

2. These are the reductions required based on a March 3, 1999, decision by the D.C. Circuit of the U.S. Court of Appeals. EPA is undergoing rulemaking to address issues raised by the Court regarding emission reductions for internal combustion engines, co-generation units and the States of GA, MO and WI. Based on the results of this rulemaking, additional emission reductions may be required. While States are not required to demonstrate that all of the required emission reductions are made until 2007, States are required to have control measures that require reductions beginning on May 31, 2004.

3. Reductions under the Section 126 action are required to begin on May 1, 2003. States may choose to regulate some or all of the same sources that EPA is regulating under the Section 126 action under the SIP Call starting in 2004. For 2004 and beyond, therefore, emission reductions from the SIP Call action and the Section 126 action should not be considered additive.

NA - Not Available

III. Education, Outreach and Scientific Exchange

Education, outreach and scientific exchange are key components in any program. Much information has been developed and presented on the air deposition problem; however, there is still much yet to be done. Past technologies, such as reports and conferences, still serve a very useful purpose; however, with the expanded use of the Internet, the public has come to expect information to be provided on a real-time basis. We continue to strive to determine the best means of providing information quickly while still also providing the dialogue, training and face-to-face activities which are so important in providing information and developing

solutions to problems. Audiences we are trying to reach include watershed managers and State, Tribal, local and Federal regulators, as well as members of the scientific community, industry and the general public.

While the education and outreach activities discussed in this work plan are those of the Office of Water and Office of Air and Radiation, we are aware that other EPA offices and Federal agencies (e.g., Great Lakes National Program Office, Chesapeake Bay Program Office, and the National Oceanic and Atmospheric Administration) also support education and outreach efforts related to air deposition. We will continue coordinate and collaborate with these programs.

A. Current education and outreach activities:

1. Great Waters Reports to Congress - EPA released the *Third Report to Congress on Deposition of Air Pollutants to the Great Waters* in early June 2000. This report is a compilation of the results of monitoring, studies and investigations being conducted to identify and assess the extent of atmospheric deposition of air pollutants to the Great Waters. It reviews trends in emissions, transport, fate and effects of various pollutants (e.g., mercury, nitrogen) and highlights the programs activities to reduce these effects. It also describes developments in the science and tools (e.g., monitoring networks and models) for analyzing the problem. EPA will begin working on consolidating much of this information into one location by creating a web-site which is a combination of the report and the latest information. This will make information readily available to the general public.

2. Air-Water Initiative - The Air-Water Initiative is part of the Office of Water's efforts to assess the problem of air deposition and find solutions that protect water quality. The initiative began in 1995 and is still considered an important part of the Office of Water's efforts to protect and improve water quality. The Initiative includes the position of an Air-Water Coordinator to facilitate communication between EPA Offices of Water, and Air and Radiation, other EPA Offices, and other Federal agencies on atmospheric deposition issues. The initiative has also funded atmospheric deposition monitoring in various coastal areas and many workshops aimed at both scientists and managers to focus attention on the issue of atmospheric deposition.

3.Nitrogen Brochure - EPA is developing a brochure that describes NO_X and nitrogen-related issues. The document will identify and integrate the multiple effects of nitrogen deposition, as well as the environmental and health benefits that can be derived from emissions reductions. The brochure will be a visually appealing, 20-25 page document providing an integrated characterization of the extent of the nitrogen deposition problem, in terms of both multiple effects and geographic distribution, that contributes to education and outreach.

The brochure focuses on synthesizing and integrating existing information on the broad effects of nitrogen emissions and deposition, presenting the information in an integrated, cohesive, and highly visual manner. The audience for the end product document will be various policy communities (e.g., EPA OAR, OW, and other offices; other Federal agencies; State, local, and Tribal agencies; members of Congress and their staff) and stakeholder groups. Through maps and graphics, accompanied by concise narrative description, the document should characterize multiple effects of nitrogen deposition, including geographic distribution.

4. Scientific Workshops - EPA has sponsored and/or participated in many scientific workshops focused on atmospheric inputs to coastal waters. Some past workshops include:

4. **Shared Resources Conference -** This workshop was held on November 15-16, 2000. The workshop focused on the significance of atmospheric ammonia in coastal and estuarine areas. The regions involved include the Delaware Inland Bays, New York-New Jersey Bight to Florida waters. This workshop was supported by Chesapeake Bay Program Air and Nutrient Subcommittees, EPA's Great Waters Program, and the Mid-Atlantic Regional Air Management Association.

5. **Atmospheric Deposition to the Pacific Coast -** In February 2000, EPA partnered with the Ecological Society of America (ESA) to convene a workshop of west coast scientists and managers to begin a discussion of air deposition concerns on the West Coast. The workshop included discussion of various toxics of concern and international transport among other topics. A summary report is available on the ESA website: http://www.esa.sdc.edu/pcairrpt.htm

6. **Atmospheric Deposition of Toxics to the Great Lakes: Science and Policy** - In 1999 and 2000, workshops were held by the Delta Institute and co-sponsored by U.S. EPA's Great Lakes National Program Office. The workshops attendees included scientists, State and Federal policy-makers, environmental organizations, and industry representatives. The report from the two workshops can be found at: http://www.delta-institute.org/publications/airtoxics.pdf

7. **The Role of Atmospheric Deposition in the Gulf of Mexico Hypoxic Zone** - The ESA with support from EPA and the Gulf of Mexico Program hosted this workshop in September 1999. The workshop report can be located on the ESA website at: http://esa.sdsc.edu/hypoxrpt.htm

8. **Acid Deposition: The Ecological Response -** The workshop was held on March 1-3, 1999, and was sponsored by the ESA and several Federal agencies, including EPA, USDA Forest Service (USFS), U.S. Geological Survey (USGS), and the National Acid Precipitation Assessment Program (NAPAP). The workshop report can be located on the ESA website at: http://esa.sdsc.edu/aciddep.htm

9. **Atmospheric Deposition Workshop** - The purpose of this workshop, held in October 1998, was to bring together representatives of the National Estuary Programs with representatives of EPA, NOAA, and the research community to discuss air deposition science and issues. Deposition of both toxics and nitrogen were discussed.

10. **Atmospheric Nitrogen Deposition to Coastal Watersheds** - This workshop took place in June 1997, and was convened by ESA with support from EPA and NOAA. The workshop report can be located on the ESA website at: http://esa.sdsc.edu/sbindep1.htm

11. **Airsheds and Watersheds II: A Shared Resources Workshop** - This workshop took place in March 1997, and was organized by the Alliance for the Chesapeake Bay. The workshop executive

summary and report can be located on the NOAA website at: http://www.arl.noaa.gov/milestn/mile6.html

12. **Airsheds and Watersheds: The Role of Atmospheric Nitrogen Deposition** - This workshop took place in October 1995, and was organized by the Alliance for the Chesapeake Bay. The workshop executive summary and report can be located on the NOAA website at: http://www.arl.noaa.gov/research/aq/sr/report.html

B. Challenges to Address:

Environmental managers need training to better understand how to evaluate whether they have an air deposition problem, and if so how to better characterize the air deposition problem. They also need help determining the best way to address the problem once it has been identified, either through the use of a TMDL or other means.

The public has received information on the problems associated with air deposition through items such as the Great Waters report to Congress, however there is still a lack of air deposition information that is provided on an on-going basis. Public participation and education is a vital part of any program, and EPA needs to make information easily accessible.

C. Actions we plan to address these challenges:

We plan to increase our efforts to provide the necessary training and information that environmental managers need, and also to address the public's need for information through the following actions:

1.Training - EPA is planning to offer regional training workshops, which will include relevant State, Tribal and local staff, to help managers and others to better understand the importance of the air/water connection and to lay out resources and tools that are available to characterize and reduce air deposition. Two of these workshops will be conducted each year from FY200l through FY2003.

2. Handbook for water resource managers - EPA is developing a handbook for water quality managers to help them address atmospheric deposition in their watersheds. It will start at the beginning of the process by explaining what clues suggest atmospheric deposition might be a problem in a watershed. The handbook will describe how to make a first estimate of the significance of atmospheric deposition using data that has already been collected and suggests sources to find that information. Various options for monitoring and modeling atmospheric deposition are explained, along with some general information of technical terms and equipment that a practitioner will probably need to know. The goal of the Handbook is to provide enough information on how to answer questions about air deposition that users will be able make informed decisions about their options.

3. Ecological Assessment Handbook for States and Tribal Nations - EPA is leading an effort to develop

an Ecological Assessment Handbook for States and Tribal Nations . The purpose of the handbook is to provide guidance on developing policy-relevant ecological assessment studies to determine the environmental response to the emission reductions from the Acid Deposition Control Program (1990 Clean Air Act Amendments) and/or future emission reduction strategies. The handbook attempts to outline the steps involved in the assessment process as well as to provide a discussion of details about some relevant data, networks, and models that can assist in this effort. To a limited extent, the handbook will discuss water quality issues and air impacts to water bodies.

4. Website Development - EPA has a goal of providing easy access to current information related to atmospheric deposition through the world wide web. EPA will be reviewing the current websites and considering improvements to better achieve this goal.

5. Scientific Workshops - Several workshops or conferences have been planned to discuss information on problems with air deposition which will in part be sponsored by EPA.

13. **Second International Nitrogen Conference**
The Second International Conference (N2001) will take place in Potomac, MD, from October 14-18, 2001. The Conference will focus primarily on North America with a secondary focus on Asia. It will provide a much-needed opportunity to update scientific understanding of nitrogen science and policy, as well as giving attention to Asia, the most rapidly developing region in the world. Given the rapidly increasing knowledge base on the science, and the increasing interest of the policy community, such an update will be very timely in both developed and developing nations all over the world. The goals of the Conference are to:

1. Build scientific knowledge about nitrogen sources and fate;
2. Stimulate discussions between nitrogen producers and consumers;
3. Develop balanced strategies to increase food and energy production while decreasing environmental impacts.

These goals will be accomplished through plenaries, concurrent paper sessions, and poster sessions focusing on science, policy, and management issues. EPA is playing an important role in the conference, with members on both the Organizing and Program Committees, as well as providing substantial funding.

14. **Scientific Workshop TBD** - At least one additional scientific workshop will be held between 2000 and 2002.

Section III: Education, Outreach and Scientific Exchange Activities

Element/ Sub-elements	Activities	Estimated Dates
Great Waters Report to Congress		
Third Report	Complete report covering six required elements	June 2000
Nitrogen Brochure		
Integrated description of NOx and nitrogen-related issues	Publication of brochure	Summer 2000
Scientific Workshops		
Previous Workshops	Shared Resources Workshop - Ammonia	November 2000
	West Coast Workshop	February 2000
	Atmospheric Deposition of Toxics to the Great Lakes: Science and Policy	1999/2000
	Role of Atmospheric Deposition in the Gulf of Mexico Hypoxic Zone	September 1999
	Acid Deposition: The Ecological Response	March 1999
	Atmospheric Deposition Workshop	October 1998
	Atmospheric Nitrogen Deposition to Coastal Watersheds	June 1997
	Airsheds and Watersheds II: A Shared Resources Workshop	March 1997
	Airsheds and Watersheds: The Role of Atmospheric Nitrogen Deposition	October 1995
Future Workshops	Second International Nitrogen Conference	October 2001
	Atmospheric Deposition Workshop	TBD
Training		
Regional Workshops	Assist environmental managers with air deposition concerns, two workshops per year	2001-2003

Element/ Sub-elements	Activities	Estimated Dates
Handbooks		
Handbook for water resource managers	Final handbook	Winter 2000/2001
Ecological Assessment Handbook for States and Tribal Nations	Final handbook	Spring 2001
Website Development		
Air Deposition Websites	Improve website usability and information provided	Ongoing