Environmental Protection Agency

FY 2002 Annual Performance Plan and Congressional Justification

Clean Air

Strategic Goal: The air in every American community will be safe and healthy to breathe. In particular, children, the elderly, and people with respiratory aliments will be protected from health risks of breathing polluted air. Reducing air pollution will also protect the environment, resulting in many benefits, such as restoring life in damaged ecosystems and reducing health risks to those whose subsistence depends directly on those ecosystems.

Resource Summary
(Dollars in thousands)

		FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
Goal 01	**Clean Air**	$535,284.5	$544,094.1	$590,082.0	$564,628.0
Obj. 01	Attain NAAQS	$427,182.1	$430,096.2	$456,019.5	$436,470.3
Obj. 02	Reduce Air Toxics Risk	$89,966.2	$94,748.6	$112,272.7	$109,247.2
Obj. 03	Reduce Acid Rain.	$18,136.2	$19,249.3	$21,789.8	$18,910.5
	Total Workyears	1,751.4	1,803.7	1,855.6	1,810.8

*For proper comparison with the FY 2002 request, the historic data has been converted to be consistent with the new 2000 Strategic Plan structure. Goal and Objective resources for FY 1999, FY 2000, and FY 2001 may therefore differ from the resources reported in the FY 2001 Annual Plan and Budget and the FY 2000 Annual Report.

Background and Context

The average American breathes 3,400 gallons of air each day. Despite concerted efforts and steady progress toward achieving cleaner, healthier air, air pollution continues to be a widespread human health and environmental problem in the United States. Air pollution contributes to illnesses such as cancer and to respiratory, developmental and reproductive problems. Children are at greater risk because they are more active outdoors and their lungs are still developing. The elderly are also more sensitive to air pollution because they often have heart or lung disease.

Certain air pollutants (such as some metals and organic chemicals) that are emitted from industrial sources can be deposited into water bodies and magnified through the food web, adversely affecting fish-

eating animals and humans. Currently about 2,500 water bodies are under fish consumption advisories resulting from chemicals such as PCBs, chlordane, dioxins and mercury. Air pollution also makes soil and waterways more acidic, reduces visibility, and accelerates corrosion of buildings and monuments.

EPA responds to air pollution problems that are national and international in scope. Air pollution crosses local and state lines and, in some cases, crosses our borders with Canada and Mexico. This causes problems not only for the majority of the population that lives in expanding urban areas but also for less populated areas and national parks. Federal assistance and leadership are essential for developing cooperative state, local, Tribal, regional, and international programs to prevent and control air pollution, for ensuring that national standards are met, and for providing tools for states, tribes, and local communities to use in developing and implementing their clean air plans.

Means and Strategies

Criteria pollutants. EPA develops standards to protect human health and the environment that limit concentrations of the most widespread pollutants (known as criteria pollutants), which are linked to many serious health and environmental problems:

- Ground-level ozone. Impairs normal functioning of the lungs in healthy people, as well as in those with respiratory problems. Relatively low amounts can cause coughing, shortness of breath, and pain, especially when taking a deep breath. Ground-level ozone can aggravate lung conditions, such as asthma, and is associated with increased medication use, visits to emergency rooms, and hospital admissions. Ozone can inflame and damage the lining of lungs. Also causes damage to vegetation and contributes to visibility problems.

- Particulate matter (PM). Coarse particles can aggravate respiratory conditions such as asthma. Exposure to fine particles is associated with several serious health effects, including premature death. When exposed to PM, people with existing heart or lung diseases - such as asthma, chronic obstructive pulmonary disease, congestive heart disease, or ischemic heart disease - are particularly vulnerable and are at increased risk of premature death or admission to the hospital or emergency room. Also affects the environment through visibility impairment.

- Sulfur dioxide (SO_2). Long-tem exposure to both sulfur dioxide and fine particles can aggravate respiratory illness, alter the defense mechanisms of lungs, and aggravate existing cardiovascular disease. People who may be most susceptible to these effects include individuals with cardiovascular disease or chronic lung disease, as well as children and the elderly. Sulfur dioxide is also a major contributor to acid rain.

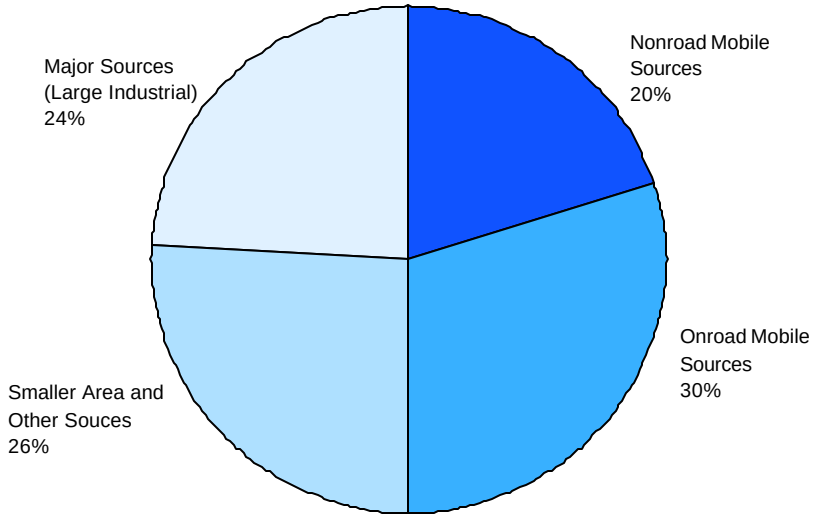
- Nitrogen dioxide (NO_2). Exposure to NO_2 causes respiratory symptoms such as coughing, wheezing, and shortness of breath in children and adults with respiratory disease, such as asthma. Even short exposures to nitrogen dioxide affect lung function. Nitrogen dioxide also contributes to acidic deposition, eutrophication in coastal waters and visibility problems.

- Carbon monoxide (CO). People with cardiovascular disease may experience chest pain and generally increased cardiovascular symptoms when exposed to carbon monoxide, particularly while exercising. People with marginal or compromised cardiovascular and respiratory systems (e.g., individuals with congestive heart failure, cerebrovascular disease, anemia, chronic obstructive lung disease) and possibly fetuses and young infants may also be at greater risk to carbon monoxide pollution.

- Lead. Accumulates in the body in blood, bone, and soft tissue and can affect the kidneys, liver, nervous system and other organs. Excessive exposure to lead may cause kidney disease, reproductive disorders, and neurological impairments such as seizures, mental retardation, and/or behavioral disorders. Fetuses and children are especially susceptible to low doses of lead, often suffering central nervous system damage or slowed growth.

Hazardous air pollutants. Hazardous air pollutants (HAPs), commonly referred to as air toxics or toxic air pollutants, are pollutants that cause, or may cause, adverse health effects or ecosystem damage.

1996 National Toxic Air Pollutant Emissions by Source



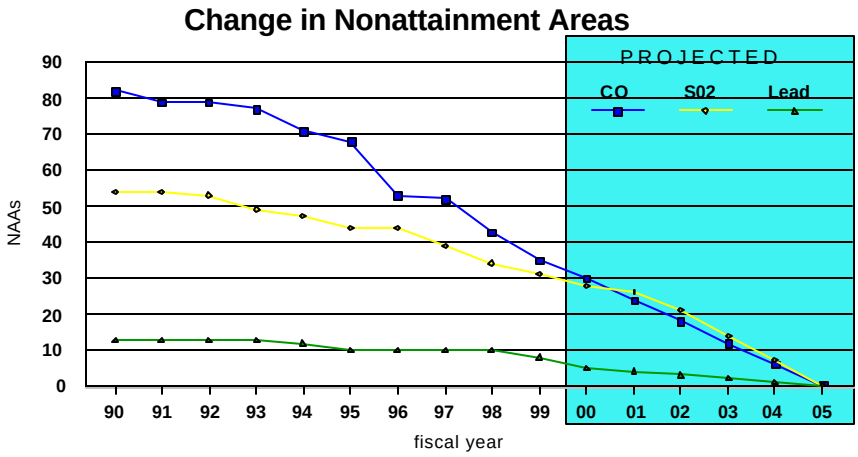
General summary of the summed national emissions in the 1996 National Toxics Inventory-based on source sectors and urban and rural designations.
Note: Mobile source emissions do not include diesel particulates.

The Clean Air Act Amendments of 1990 list 188 pollutants or chemical groups as hazardous air pollutants and target sources emitting them for regulation. Examples of air toxics include: heavy metals such as mercury and chromium, dioxins, and pesticides such as chlordane and toxaphene. HAPs are emitted from literally thousands of sources including stationary as well as mobile sources. Adverse effects to human health and the environment due to HAPs can result from even low level exposure to air toxics from individual facilities, exposures to mixtures of pollutants found in urban settings, or exposure to pollutants emitted from distant sources that are transported through the atmosphere over regional, national, or even global airsheds.

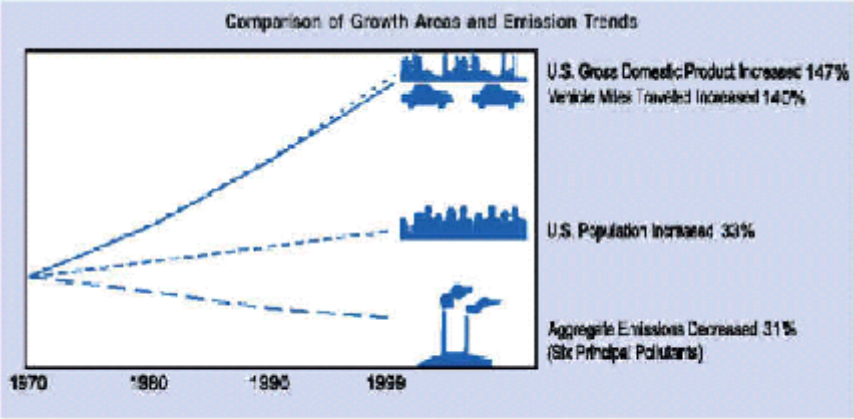
Compared to information for the criteria pollutants, the information about the potential health effects of HAPs (and their ambient concentrations) is relatively incomplete. Most of the information on potential health effects of these pollutants is derived from experimental animal data. Of the188 HAPs listed in the Clean Air Act, almost 60 percent are classified by EPA as known, probable, or possible carcinogens. One of the often documented ecological concerns associated with toxic air pollutants is the potential for some to damage aquatic ecosystems. Deposited air pollutants can be significant contributors to overall pollutant loadings entering water bodies.

Acid rain. The Clean Air Act Amendments of 1990 established a program to control emissions from electric power plants that cause acid rain and other environmental and human health problems. Emissions of SO_2 and nitrogen oxides (NO_x) react in the atmosphere and fall to earth as acid rain, causing acidification of lakes and streams and contributing to the damage of trees at high elevations. Acid deposition also accelerates the decay of building materials and paints and contributes to degradation of irreplaceable cultural objects such as statues and sculptures. NO_x emissions are a major precursor of ground-level ozone, which affects human health and damages crops, forests, and materials. Additionally, NO_x deposition contributes to eutrophication of coastal waters, such as the Chesapeake Bay and Tampa Bay. Before falling to earth, SO_2 and NO_x gases form fine particles that ultimately may affect human health by contributing to premature mortality, chronic bronchitis, and other respiratory problems. The fine particles also contribute to reduced visibility in national parks and elsewhere.

Trends. Air quality has continued to improve during the past 10 years. Concentrations of all six criteria pollutants have decreased. Nationally, air quality concentration data taken from thousands of monitoring stations across the country have continued to show improvement since the 1980s for ozone, PM, CO, NO_2, SO_2, and lead. Areas in the country where air pollution levels persistently exceed national ambient air quality standards are designated in "nonattainment." As this chart shows, all the years throughout the 1990s have shown better air quality than any of the years in the



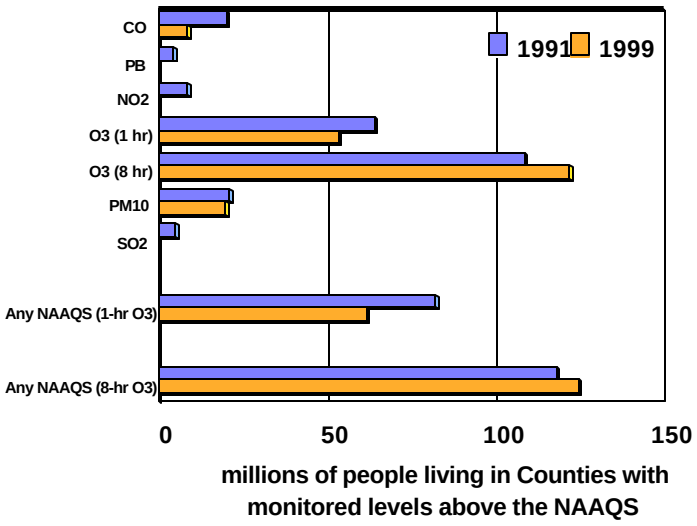
1980s based upon nonattainment areas. This steady trend of improvement resulted in spite of weather conditions in the 1990s which were generally more conducive to higher pollution levels, especially ground-level ozone formation. Emissions of hazardous air pollutants have also been reduced significantly; estimates of nationwide air toxic emissions have dropped approximately 23 percent between 1990 and 1996. For example, perchloroethylene monitored in 16 urban sites in California showed a drop of 60 percent from 1989 to 1998. Benzene, emitted from cars, trucks, oil refineries and chemical processes, is another widely monitored toxic air pollutant. Measurements taken from 84 urban monitoring sites around the country show a 39 percent drop in benzene levels from 1993 to 1998. There have been dramatic reductions (10 to 25 percent) in sulfates deposited in the most sensitive systems located in the northeastern United States since the implementation of the acid rain program in 1995.



Between 1970 and 1999, U.S. population increased 33 percent, vehicle miles traveled increased 140 percent, and gross domestic product increased 147 percent. At the same time, total emissions of the six principal air pollutants decreased 31 percent.

The dramatic improvements in emissions and air quality occurred simultaneously with significant increases in economic growth and population. The improvements are a result of effective implementation of clean air laws and regulations, as well as improvements in the efficiency of industrial technologies.

While substantial progress has been made, it is important not to lose sight of the magnitude of the air pollution problem that still remains. Despite great progress in air quality improvement, over 150 million tons of air pollution were released into the air in 1999 in the United States, and approximately 62 million people lived in counties where monitored data showed unhealthy air for one or more of the six principal pollutants. Even in cities with nonattainment status, air quality standards are met most of the time of hours monitored. However, it is important to note that serious health effects can occur with even limited exposure. Some national parks, including the Great Smoky Mountains and the Shenandoah, have high air pollution concentrations resulting from



the transport of pollutants many miles from their original sources and from biogenic VOCs within the parks. In 1999, for the second consecutive year, average rural 1-hour ozone (smog) levels were greater than the average levels observed for urban sites.

Strategy. To continue to reduce air pollution, the Clean Air Act sets specific targets for the mitigation of each air pollution problem. The Act also mandates the air quality monitoring that helps measure progress. In addition, the Act lays out a specific roadmap for achieving those goals that EPA and its partners -- states, tribes, and local governments -- have to do to clean up the air. One constant across the titles in the Act is that the pollution control strategies and programs it contains are all designed to get the most cost-effective reductions early on. The early reductions program in toxics, Phase 1 of the Acid Rain program, Tier I and Tier 2 auto emission standards, more stringent standards on diesel exhaust from trucks and buses, the reformulated gasoline program, and the MACT standards program were all designed to achieve early reductions, making our air cleaner and safer to breathe. The problems that remain are some of the most difficult to solve.

We have developed strategies to address this difficult increment and overcome the barriers that have hindered progress towards clean air in the past. We will use flexible approaches, where possible, instead of hard and fast formulas or specific technological requirements. Efforts will focus on:

- Coupling ambitious goals with steady progress - The emphasis will be on achieving near-term actions towards meeting the standards, while giving states, tribes, and local governments time to implement more difficult measures. We recognize that it will be difficult for some areas of the country to attain the new NAAQSs for ozone and fine particles, and we believe it will take more than individual state efforts to achieve the needed emission reductions. We will work with states, tribes, and local governments to identify ways to achieve interim reductions, principally through regional strategies, national strategies, and the air toxics and acid rain programs by building on multi-pollutant emission reductions.

  This approach ensures progress toward the goal and, for many areas, will achieve the goal. For those areas where additional measures are required, this work will allow progress toward the goal while providing the time to identify measures that will get that last increment to fully achieve the goal. For example, many areas will still be implementing measures to implement the 1-hour ozone standard while they are developing new strategies for achieving the revised 8-hour standard.

- Maintaining accountability with flexibility - In 2001, the Agency released final guidance for states that want to use economic incentive programs to improve air quality and visibility. Economic incentive programs include a variety of measures designed to increase flexibility and efficiency, while maintaining accountability and enforceability of traditional air quality management programs. EPA's guidance encourages cost-effective and innovative approaches to achieving air pollution goals. Economic incentive programs are incorporated into states' strategies for meeting air quality standards and visibility goals.

In addition, recent mobile source rulemakings established programs to reduce vehicle and engine emissions and to reduce sulfur levels in fuel. These programs meet industry needs for flexibility, while containing clear deadlines, milestones, and reporting requirement to monitor compliance.

- Fostering technical innovations where they provide clear environmental benefits - Market-based approaches provide "niches" for many types of technologies; no one size will fit all. Sources of pollution can improvise, innovate, and otherwise be creative in reducing emissions. We will promote such technological innovation and then disseminate it to others to show how they can get needed reductions. For example, in FY 2002 EPA plans to work with states on developing a process for SIP credits for new technologies and for developing early emissions reductions programs that could help minimize the impact of environmental regulations on economic growth in urban areas.

- Building partnerships - There are numerous forms of partnerships, all of which have been used by EPA at one point or another in implementing the Clean Air Act. EPA uses public outreach to educate people on air problems and encourages them to work to solve them. EPA involves broad-based groups, such as the multi-state Ozone Transport Assessment Group, to study a problem and provide recommendations to EPA on ways to solve it. EPA also works with organizations like the National Academy of Sciences (NAS) on both short-term and long-term research priorities. EPA also engages in regulatory negotiations to bring stakeholders to work on a problem and address a specific regulatory issue. EPA will continue to use these types of partnerships, as appropriate. For example, EPA is working with five regional planning bodies on regional strategies for addressing regional haze. Since many of the strategies for addressing haze and PM are the same, this effort will also provide for partnering to implement the PM standard.

- Anticipating upcoming issues and ensuring that research is underway in those areas. The Agency is seeking to better understand the root causes of the environmental and human health problems created by air toxics in urban areas, thereby improving the ability to weigh alternative strategies for solving those problems. Research will be devoted to the development of currently unavailable health effects and exposure information to determine risk and develop alternative strategies for reducing risks. Based on this research we will be able to model and characterize not only the current toxics risks and compare national program alternatives, but also identify regional and local "hot spots," and model alternative strategies to assist states and localities in solving their air and water toxics problems.

Using these strategies, we will work with areas that have the worst problems to develop strategies accounting for unique local conditions that may hinder them from reaching attainment. We also will work with states, tribes, and local governments to ensure that work they are doing on the PM and ozone standards effectively targets both pollutants, as well as regional haze, air toxics and greenhouse gas emissions to maximize the effectiveness of control strategies. On the national level, we will continue to implement or establish Federal standards to require cleaner motor vehicles, fuels and non-road equipment that are cost effective and technically feasible. We also will target source characterization work, especially

development and improvement of emissions information, that is essential for the states, tribes and local agencies to develop strategies to meet the standards. We will look closely at urban areas to determine the various sources of toxics that enter the air, water, and soil and determine the best manner to reduce the total toxics risk in these urban areas. We will also focus on research that will inform and enhance our regulatory decisions as well as research that explores emerging areas.

Research

To reach the objective of attaining and reviewing the NAAQS for tropospheric ozone, particulate matter (PM), and other pollutants, research will provide methods, models, data and assessment criteria on health risks, focusing on the exposures, mechanisms of injury, and components which affect human health. In FY 2002, EPA will provide tropospheric ozone precursor measurements methods, emissions-based air quality models, observation-based modeling methods, and source emissions information to guide State Implementation Plan (SIP) development. In support of Agency efforts to attain the NAAQS for PM, research in FY 2002 will continue to provide data on human exposure to PM and the health effects of that exposure, as well as provide methods for assessing the exposure and toxicity of PM. Modest research and technical support efforts to support other NAAQS pollutants will also be carried out.

Air toxics research investigates the root causes of the air toxics environmental and human health problems in urban areas. Efforts will focus on providing new methods to estimate human exposure and health effects from high priority air toxics, and mobile source air toxics . With this information the Agency will be in a better position to determine risk and develop alternative strategies for maximizing risk reductions.

Strategic Objectives and FY 2002 Annual Performance Goals

Objective 01: Attain NAAQS

- Certify that 3 new areas of the remaining 52 nonattainment areas have attained the 1-hour NAAQS for ozone, thus increasing the number of people living in areas with healthy air quality by 2.9 million.

- Maintain healthy air quality for 1.3 million people living in 15 areas attaining the PM standards; increase by 60 thousand the number of people living in areas with healthy air quality that have newly attained the standard.

- Provide data on the health effects and exposure to particulate matter (PM) and provide methods for assessing the exposure and toxicity of PM in healthy and potentially susceptible subpopulations to strengthen the scientific basis for reassessment of the NAAQS for PM.

- Maintain healthy air quality for 44.3 million people living in 70 areas attaining the CO, SO2, NO2, and Lead standards; increase by 350 thousand the number of people living in areas with healthy air quality that have newly attained the standard.

Objective 02: Reduce Air Toxics Risk

- Air toxics emissions nationwide from stationary and mobile sources combined will be reduced by 5% from 2001 (for a cumulative reduction of 40% from the 1993 level of 4.3 million tons per year.)

Objective 03: Reduce Acid Rain

- 2 million tons of NOx from coal-fired utility sources will be reduced from levels that would have been emitted without implementation of Title IV of the Clean Air Act Amendments.

- Maintain or increase annual SO2 emission reduction of approximately 5 million tons from the 1980 baseline. Keep annual emissions below level authorized by allowance holdings and make progress towards achievement of Year 2010 SO2 emissions cap for utilities.

Highlights

Reduce emissions of criteria pollutants

Ground-level ozone, fine PM and regional haze have many similarities. All three problems result from their formation under certain atmospheric conditions in the presence of gases, such as NO_x and VOCs, emitted by the same types of sources. Because of these similarities, there are opportunities for integrated strategies for reducing pollutant emissions in the most cost-effective ways.

In FY 2002, EPA will assist states, tribes and local governments in devising additional stationary source and mobile source strategies to reduce ozone and particulate matter. Some specific activities and initiatives in this program for FY 2002 will include:

- Propose a decision on whether to retain or revise the NAAQS for PM.

- Implement Tier II (light-duty) vehicle and gasoline standards and 2004/2007 heavy-duty highway engine and diesel sulfur requirements. This includes continued assessment of required technology. Continue implementing other mobile source programs, such as the Tier 1 standards for locomotives and Phase 2 standards for small spark-ignition handheld engines (e.g., trimmers, brush cutters, and chainsaws).

- Continue to help create voluntary diesel retrofit projects to reduce PM and, where possible, NO_x. Continue to develop projects to reduce diesel idling time at truck stops and along highways.

- Propose standards for heavy-duty non-road, land-based diesel engines and vehicles, potentially including new diesel fuel sulfur requirements. Propose standards for commercial marine diesel engines used in ocean-going vessels. Finalize regulatory program that will address emissions from a range of unregulated non-road sources and highway motorcycles. The non-road sources include industrial spark-ignition engines (e.g., forklifts and generators), recreational gasoline engine (e.g., all terrain vehicles and off-road motorcycles), and recreational marine gasoline and diesel.

- Continue and expand the voluntarily organized, state-run regional program for seasonal ozone control. EPA administers the NOx Allowance and Emissions Tracking Systems for the NOx Budget Program, as requested by nine states in the Northeast Ozone Transport Region (OTR). In FY 2002, this program will be in its fourth compliance year. The Clean Air Markets Division has launched a multi-year effort to re-engineer the information technology support structure for the Allowance and Emissions Tracking Systems; system modernization is needed to handle increased emissions reporting and allowance trading activities, for improved public access, and timely exchange of data with state partners.

- Continue to work with tribes: developing programs for Indian Country, making eligibility determinations, completing VOC and NO_x emission inventories and approving Tribal air programs as appropriate.

- Continue efforts to improve emission models and start development of the "new generation model" that will greatly improve EPA's ability to support the development of emissions control programs, as well as providing support to the states and tribes in their determination of program needs to meet air quality standards

- Continue outreach efforts to promote public awareness of the Air Quality index and the effects of pollution. Continue to enhance the content and promotion of the Green Vehicle Guide Website. These activities will encourage consumers to purchase the cleanest and most fuel efficient vehicle that meets their needs.

- Develop a program of SIP credits that result from voluntary measures to reduce emissions.

For all NAAQS pollutants, we will continue to redesignate areas to attainment as they meet the standards, carry out the regular review of the NAAQS using the most current science, and ensure the maintenance of NAAQSs in areas that have clean air. For the CO, SO_2, and lead NAAQSs, there are some states that have areas that cannot meet the standards because of some particular, source-specific problem. These sources are often high-profile and critical to the local economy. We will work cross-Agency to develop strategies that help them to comply, while being sensitive to economic and other issues.

Target air toxics in urban areas

In FY 2002, EPA will develop strategies and rules to help states and tribes reduce emissions and exposure to hazardous air pollutants, particularly in urban areas, and reduce harmful deposition in water bodies. Some specific activities and initiatives in this program for FY 2002 include:

- Implement the final mobile source air toxics rule, issued in December 2000, by gathering emissions data, conducting exposure analyses, and evaluating the need for additional controls in FY 2002.

- Incorporate toxics emissions data into the mobile source models.

- Make further progress in linking release and exposure information from the various media programs to determine multi-media toxics exposure and use this information to develop cross-media strategies to more effectively reduce urban exposures to toxic emissions.

- Develop the final Federal Plan for small municipal waste combustors.

- Promulgate a Generic MACT rule that covers carbon black production, cyanide chemical manufacturing, ethylene processes, and spandex production.

- Promulgate remaining 10-year MACT standards, including standards covering plywood and composites wood products with facilities in 41 states, reciprocating internal combustion engines with over 30,000 facilities, over 10,000 municipal landfills, and miscellaneous organic hazardous air pollutants from 23 different source categories.

Continue market-based acid rain program

In FY 2002, Phase II of the Acid Rain Program will complete its second compliance year and commence the third year of operation. The Program requires annual reductions in SO_2 emissions from more than 2,500 electric utility units (gas-fired, oil-fired, and coal-fired) and reductions in year-round NO_x emissions from approximately 750 coal-fired units. The market-based approaches pioneered by EPA in the Acid Rain Program are being used to solve other air quality problems (e.g., ground-level ozone).

Research

To reach the objective of attaining and reviewing the NAAQS for tropospheric ozone, particulate matter (PM), and other pollutants, research will provide methods, models, data and assessment criteria on health risks, focusing on the exposures, mechanisms of injury, and components which affect human health. In FY 2002, EPA will provide tropospheric ozone precursor measurements methods, emissions-based air quality models, observation-based modeling methods, and source emissions information to guide State Implementation Plan (SIP) development. In support of Agency efforts to attain the NAAQS for PM, research in FY 2002 will continue to provide data on human exposure to PM and the health effects of that exposure, as well as provide methods for assessing the exposure and toxicity of PM. Modest research and technical support efforts to support other NAAQS pollutants will also be carried out.

Air toxics research investigates the root causes of the air toxics environmental and human health problems in urban areas. Efforts will focus on providing new methods to estimate human exposure and health effects from high priority air toxics, and mobile source air toxics. With this information the Agency will be in a better position to determine risk and develop alternative strategies for maximizing risk reductions.

External Factors

Stakeholder participation. To achieve our collective goal of healthy, clean air, EPA relies on the proactive cooperation of Federal, state, Tribal, and local government agencies; industry; non-profit organizations; and individuals. Our success is far from guaranteed even with the full participation of all our stakeholders. EPA has significant work to accomplish just to reach its annual targets that support the longer term health and environmental outcomes and improvements that are articulated in the Clean Air goal. Meeting the Clean Air goal necessitates a strong partnership among all the stakeholders but in particular, among the states, tribes, and EPA, the Environmental Council of States, and organizations of state and local air pollution control officials. And, as we begin the 21st century, EPA will be working with our various stakeholders to encourage new ways to meet the challenges of "cross regional" issues as well as to integrate our programs to holistically address airborne pollutants.

Environmental factors. In developing clean air strategies, states, tribes, and local governments consider normal meteorological patterns. As EPA develops standards and programs to achieve the Clean Air goal, it has to consider weather as a variable in the equation for implementing standards and meeting program goals. For example, even if an area is implementing a number of air pollution control programs under normal meteorological patterns, a hot humid summer may cause an area to exceed standards for days at a time, thereby exposing the public to unhealthy air.

Litigation. In July 1997, EPA published revised, more protective NAAQS for ozone and PM. The standards are currently under litigation. In February, 2001, the U.S. Supreme Court issued an opinion largely upholding EPA's position on several key issues related to these standards. The Supreme Court sent the case back to the U.S. Court of Appeals for the District of Columbia Circuit to address unresolved issues that challengers had raised before the D.C. Circuit. The D.C. Circuit had not addressed these issues before because it had remanded the standards to EPA based primarily on its finding that the Clean Air Act, as EPA had interpreted it, was unconstitutional -- a finding the Supreme Court has now reversed.

EPA is currently evaluating the Supreme Court opinion, the opinions of the D.C. Circuit, and several legislative provisions to determine how to proceed. We continue to believe that the standards are necessary to protect human health, and nothing in the decisions undercuts that belief. We are evaluating our programs to determine how best to secure necessary human health protections while still respecting the courts' decisions. This litigation does not affect standards that were in place prior to July 1997.

Coordination with Other Agencies

Clean air is a national goal that requires the cooperation and efforts of many agencies, organizations, industries, and academic entities. Beyond EPA, for example, each state has a department of natural resources, environment, or health that deals with air pollution issues. EPA also coordinates with several other Federal agencies in achieving goals related to ozone and PM. For example, EPA is working closely with the Department of Agriculture in developing its agricultural burning policy. EPA, the Department of Transportation, and the Army Corp of Engineers work with state and local agencies to help them manage growth and urban sprawl. EPA worked with the Department of the Interior, National Park Service, in developing its regional haze program and deploying the Interagency Monitoring of Protected Visual Environments (IMPROVE) visibility monitoring network.

EPA also coordinates with other Federal agencies and international organizations in carrying out research. For example, EPA's tropospheric ozone research program is coordinated with the research efforts of others. A significant portion of the tropospheric ozone research is coordinated through the efforts of the North American Research Strategy for Tropospheric Ozone (NARSTO). The remainder of the EPA tropospheric ozone research program focuses on needs associated with the review of the tropospheric ozone NAAQS, which is also not being met by others.

The science and policy communities have agreed that solving the PM issue will require substantial, coordinated research efforts. EPA is taking steps to achieve public/private coordination and cooperation by (1) initiating health and exposure research coordination among Federal agencies and with public/private research organizations; (2) completing an EPA Research Strategy for PM; and (3) participating as a sponsoring member of NARSTO as it realigns its mission and research agenda to include PM atmospheric sciences research. An inventory of PM research in the public and private sectors has been developed.

The 1998 Appropriations Act identified an important role for the National Academy of Sciences (NAS) in developing and monitoring implementation of a comprehensive, prioritized, near- and long-term PM research plan, working in close consultation with representatives from many public and private sector organizations. The PM research plan is intended to be the principal guideline for the Agency's PM research program for the next several years. The plan also affects other agencies, with Congress expecting the EPA and other Federal agencies to review their ongoing PM research activities and, where appropriate, re-focus activities so as to be consistent with the NAS plan.

Opportunities exist to complement EPA capabilities through programs targeted toward the academic community, such as in epidemiology research to evaluate the consequences of long-term exposure to ambient PM. The Department of Health and Human Services supported much of the current epidemiological research on links between long-term exposure to ambient PM and life shortening and other long-term health effects, thus the capacity to conduct large-scale epidemiological research on PM is generally found outside EPA. EPA is entering into an Interagency Agreement with the National Institute of Allergy and Infectious Diseases to study, for the next several years, the role of PM and co-pollutants on asthma in children.

In a national air toxics strategy, EPA will address whether any control measures are needed to address the urban toxics risk beyond other actions required under the Clean Air Act Amendments. EPA's toxic research supports the Agency's regulatory efforts, which aid state and local governments in lowering major source and mobile source emissions.

Environmental Protection Agency

FY 2002 Annual Performance Plan and Congressional Justification

Clean Air

Objective #1: Attain NAAQS

Reduce the risk to human health and the environment by protecting and improving air quality so that air throughout the country meets national clean air standards by FY 2005 for carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead; by FY 2012 for ozone; and by FY 2018 for particulate matter (PM). To accomplish this in Indian country, the tribes and EPA will, by FY 2005, have developed the infrastructure and skills to assess, understand, and control air quality and protect Native Americans and others from unacceptable risks to their health, environment, and cultural uses of natural resources.

Resource Summary
(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
Attain NAAQS	**$427,182.1**	**$430,096.2**	**$456,019.5**	**$436,470.3**
Environmental Program & Management	$100,054.5	$113,443.9	$130,314.6	$117,015.4
Science & Technology	$146,376.5	$147,692.2	$140,057.3	$132,473.4
State and Tribal Assistance Grants	$180,750.1	$168,960.1	$185,647.6	$186,981.5
Total Workyears	1,293.3	1,314.2	1,379.5	1,351.7

Key Programs
(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$180,750.1	$176,636.1	$185,647.6	$186,981.5
Tropospheric Ozone Research	$18,100.4	$6,273.7	$6,551.0	$6,786.0
Particulate Matter Research	$55,842.9	$62,300.5	$68,765.0	$65,743.3

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
EMPACT	$2,578.7	$2,969.1	$1,797.9	$0.0
Project XL	$0.0	$390.5	$0.0	$0.0
Common Sense Initiative	$0.0	$135.6	$0.0	$0.0
Ozone	$69,292.5	$58,679.8	$67,981.6	$69,615.1
Particulate Matter	$65,569.8	$54,118.7	$55,617.3	$54,693.0
Regional Haze	$12,254.9	$1,851.5	$2,305.9	$2,352.1
Lead	$326.3	$357.7	$329.5	$339.9
Sulfur Dioxide	$9,993.1	$9,863.7	$12,158.1	$12,495.2
Nitrogen Oxides	$956.9	$2,407.1	$1,379.4	$1,323.1
Carbon Monoxide	$3,383.7	$4,067.5	$4,062.3	$4,128.8
Rent, Utilities and Security	$0.0	$21,005.2	$20,363.1	$21,645.1
Administrative Services	$304.3	$3,220.3	$3,643.9	$3,505.8
Regional Management	$0.0	$1,123.1	$1,597.9	$1,388.0

FY 2002 Request

Under the Clean Air Act (CAA), EPA must set and periodically review National Ambient Air Quality Standards (NAAQSs) for pollutants that are widespread, endanger human health and the environment, and originate from numerous and diverse sources. These pollutants include ozone, particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead (Pb). Each pollutant and the programs that reduce it are described separately below. This objective also includes cross-pollutant preconstruction and operating permit programs. For each pollutant, EPA sets both health-based or "primary" standards to protect human health, and welfare-based "secondary" standards to protect the environment (crops, vegetation, wildlife, buildings and national monuments, etc.). States and tribes then must develop and carry out strategies and measures to attain the NAAQS. These strategies and measures are included in state implementation plans (SIPs) and Tribal implementation plans (TIPs). The Clean Air Act also requires states to develop programs to protect and improve visibility in national parks and wilderness areas. EPA works in partnership with Federally recognized tribes to carry out Federal trust responsibilities

and implement those provisions of the Act that most effectively address air quality management concerns on Tribal lands. In addition, EPA establishes, implements, and enforces national control programs on such sources as motor vehicles and fuels.

In July 1997, EPA published revised, more protective NAAQS for ozone and PM. The standards are currently under litigation. In February 2001, the U.S. Supreme Court issued an opinion largely upholding EPA's position on several key issues related to these standards. The Supreme Court sent the case back to the U.S. Court of Appeals for the District of Columbia Circuit to address unresolved issues that challengers had raised before the D.C. Circuit. The D.C. Circuit had not addressed these issues before because it had remanded the standards to EPA based primarily on its finding that the Clean Air Act, as EPA had interpreted it, was unconstitutional -- a finding the Supreme Court has now reversed.

EPA is currently evaluating the Supreme Court opinion, the opinions of the D.C. Circuit, and several legislative provisions to determine how to proceed. We continue to believe that the standards are necessary to protect human health, and nothing in the decisions undercuts that belief. We are evaluating our programs to determine how best to secure necessary human health protections while still respecting the courts' decisions. This litigation does not affect standards that were in place prior to July 1997.

The D.C. Circuit Court's 1999 decision did not affect the pre-existing NAAQSs, which have not yet been met in a number of areas. Since the litigation, the Agency's efforts have been devoted to maximizing the human health protection available under the 1-hour ozone standard and the pre-1997 PM_{10} standard. To protect against backsliding during the litigation, EPA has reinstated the 1-hour ozone standard in those areas where it was revoked when the 8-hour standard was established.

In FY 2002, EPA will continue to provide research, technical tools, guidance, and data: (1) to support EPA's ongoing review of the scientific criteria and NAAQS for PM; and (2) to support state, Tribal, and local analyses of their ozone and PM problems and the need for additional air pollution controls. The budget request is geared toward enhancing scientific knowledge and filling critical information gaps regarding particulate matter before states, tribes, and local governments identify areas not meeting the health-based NAAQS and begin to develop programs to reduce health risks. The EPA sponsored research on PM included in this proposal follows the recommendations from the National Academy of Sciences (NAS).

Urban and regional-scale numerical grid models (i.e., UAM-IV, UAM-V, CAMx, etc) continue to be used extensively for analysis of ozone issues and preparation of State Implementation Plans (SIPs) during FY 2001 and are expected to continue into FY 2002 and beyond. In addition, the use of other modeling systems (i.e., REMSAD and Models-3) will intensify in support of Regional Planning Organizations (RPOs) for addressing regional haze and for PM2.5. The applicability of such models will also benefit such programs as the Great Lakes Initiative, U.S./Mexico Border, U.S./ Canada and the air toxics program. EPA, states and RPOs will work collaboratively in developing the capability to continue using these models, evaluating their accuracy and applicability to complex air quality issues, testing and analyzing emission control alternatives, as well as sharing information on model input data and estimates of ambient concentrations. Models-3 is expected to be the focus of significant efforts for evaluation, testing and application to

multi-pollutant programs. EPA will focus extensively on public outreach and access to provide high quality information for general and technical audiences to facilitate public understanding, so that individuals can make choices about activities that might increase personal risk on days when air pollution levels are high. Improved information quality and access will enable citizens and users to obtain "real-time" air quality information and enable EPA to better track environmental indicators and assess progress.

Ozone

Unlike most other pollutants, ozone is not emitted directly into the air by specific sources, but is created by sunlight acting on nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Some common sources that emit one or more of these are power plants, chemical manufacturing facilities, petroleum refineries, printing/coating operations, and a vast array of car and truck emissions.

Ozone can impair normal functioning of the lungs in healthy people, as well as in those with respiratory problems. Relatively low amounts of ozone can cause coughing, shortness of breath, and pain, especially when taking a deep breath. Ozone also can worsen chronic lung diseases, such as asthma, and is associated with increased medication use, visits to emergency rooms, and hospital admissions. Ozone can inflame and damage the lining of the lung. Within a few days, the damaged cells are shed and replaced–much like the skin peels after a sunburn. Animal studies suggest that if this type of inflammation happens repeatedly over a long time period (e.g., months, years, a lifetime), lung tissue may become permanently scarred, causing reduced lung elasticity, permanent loss of lung function, and a lower quality of life. Adverse ecosystem effects are known to occur for various species of vegetation and are likely to extend to entire ecosystems. Ozone damage to plants is extensive, with major impacts on commercial crops of wheat, corn, soybeans, cotton and commercial forestry.

More people are exposed to unhealthful levels of ozone than to any other air pollutant. Meeting the new 8-hour ozone standard would protect 13 million more children from exposure to unhealthful levels of smog than the previous standard.

Emissions of ozone precursors can be carried hundreds of miles from their origins and result in high ozone concentrations over very large areas of the country. This "transport" often affects a given state's ability to attain the NAAQS through traditional SIP programs. To address this persistent and widespread problem, EPA will continue to work with affected states, local governments, tribes and other stakeholders, developing control strategies for NOx and other precursors using, thus overlaying a regional, background-reducing approach onto each state-by-state approach effort.

EPA will administer the national program to implement the 1-hour NAAQS for ozone, providing oversight and coordinating among Regions and with states to provide national consistency and developing policy and guidance to resolve major issues. EPA and states will continue outreach efforts to promote public awareness of the Air Quality Index and the effects of ozone on health. Working closely with states and industry, EPA will develop a program of SIP credits that result from voluntary measures to reduce emissions. States will continue to implement the 1-hour ozone standards. For nonattainment areas classified as

"severe", states must develop and submit the necessary local control measure portions of the required 1-hour ozone attainment demonstrations, develop mid-course review analyses to assure plans are on track for attainment and adopt adequate motor vehicle emissions budgets to assure that transportation projects do not cause air quality problems.

EPA issued final guidance in January 2001 on an economic incentives program to encourage states to reduce emissions of air pollutants in the most efficient manner. EPA will continue to provide guidance on market-based approaches to emissions control and to review and approve emissions trading protocols for nationally significant source categories to facilitate these trading programs. To stimulate the development of creative new pollution control initiatives, EPA will work with states to develop a process for SIP credits for new technologies and for developing early emissions reductions programs that could help minimize the impact of environmental regulations on economic growth in urban areas.

In FY 2002, EPA will continue to study, review, and revise the policy used for responding to petitions from industry for exemption of a compound from controls as a VOC. EPA will also evaluate the need to revise the general conformity rules and provide guidance on SIP program requirements. The Agency will continue to work with tribes to develop programs for Indian Country, making eligibility determinations, completing VOC and NOx emission inventories, and approving Tribal air programs as appropriate.

To better assess the causes of the ozone problem, EPA will continue to collect ambient air measurements for a target list of VOCs (precursors to both ozone and PM), as well as for nitrogen, ozone, and both surface and upper air meteorological measurements from the Photochemical Assessment Monitoring Station (PAMS) network. There are 24 PAMS area with the more established areas having sties with up to eight years of data. Continued national and local analyses of the PAMS data provides: 1) insight into how ozone precursors and toxic pollutants contribute to the ozone problem; 2) a trends assessment of ozone, ozone precursors, and toxic pollutants; 3) an evaluation of pollutant management programs; and, 4) a database for developing control strategies. EPA also will explore and implement improvements to emissions testing and monitoring approaches for VOCs, including better and less expensive continuous monitors and more reliable techniques for analysis of water-based coatings, inks, and other solvents. EPA will also work to improve emissions testing and monitoring of NOx emissions required in SIPs.

In FY 2001, EPA will propose Phase II of the NOx SIP Call that will provide state emission budgets for 19 eastern states, the District of Columbia and portions of Missouri and Georgia, as well as codify definitions of electric generating units and internal combustion engines. In FY 2002, the Clean Air Markets Division (CAMD), the EPA Headquarters organization with responsibility for administering the Acid Rain Program, will also continue implementing the Ozone Transport Commission's NOx Budget Trading program. Additionally, CAMD has begun start-up operations for implementation of the Section 126 and NOx SIP Call trading programs. These programs could comprise an additional 1,400 units requiring review of monitoring plans, certification of monitoring methods, and reporting of quarterly emissions for the ozone-season, NOx control program. Furthermore, CAMD will administer the Emission and Allowance Tracking Systems for these programs that will involve trading across up to 19 states and the District of Columbia.

To address the need for further reductions in motor vehicle emissions to attain and maintain the current as well as the new NAAQS, the Agency will implement current motor vehicle and fuel standards and develop new programs. In calendar year 1996, light-duty vehicles (LDVs) and light-duty trucks (LDTs) contributed more than 22 percent of national NO_x emissions and 25 percent of VOC emissions. Heavy-duty trucks and buses also contribute greatly to the nation's air quality problems, accounting in calendar year 2000 for about one-third of NOx emissions from mobile sources. To address these issues, in FY 2000, the Agency promulgated the Tier II program for LDVs/LDTs to begin in calendar year 2004. This program established new tailpipe standards for all passenger vehicles and new limits for sulfur in gasoline. The new standards will reduce NOx emissions by 74 percent (2 million tons per year by calendar year 2020 and nearly 3 million tons annually by calendar year 2030). In FY 2002, EPA will fully implement Tier 2 regulations for LDVs, LDTs, and medium duty passenger vehicles. This will allow manufacturers to certify at Tier 2 standards under early opt-in provisions for Tier II standards.

In FY 2001, the Agency promulgated new standards for heavy-duty vehicles and engines. The first phase of the program (promulgated in FY 1997 and reaffirmed in FY 2000) requires gasoline trucks to be 78 percent cleaner and diesel trucks to be more than 40 percent cleaner than today's models. This phase will reduce NOx emissions by 2.4 million tons annually when the program is fully implemented in calendar year 2030 and thereafter. The second phase established a comprehensive national program that will regulate trucks and buses and diesel fuel as a single system, with the new emission standards taking effect in calendar year 2007. The level of sulfur in highway diesel fuel will be reduced by 97 percent by mid-2006. As a result of this program, each new truck and bus will be more than 90 percent cleaner than current models, resulting in a reduction of 2.6 million tons of NOx emissions in calendar year 2030. In FY 2002, the Agency will continue work to implement Tier II vehicle and gasoline standards and the new calendar year 2004/2007 heavy-duty highway engine and diesel sulfur requirements. This includes continued assessment of the development of clean engine and fuel technology. In addition, EPA will begin rulemaking to consider new standards for heavy-duty non-road, land-based diesel engines and vehicles, potentially including new diesel fuel sulfur requirements. Additionally, in FY 2002, the Agency, as part of the implementation of the existing Tier I and National Low Emission Vehicle (NLEV) programs, will continue to ensure that emission benefits from these programs are achieved through vigorous compliance programs.

EPA plans to finalize programs that will address emissions from a range of unregulated non-road sources and, possibly, highway motorcycles. The non-road sources include industrial spark-ignition engines (e.g., forklifts and generators), recreational gasoline engines (e.g., all terrain vehicles and off-road motorcycles), and certain recreational marine gasoline and diesel engines. Emissions from these engines together account for about 11 percent of hydrocarbon emissions and 3 percent of NOx emissions. The anticipated emission standards will significantly reduce emissions from engines that contribute to ozone formation, as well as carbon monoxide and toxics.

In FY 2002, the Agency will propose standards for engines used in ocean-going vessels under a court-ordered schedule. A final rule for these engines is due in January 2003. In FY 2000, the Agency promulgated standards for smaller commercial marine diesel engines. Commercial marine diesel engines

account for about 4.5 percent of the mobile source NOx inventory; however, their extensive use around harbors causes a greater concentration of emissions in port cities.

EPA will continue implementing other mobile source programs addressing ozone emissions. The first phase of emission standards for locomotives that will result in more than 60 percent reduction in locomotive NO_x emissions began in calendar year 2000. The next two phases of locomotive standards will take effect in calendar year 2002 and in calendar year 2005. In FY 2002, the Agency will continue to evaluate certification test data to ensure locomotive designs comply with standards. In addition, the Agency will begin collecting production line test data to ensure that production engines meet emission requirements for model year 2002 locomotives.

Another recent program that EPA will be implementing in FY 2002 is the Phase 2 standards for small spark-ignition handheld engines (e.g., trimmers, brush cutters, and chainsaws). The new standards will be phased in beginning with the FY 2002 model year. This program will reduce HC+NOx emissions by 70 percent. This is equivalent to an annual reduction of 500,000 tons of HC+NOx by the calendar year 2027. This reduction is accompanied by an overall reduction in fuel consumption.

An important element of the Agency's work on controlling emissions is to ensure emission data from the different categories of mobile sources. In FY 2000, the Agency started development of a Portable Emission Measurement System (PEMS) that will allow the Agency to acquire in-use emission data in a cost-effective manner. In FY 2001, EPA developed in-use NOx and PM measurement capability. In FY 2002, the system will be expanded to include the measurement of toxics. In the near-term, the Agency plans to use this portable system to characterize in-use emissions from light-duty vehicles, heavy-duty highway vehicles, and non-road equipment. The newly acquired emission data will enhance our emission models. In the long-term, PEMS will find widespread application by EPA, states, and industry for compliance and in-use emission monitoring purposes.

The Agency also will emphasize improvements in our transportation emission models in FY 2002. In FY 2001, EPA started the development of an architectural framework for a new generation model that will greatly improve our ability to support the development of emission control programs, as well as providing support to the states in their determination of program needs to meet air quality standards. The Agency will start developing the new transportation emission model in FY 2002. The Agency will continue providing guidance and training in the use of mobile source models.

EPA will partner with states, tribes, and local governments to create a comprehensive compliance program to ensure that vehicles and engines are clean. EPA will use advanced in-use measurement techniques and other sources of in-use data to monitor the performance of on-board diagnostic (OBD) systems on vehicle models to make sure that OBD is a reliable check on the emissions systems as part of vehicle inspection and maintenance (I/M) programs. With this information, EPA will work to establish an integrated information system which allows for assessment and action on those vehicles and engines which present the greatest environmental risk. Additionally, EPA will continue its public education and outreach efforts to ensure that the public and vehicle repair technicians understand OBD.

In FY 2001, about 35 states are operating I/M programs. EPA will continue providing technical and programmatic guidance to states and local agencies for implementing these programs. In FY 2002, EPA will assist the states in incorporating OBD inspections into operating I/M programs. EPA will support states in the evaluation of I/M programs as directed by the Clean Air Act and the National Highway System Designation Act.

As part of implementing the ozone standard and regional haze rule, EPA's Transportation Air Quality Center, in cooperation with the Department of Transportation, will continue assistance to states and local governments including implementation of the transportation conformity requirements. EPA will continue to ensure national consistency in our adequacy findings for motor vehicle emissions budgets in air quality plans.

In addition, EPA will work with states and local governments to ensure the technical integrity of the mobile source controls in the SIPs. EPA will assist areas in identifying the most cost effective control options available.

EPA will continue to develop partnerships that emphasize the development of innovative transportation control strategies and voluntary mobile source programs. The Agency will continue providing technical guidance for implementing the National Low Emission Vehicle program.

The Agency will continue implementing Phase II of the reformulated gasoline (RFG) program, which will result in additional VOC, NO_x, and toxic emission reductions in 17 states and the District of Columbia, and will provide technical and programmatic guidance to states implementing clean fuel programs. RFG is designed to reduce vehicle emissions of ozone-forming and toxic pollutants and it is estimated to reduce VOC emissions by 27 percent, toxic emissions by 22 percent, and NO_x emissions by 6.8 percent. EPA will continue to address issues associated with the use of oxygenates (e.g., MTBE and ethanol) in RFG, with emphasis on implementing September 1999 recommendations from the "Blue Ribbon Panel on the Use of Oxygenates in Gasoline." EPA will process approximately 100,000 fuel quality reports and review 156 fuel surveys with 17,000 samples.

The National Vehicle and Fuels Emissions Laboratory (NVFEL) will continue to conduct vehicle emission tests as part of the pre-production tests, certification audits, in-use assessments, and recall programs to support mobile source clean air programs. In FY 2002, EPA will continue conducting testing activities for fuel economy, LDV and heavy-duty engine (HDE) characterization, Tier II testing, reformulated gasoline, future fleets, OBD evaluations, certification audits and recall programs. EPA also will continue to conduct separate in-use testing on heavy-duty diesel engines to ascertain compliance with consent decrees related to violations of defeat device prohibitions and will expand its in-use presence to include non-consent decree engines and non-road diesel engines as well. In addition, NVFEL will conduct energy efficiency tests of electric vehicles in collaboration with the Department of Energy (DOE) and non-road vehicle emission testing in support of non-road regulatory development.

To support confirmatory and compliance programs, the NVFEL will conduct 400 certification and fuel economy tests on LDV, LDT and Light-Heavy Duty Vehicles (LHDV) and will conduct 240

compliance tests on in-use LDVs and LDTs. NVFEL will also conduct an approximately equivalent amount of testing of LDV and heavy duty engines for regulatory development.

The mobile source compliance program will oversee more than 225 original equipment manufacturers to ensure that vehicles and engines will meet the applicable emission standards throughout their useful life. The program issues nearly 2,200 certificates of conformity annually. Compliance is audited and ensured through pre-production certification, assembly line testing, and in-use testing and recall. For light-duty vehicles and trucks, there also is a fuel economy compliance program, which in FY 2002 will issue 1,000 fuel economy consumer labels, data for the EPA/DOE Gas Mileage Guide and "gas guzzler" tax collection, and data to calculate the Corporate Average Fuel Economy (CAFÉ) values for all light-duty manufacturers. The mobile source fees program will collect approximately $11 million in FY 2002, offsetting costs of the certification, recall, selective enforcement audit, and fuel economy programs.

The FY 2002 model year will be the second year of mandatory participation in the Agency's new compliance assurance program (CAP 2000). CAP 2000 will simplify and streamline the current procedures for pre-production certification of new motor vehicles. Manufacturers are projected to save $55 million each year under the CAP 2000 program. Under CAP 2000, manufacturers will supply in-use test data for each class of vehicle sold. These data will be an important tool for the Agency in targeting its recall testing investigations.

Particulate Matter

PM is the term for solid or liquid particles found in the air. Some particles are large enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. The PM NAAQS were revised in 1997 in part to separately address both fine ($PM_{2.5}$) and coarse particles. Because particles originate from a variety of mobile and stationary sources (diesel trucks, woodstoves, power plants, etc.), their chemical and physical compositions vary widely. PM can be directly emitted or can be formed in the atmosphere when gaseous pollutants, such as sulfur dioxide (SO_2), VOCs and NO_x, react to form fine particles.

Both fine and coarse particles can accumulate in the respiratory system and are associated with numerous health effects. Coarse particles can aggravate respiratory conditions such as asthma. Exposure to fine particles is associated with several serious health effects, including premature death. Health effects have been found to be associated with PM exposures that occur both over short- (such as a day) and long-term (a year or more) periods. When exposed to PM, people with existing heart or lung diseases—such as asthma, chronic obstructive pulmonary disease, congestive heart disease, or ischemic heart disease—are particularly vulnerable and may be at increased risk of premature death or admission to the hospital or emergency room. The elderly also are sensitive to PM exposure. They are at increased risk of admission to hospitals or emergency rooms and, perhaps, premature death from heart or lung diseases. When exposed to PM, children and people with existing lung disease may not be able to breathe as deeply or vigorously as they normally would, and they may experience symptoms such as coughing and shortness of breath. PM can increase susceptibility to respiratory infections and aggravate existing respiratory diseases, such as asthma and chronic bronchitis, causing increased medication use and increased doctor visits.

In FY 2001, as part of our ongoing review, EPA will complete and make available to the public a comprehensive assessment of the recent scientific findings regarding air quality, exposure, and health and environmental effects of PM in the PM Criteria Document. Based on the scientific information in the PM Criteria Document, EPA is preparing a Staff Paper that will evaluate the policy implications of the available scientific information and identify critical elements that should be considered in the Administrator's decision whether to retain or revise the PM NAAQS. The Criteria Document and Staff Paper will be reviewed by the Clean Air Scientific Advisory Committee (CASAC) and made available for public comment. Following completion of these documents, EPA anticipates proposing a decision on whether to retain or revise the PM NAAQS in FY 2002.

EPA is better defining the $PM_{2.5}$ (or PM fine) problem by assisting states and tribes in establishing and maintaining a nationwide monitoring network and carrying out source characterization analyses. Since promulgating the new $PM_{2.5}$ standards, EPA has been working with states and tribes to install monitors and obtain data on $PM_{2.5}$ particle emissions. This compliance network was fully operational as of December 31, 1999. EPA has committed to providing 100 percent of the funding through state and Tribal grants under the authority of section 103 of the Clean Air Act for operation and maintenance of the network. EPA also will promote the use of continuous PM monitoring and improved PM fine test methods. States and tribes will also use the air quality data and chemical speciation data to identify PM sources and "hot spots" for purposes of developing any SIPs and TIPs that may ultimately be required depending on the resolution of the NAAQS litigation. As recommended by NAS, EPA is discussing with the Clean Air Science Advisory Committee ways to increase the usefulness of the resultant monitoring data to PM health effects and epidemiology researchers.

EPA, states, and tribes will continue to implement the CAA requirements for the pre-1997 PM_{10} standard, including bump-ups and SIP rulemaking actions on plans for serious PM_{10} nonattainment areas. Monitoring data for PM_{10} will continue to be used to characterize emission sources, evaluate air quality models, and contribute to the regular scientific health review of the standard. The Air Quality Index is being expanded to include information on PM and to provide health information to the public on the impact of exposure to various levels of PM.

To ensure the source and ambient monitoring measurements are credible, EPA will continue to develop and conduct quality assurance protocols. Currently our efforts are focused on the quality assurance of the ambient $PM_{2.5}$ monitoring network because of its recent establishment.

In FY 2002 and beyond, EPA will also develop improvements to source testing and monitoring methods for PM and $PM_{2.5}$ emissions from stationary sources. These method improvements are needed at this time for characterization of $PM_{2.5}$ emissions. The improved methods will also be available for determining compliance with any future $PM_{2.5}$ SIP emission limits that may be needed.

EPA will continue to assist states, local governments, and tribes in maintaining existing control programs and in devising stationary source and mobile source strategies to reduce PM. EPA will provide guidance on SIP requirements, the impact of fire and agricultural processes on PM levels, and benefits to

PM implementation of regulations designed for controlling toxics. EPA will further provide guidance that integrates any future implementation of PM standards with implementation of the new regional haze rule.

Levels of PM caused by mobile sources may rise in the future due to the projected increases in the number of individual mobile sources and in motor vehicle travel. The Agency will continue to seek further reductions in motor vehicle emissions to attain and maintain the NAAQSs through the review of current motor vehicle and fuel standards and the development of new programs. Heavy-duty trucks and buses today account for one-quarter of PM emissions from mobile sources. In some urban areas, the contribution is even greater. In FY 2001, EPA promulgated the new diesel fuel standards and heavy-duty vehicle and engine standards that will significantly reduce emissions from diesel trucks and buses. The new program will result in PM emission levels that are 90 percent below 2000 levels. By 2030, the program will reduce annual emission of PM by 109,000 tons. The Agency will continue working toward implementing these standards. This includes continued assessment of the development of new emission control technology. In addition, EPA will begin rulemaking to consider new standards for heavy-duty non-road, land-based diesel engines and vehicles, including potentially new diesel fuel sulfur requirements.

In FY 2002, EPA will continue to help create voluntary diesel retrofit projects to reduce PM from older, high-polluting trucks and buses. In some cases, EPA will help fund the costs of purchasing emission control devices, such as PM filters and oxidation catalysts. EPA also will increase efforts to promote the use of emerging retrofit emission control technology and will partner with states, EPA regional offices, local administrations, private fleets, and industry members.

In FY 2002, EPA also will propose standards for commercial and recreational diesel marine engines under a court-ordered schedule. A final rule for these engines is due in January 2003. The anticipated emission standards from these categories will result in reductions of PM.

In FY 2002, EPA will continue implementing other mobile source programs addressing PM emissions. The emission standards for locomotives that will result in more than 40 percent reduction in PM, began in 2000 (Tier 0). Tier 1 standards will take effect in FY 2002 and Tier 2 standards in FY 2005. In FY 2002, the Agency will continue to evaluate certification test data to insure locomotive designs comply with standards. In addition, the Agency will begin collecting production line test data.

As discussed earlier for ozone, an important element of the Agency's work on controlling emissions is to ensure the accuracy of emission data from the different categories of mobile sources. In 2000, the Agency started development of a Portable Emission Measurement System (PEMS) that will allow the Agency to acquire in-use emission data in a cost-effective manner. In FY 2001, EPA developed in-use NOx and PM measurement capability. In FY 2002, the system will be expanded to include the measurement of toxics. The Agency plans to use this portable system to characterize in-use emissions from light-duty vehicles, heavy-duty highway vehicles, and non-road equipment. The newly acquired emission data will enhance our emission models.

Improving our models is another area that the Agency will be addressing in FY 2002. In FY 2001, EPA started the development of an architectural framework for a new generation model that will greatly

improve our ability to support the development of emission control programs, as well as providing support to the states in their determination of program needs to meet air quality standards. The Agency will start development of the new model in FY 2002. The Agency will continue providing guidance and training in the use of mobile source models.

EPA will develop a series of guidance documents for the particulate matter program to provide infrastructure for implementing the new standards. EPA will continue public outreach activities, especially to create materials for the general public on fine particulate matter.

Visibility

Visibility impairment, caused by the presence of tiny particles in the air, is most simply described as the haze that obscures the clarity, color, texture, and form of what we see. The Clean Air Act gives special protection to natural areas that we want to preserve for future generations, such as our national parks and wilderness areas.

EPA promulgated a final regional haze rule in FY 1999. Because of regional variations in natural conditions which combine with man-made pollution to produce regional haze, EPA believes that regional haze should be addressed through a region-specific program that accounts for these variations. EPA worked with states to establish five regional planning organizations. Through dedicated funding included in this request, EPA is working closely with the regional planning organizations to develop the technical basis for future policy decisions and tailor programs that take into account the varying conditions in the different geographical areas.

Since FY 1987, EPA has supported the long-term visibility monitoring program known as the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE network collects data on visibility, including optical and photographic data, at 110 sites. To broaden understanding of Class I area visibility, EPA will work with states to add an additional 10-15 sites using the IMPROVE protocol in FY 2002. EPA will work with western states to determine the steps that are needed to preserve clear days and improve visibility in the 16 national parks and wilderness areas located in the Colorado Plateau. An Eastern regional haze program will address visibility impairment in the Appalachian Mountains. IMPROVE sites will also better characterize background $PM_{2.5}$ levels.

In FY 2001, EPA proposed Best Available Retrofit Technology (BART) rules that would require certain larger, older plants to install BART as part of a state's strategy for improving visibility. The proposal provides guidelines to states in selection of plants where BART should be applied and determining the type of controls to be installed. The proposal will undergo a public comment period.

Implementation of NAAQS and Visibility Requirements

Ground-level ozone, fine PM, and regional haze have many similarities. Both ozone and PM (and the resulting regional haze) remain in the atmosphere for days, leading to regional scale transport that can affect broad areas of the country. Both pollutants are formed under certain atmospheric conditions by gases, such as NO_x and VOCs, emitted by the same types of sources. There are similar health effects associated

with exposure to ozone and PM (e.g., increased respiratory symptoms and increased hospital admissions and emergency room visits for respiratory causes). The similarities between the pollutants and the regional haze problem provide opportunities for integrated strategies for reducing pollutant emissions in the most cost-effective ways.

EPA also recognizes the increased burden on state and local agencies in controlling multiple pollutants. To address this EPA is developing technologies to help states form control strategies to address the multiple pollutants with NAAQS. One of the activities EPA is currently engaged in is developing an integrated ambient monitoring strategy to determine the optimal number of monitors and associated man-hours needed for each pollutant given the competing needs of measuring the other pollutants. As we determine the need to add monitors or change location of monitors in the network, we will use this strategy to minimize any increase in resources needed.

The strategy for implementing any new ozone and particulate matter standard together with regional haze requirements will be targeted at maintaining air quality protection efforts currently underway and building on the agreements and progress already made by communities and businesses. In carrying out the implementation strategy, EPA will seek to reward state, Tribal, and local governments and businesses that take early action to reduce air pollution levels through cost-effective approaches and address pollution that travels across jurisdictional lines. EPA will work with states and tribes to develop control programs that employ regulatory flexibility to minimize economic impacts on businesses to the greatest possible degree consistent with human health protection. EPA also will attempt to minimize regulatory burdens for states, tribes, local governments, and businesses and ensure that air quality planning and related Federal, Tribal, state and local planning are coordinated.

Carbon Monoxide

Carbons monoxide (CO) is a colorless, odorless gas that enters the bloodstream and interferes with the delivery of oxygen to the body's organs and tissues. People with cardiovascular disease, such as angina, are most at risk from carbon monoxide. These individuals may experience chest pain and generally increased cardiovascular symptoms if they are exposed to carbon monoxide, particularly while exercising. People with marginal or compromised cardiovascular and respiratory systems (e.g., individuals with congestive heart failure, cerebrovascular disease, anemia, chronic obstructive lung disease) and possibly fetuses and young infants may also be at greater risk to carbon monoxide pollution in certain settings and conditions, mainly enclosed or indoor spaces.

CO is formed when carbon in fuels is not burned completely. It is a component of highway vehicle exhaust, which accounts for 60 percent of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95 percent of all CO emissions. As vehicle miles traveled continue to increase each year, these emissions can result in high concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion in sources such as boilers and incinerators.

EPA has set standards for CO and currently assists states, tribes, and local agencies in implementing strategies to reduce CO pollution and maintain compliance with the standard. Clean air plans for CO include

many mobile-source related programs such as auto tailpipe standards and oxygenated gasoline. There has been a significant downward trend in concentrations and emissions of CO. Approximately 16 of the total 43 areas still do not meet the CO air quality standard set to protect human health.

In FY 2001, EPA will continue to assist states, tribes, and local agencies in implementing strategies to reduce CO pollution and maintain compliance with CO standards. As a result of these efforts, EPA expects an additional 4 areas to attain the NAAQS for CO in FY 2002.

In FY 2002, EPA plans to finalize programs that will address emissions from a range of unregulated non-road sources and, possibly, highway motorcycles. The non-road sources include industrial spark-ignition engines (e.g., forklifts and generators), recreational gasoline engines (e.g., snowmobiles and off-road motorcycles), and recreational marine gasoline and diesel engines. Emissions from these engines together account for about 9 percent of CO emissions. The anticipated emission standards will reduce emissions from engines that potentially expose people to high concentrations of poisonous CO exhaust.

In FY 2001, the NAS will begin a 2-year study for EPA of CO episodes in conjunction with meteorological and topographical problem areas, the human health significance of such episodes and strategies for these nonattainment areas. EPA is currently reviewing the NAAQS for CO and has completed the CO Criteria Document. In FY 2002, EPA anticipates completing the staff paper, taking into account CASAC review and public comment, and proposing a decision whether to retain or revise the CO NAAQS with promulgation following in FY 2003.

Sulfur Dioxide

Sulfur dioxide (SO_2) belongs to the family of gases called sulfur oxides (SO_x). These gases are formed when fuels (mainly coal and oil) containing sulfur are burned, and during metal smelting and other industrial processes. Children and adults with asthma who are active outdoors are most vulnerable to the health effects of sulfur dioxide. The primary effect they experience is a narrowing of the airways (called bronchoconstriction), which may cause symptoms such as wheezing, chest tightness and shortness of breath. Symptoms increase as sulfur dioxide concentrations and/or breathing rates increase. When exposure is relatively brief, lung function typically returns to normal within an hour of exposure. Long-term exposure to both sulfur dioxide and fine particles can cause respiratory illness, alter the lung's defense mechanisms, and aggravate existing cardiovascular disease. People who may be most susceptible to these effects include individuals with cardiovascular disease or chronic lung disease, as well as children and the elderly.

SO_2 is also a precursor to sulfates, which are associated with acidification of lakes and streams, accelerated corrosion of buildings and monuments, and reduced visibility. Approximately 28 of the total 55 areas still do not meet the NAAQS for SO2.

EPA will continue to ensure that all areas are in compliance with the standard and will review the standard, as the Clean Air Act mandates, to ensure that it adequately protects human health. The courts have remanded the most recent review of the SO_2 standard the D.C. Circuit Court of Appeals has

remanded for further explanation our most recent decision not to revise the SO_2 NAAQS by adding a new 5-minute SO_2 standard. In a January 9, 2001 Federal Register notice, EPA announced it would await a Supreme Court decision on the ozone and PM NAAQS before responding to the SO_2 remand. In the same notice, EPA provided new 5-minute data and analyses of that data. Because the results of the data analyses continue to suggest that there may be a number of locations in the country where repeated exposures to 5-minute peak SO_2 levels could pose a risk of health effects, EPA will consider taking final action a previously proposed intervention level program. This program gives states guidance on identifying and addressing high, short-term peaks that occur for short durations (five minutes) but that can cause bronchial constriction in asthmatics, a serious health concern. In FY 2002, should EPA decide to go forward with the intervention level program, EPA will would provide additional guidance as needed to states and tribes on implementing the intervention level program. EPA will increase efforts to reduce the more pervasive sulfur oxides through the acid rain, particulate matter, and regional haze programs that are described under those objectives. These efforts will result in 3 additional areas coming into compliance with the SO_2 NAAQS in FY 2002.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) belongs to a family of highly reactive gases called nitrogen oxides. Nitrogen oxides form when fuel is burned at high temperatures and result primarily from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. With regard to human health effects, in children and adults with respiratory disease, such as asthma, nitrogen dioxide can cause respiratory symptoms such as coughing, wheezing, and shortness of breath. Even short exposures to nitrogen dioxide affect lung function. In children, short-term exposure can increase the risk of respiratory illness. Animal studies suggest that long-term exposure to nitrogen dioxide may increase susceptibility to respiratory infection and may cause permanent structural changes in the lungs. Nitrogen oxides can also serve as precursors to ozone and particulate matter. Nitrogen oxides react with volatile organic compounds in the presence of sunlight to form smog. Nitrogen dioxide can be converted into fine nitrate aerosols, a constituent of fine particles ($PM_{2.5}$). In addition, it is a strong oxidizing agent and reacts in the air to form corrosive nitric acid, as well as toxic organic nitrates. They can also have adverse effects on both terrestrial and aquatic ecosystems, contributing to acid rain and eutrophication in coastal waters.

EPA has made progress toward reducing the emissions of nitrogen oxides and achieving the goal of having all areas in attainment for NO_2 by 2005. Over the next several years we will continue to work to maintain air at safe levels of NO_2. We will also review the standard to assure that it continues to protect human health and welfare.

Because NO_2 is a tropospheric ozone precursor, control of NO_2 is a way to reduce ozone. The narrative for the tropospheric ozone objective describes efforts to reduce the more pervasive nitrogen oxides in the acid rain and mobile source programs, encouraging market-based, low-cost pollutant trading. These programs will simultaneously address nitrogen oxides, tropospheric ozone, and fine particulate matter.

Lead

Exposure to lead mainly occurs through inhalation of air and ingestion of lead found in food, paint, water, soil, or dust. Lead accumulates in the body in blood, bone, and soft tissue. Because it is not readily excreted, lead also can affect the kidneys, liver, nervous system and other organs. Excessive exposure to lead may cause kidney disease, reproductive disorders, and neurological impairments such as seizures, mental retardation, and/or behavioral disorders. Fetuses and children are especially susceptible to low doses of lead, often suffering central nervous system damage or slowed growth.

Thanks largely to reduced use of leaded gasoline, human exposure to lead air emissions is currently less of a problem. Today, smelters and battery plants are the major sources of lead in the air. Approximately six of the total 13 areas still do not meet the NAAQS for lead.

EPA will continue a relatively low level of existing work, emphasizing the few nonattainment areas near smelters. Mandating the use of unleaded gasoline will continue to be the most effective way to prevent airborne lead. An additional 3 areas will come into compliance with the NAAQS in FY 2002.

Cross-Pollutant Operating Permits and New Source Review

EPA will make revisions to Part 70 operating permit rules to streamline permit revision procedures and will provide technical support to Regions, states, tribes and local agencies on permit program revisions. By the end of FY 2002, EPA intends, with assistance from state and local permitting authorities, to complete the first round of Part 70 permit issuances. Also, in FY 2002 and continuing for several years thereafter, the Agency will survey the permitting program implementation efforts and the results of industry-conducted monitoring on compliance status. The Agency will continue and expand training and technical support efforts to ensure smooth incorporation into operating permits of the Compliance Assurance Monitoring, MACT, and other rules becoming effective in FY 2002 and beyond. The Agency also will continue to be involved in and expand, as needed, efforts to reform and streamline permitting programs.

Research

Conduct National Ambient Air Quality Standards (NAAQS) Related Research

To protect human health and eco-systems from the adverse effects of air pollution, EPA's NAAQS-related research program has a two-fold purpose: (1) periodic review and revision as needed of the NAAQS, (i.e., risk assessment, exposure and effects research); and (2) implementation and attainment of the NAAQS, (i.e., atmospheric chemistry, air quality models and risk management research). The FY 2002 request focuses primarily on research to address the two NAAQS pollutants that pose the greatest risk to human health: tropospheric ozone and particulate matter (PM). Modest research and technical support efforts to support other NAAQS pollutants are described in the tropospheric ozone section.

Tropospheric Ozone and Related NAAQS

Tropospheric ozone research will focus on the development of improved risk assessment procedures and completion of the Air Quality Criteria Document (AQCD) for ozone. Planning, development and/or consultation will also continue for other related NAAQS. Activities will include research to improve measurement methods and observation-based assessments, the accuracy of emission estimates, and atmospheric chemistry and modeling.

Methods and observations-based assessments in FY 2002 will provide a reliable means of determining state and local emissions reductions by developing techniques to measure ozone precursors and their transformation during meteorological transport. This research will develop, through intensive regional field studies, observational-based methods to compliment emissions-based, physical theory modeling. In addition, continuing research will develop protocols, combining modeling and observational approaches, for use by the scientific community in conducting integrated multi-scale exposure assessments, and provide emissions profiles for mobile sources already being characterized for their contribution to air toxics and PM exposure issues.

Research to improve the accuracy of emission estimates from biogenic (i.e., naturally occurring) and mobile sources will continue in FY 2002. Biogenic emission research will develop improved emission factors for additional vegetative types and compounds, particularly oxygenated volatile compounds. This work will help determine how emissions change between seasons, investigate the contribution of biomass burning to regional ozone precursor emissions, simulate precursor emissions in complex ecological environments, and support model validation studies. The results from this research will be incorporated into future updates of the Biogenic Emissions Inventory System (BEIS) used by federal, state and local air quality managers as inputs to air quality models and inventory development.

Mobile emissions research will focus on improving the spatial and temporal resolution of emission estimates for highway vehicles through further development and validation of the Mobile Emissions Assessment System for Urban and Regional Evaluation (MEASURE). One important addition will be a new module that will provide improved spatial and temporal emissions data for heavy duty diesel trucks in urban areas. In addition, MEASURE will be upgraded to incorporate new modules that will take into account the impacts on emissions of new regulations (Tier II Standards), new vehicles and new fuels. The data generated from this research will be used as input to the atmospheric chemistry models that federal, state, and local environmental officials use to evaluate NAAQS attainment strategies. The mobile source research is closely coordinated with the EPA's plans to develop a next generation regulatory emissions model for mobile sources.

In the area of atmospheric chemistry and modeling, research will determine the causes for NAAQS non-attainment (e.g., chemical constituents, sources and source regions, and meteorological variables). Research will also describe the key missing features of the atmospheric chemistry of ozone formation and produce mechanisms of this chemistry as modules for use in atmospheric chemistry models. Developing, evaluating and applying atmospheric models for projecting the impacts of alternative control strategies will also be a priority for ozone research in FY 2002.

Particulate Matter

EPA's particulate matter research portfolio is aligned along the ten priority topics identified by the National Academy of Sciences (NAS) in a series of reports, the most recent of which was issued in January 2001 (*Research Priorities for Airborne Particulate Matter: Early Research Progress*). The next report, due near the end of FY 2002, will provide the NAS the opportunity to evaluate an extensive body of research results.

NAS Priority Topic 1- Outdoor measures vs. actual human exposures to PM: Under this research topic, indoor source emissions research planned for FY 2002 will improve data on the emission rates and characteristics of particles emitted from both combustion (e.g., heaters) and non-combustion (e.g., office equipment and consumer products) sources. Models to predict emissions from these key source categories will be developed, and the influence of human activities on emissions will also be considered. This research will provide valuable data which will be used to develop a better understanding of the relative contribution of indoor and ambient sources to total personal or population PM exposures.

NAS Priority Topic 2 - Exposure of susceptible subpopulations to toxic PM components: Research under this topic will develop data on exposure to PM for susceptible sub-populations. Work will continue to develop exposure models that predict exposure, and link these exposure models to atmospheric models and lung deposition models.

NAS Priority Topic 3- Characterization of PM emission sources: The overall objectives of FY 2002 PM research under this NAS topic are to: (1) develop new or improved methods and models to quantify or estimate emissions of primary fine particles and major gaseous precursors of secondary fine particles; (2) provide data on the size distribution of the particles emitted; and (3) provide updated and augmented data on the chemical composition of PM from a variety of sources. The program will focus on measurement techniques that use dilution tunnels and other techniques to simulate the process of plume cooling in the atmosphere. Emissions from diesel vehicles, prescribed and open burning, and combustion will be collected and methods to collect emissions from locomotives will be developed. Differences in emission rates due to changes in operating conditions, engine design and age, and fuel type will be included in the revised emission estimates. In addition, increased emphasis will be placed on characterizing biological aerosols.

Research planned on gaseous precursors will focus on sources of ammonia. Improved emission factors for different types of animal husbandry operations (swine and poultry) and other area sources, including on-road light-duty vehicles, will be developed. This research will reduce uncertainties in emissions estimates and increase the likelihood that strategies in State Implementation Plans (SIPs) will achieve the emissions reductions required to comply with the NAAQS. The emissions data generated will also be used to develop more specific source profiles for these sources. The new profiles will provide EPA with a better understanding of the relationship between sources, ambient concentrations, and human exposures and enhance the capability of states to apportion ambient particulate matter to the sources of the particulate.

NAS Priority Topic 4 - Air quality model development and testing: EPA atmospheric measurement and modeling research in support of NAS priority topic 4 will evaluate the chemical and physical processes that control the organic and inorganic chemical composition of PM and develop urban-to-regional scale emissions-based air quality models and source apportionment models and their component inputs. This effort will increase the understanding of atmospheric processes (including meteorology) and chemistry that affect the secondary formation, transport and fate to support NAAQS implementation planning. Additional research will be conducted to determine accurately the physical properties, chemistry and composition of atmospheric aerosols and to develop and evaluate measurement methods needed for applying and evaluating complex models that simulate atmospheric processes.

NAS Priority Topic 5 - Assess hazardous PM components: EPA will determine physical, chemical, and biological characteristics (e.g., size, chemical composition) of particles responsible for adverse health effects, and dose-response relationships between PM constituents and adverse health effects. This work, related to NAS priority topic 5, will involve an integrated, multi-disciplinary approach, in which emission characterization and health information will guide chemical speciation research.

NAS Priority Topic 6 - Dosimetry: EPA PM dosimetry research in FY 2002 will investigate where inhaled particles deposit in lungs and how particle deposition affects susceptibility. Efforts will develop and validate models of factors affecting deposition such as ventilation rate, structural features due to disease conditions and particle size.

NAS Priority Topic 7 - Effects of PM and co-pollutants: Research efforts under NAS priority topic 7 include *in vivo* and *in vitro* studies of interactions between PM and other air pollutants and toxicology and clinical studies to investigate effects of co-pollutants on PM health effects, deposition, and clearance. Further research under this topic will include epidemiology studies to assess the consequences of PM and co-pollutant exposures in at-risk populations.

NAS Priority Topic 8 - Identify susceptible subpopulations: Research to identify susceptible subpopulations includes effects research to identify subpopulations with enhanced sensitivity to the adverse effects of PM and determine how host susceptibility factors influence dose-response relationships. Effects research in this area will also develop animal models of human susceptibility and be used to conduct studies identifying morbidity effects on vulnerable population subgroups.

NAS Priority Topic 9 - Toxicological mechanisms of injury: Research identifying the toxicological mechanisms of injury will elucidate underlying cellular and molecular mechanisms of toxicity responsible for adverse health outcomes (including pulmonary inflammatory mechanisms and cardiopulmonary and neurogenic response mechanisms). This research will also determine physical, chemical, and biological characteristics of particles responsible for adverse health effects.

NAS Priority Topic 10 - Analysis and measurement: EPA analysis and measurement research will support development of methods for the use of alternate indicators of exposure to PM, which can be correlated with morbidity. Standard existing techniques for measuring nonvolatile PM will be compared to existing techniques to determine PM2.5 mass across seasons and locations.

In FY 2002, EPA will also continue supporting the five university-based research centers conducting particulate matter research. These research centers, established in FY 1999, advance the scientific understanding of the health effects of PM through integrated exposure and health effects studies targeted to all 10 high-priority research areas identified by the NAS. Also, with the completion of the PM Air Quality Criteria Document in FY 2001, an external review draft of a PM research needs document will be developed in FY 2002.

In addition, continued coordination and oversight of the Supersite monitoring activities, which provide detailed air quality information to support atmospheric chemistry and modeling efforts, as well as mechanistic toxicology and epidemiology studies that will support both future NAAQS decision-making and implementation of the NAAQS, will continue in FY 2002.

Also in FY 2002, laboratory and field research will be conducted cooperatively with the Department of Energy and the private sector to develop and test integrated multi-pollutant control technologies that simultaneously reduce multiple air pollutants of concern including directly emitted PM, secondary gaseous precursors (sulfur oxides, and nitrogen oxides) that form PM, and key air toxics including mercury.

FY 2002 Change from FY 2001 Enacted Budget

EPM

- (-$12,971,400) The FY 2002 Request is $12,971,400 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

- (-$500,000) EPA's FY 2001 appropriation provided $500,000 for a report from the National Academy of Public Administration evaluating the New Source Review and Prevention of Significant Deterioration programs. This is an one time effort that will not require additional funding in FY 2002.

- (-$496,100) This reduction is being taken in NOx program development. This reduction reflects a shift from EPA development of the NOx reduction program to state implementation of the program. States will use funding available under the STAG appropriation to help meet their Clean Air Act responsibilities.

- (-$1,797,900; -2.1 FTE) This reduction reflects elimination of the EMPACT program since environmental data is being made available to the public through other EPA programs.

- (+$2,495,400) This increase reflects an increase in workforce costs.

S&T

- (-$5,624,600) The FY 2002 Request is $5,624,600 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

- (-$375,800) This reduction reflects program efficiencies resulting from the close down of the Virginia Testing Laboratory in FY 2001 and the consolidation of in-use compliance testing activities at the Agency's National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan.
- (+$1,394,000) This increase reflects an increase in workforce costs.

STAG

- (+$4,167,300) This funding level reflects the increased emphasis on the ozone and particulate matter NAAQS. States will receive funding under section 105 of the Clean Air Act to help develop state plans and integrated strategies.

- (-$2,833,400) Funding will be maintained at $5,000,000 to support section 103 grants for regional planning organizations and state and Tribal implementation of the regional haze rule. This funding level will allow the organizations to continue the problem characterization and other technical analyses necessary to meet Clean Air Act requirements.

Research

S&T

- (+$2,844,000) This redirection within the PM research program will augment research in the atmospheric sciences which will support implementation-related research, focusing on research addressing scientific issues about modeling, chemistry, emission and measurement requirements necessary for states to devise successful PM NAAQS implementation plans. Specific questions that will be addressed include: (1) What measurement methods can be developed that will allow for the characterization of the size distribution, chemical composition, and emission data from sources found in the U.S.?; and (2) What are the adequately developed, tested and evaluated air quality modes that can represent the linkages between emission sources and ambient concentrations of the most biologically relevant components of PM?

- (+$1,288,800, +3.2 FTE) Redirected resources will support PM exposure measurements research, including population-based sampling design for the general population and susceptible subpopulations, personal exposure and ambient site measurements for PM and its toxic constituents, and airshed chemistry that could affect exposure to PM. This work will provide the basic field data to develop and test the Agency's Human Exposure Model.

- (-$607,600, -7 FTE) The reduction of 3.8 FTE will result in the delay of population-based studies of human exposure to PM toxic agents. The remaining 3.2 FTE will be redirected from human exposure panel studies to developing methods for personal monitoring of toxic constituents of PM and research in different regions of the country and different seasons to account for differences in activity patterns, housing characteristics, and airshed chemistry that could affect exposure to PM. This work is the planned follow-on to the human exposure panel studies the Agency has done over the last three years.

- (-$1,000,000) Resources will be redirected from the PM environmental speciation research program (the "Supersites" program). This redirection is in keeping with the PM research program's commitment to the Supersites, which is entering the final year of the original 5-year agreement.
- (-$2,211,200) This redirection will reduce PM NAAQS revision-related research, including toxicology and human exposure research involving work on PM mechanisms, susceptibility, and PM components. A robust NAAQS revision-related research program will remain in 2002, and the redirected resources will support implementation-related research in atmospheric sciences that will help states achieve the NAAQS.

- (-$3,307,700) The FY 2002 Request is $3,307,700 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

Annual Performance Goals and Performance Measures

Reduce CO2, SO2, NO2, Lead

In 2002 Maintain healthy air quality for 44.3 million people living in 70 areas attaining the CO, SO2, NO2, and Lead standards; increase by 350 thousand the number of people living in areas with healthy air quality that have newly attained the standard.

In 2001 Maintain healthy air quality for 31.1 million people living in 56 areas attaining the CO, SO2, NO2, and Lead standards; increase by 13.2 million the number of people living in areas with healthy air quality that have newly attained the standard.

In 2000 Maintained healthy air quality for 27.7 million people living in 46 areas attaining the CO, SO2, NO2, and Lead standards, and increased by 3.41 million the number of people living in areas with healthy air quality that have attained the standard.

In 1999 Healthy air quality for 22.8 million people living in 33 areas attaining the CO, SO2, NO2, and Lead standards was maintained, and 4.9 million more people are living in areas with healthy air quality that have attained the standard.

In 1999 13 of the 58 estimated remaining nonattainment areas have achieved the NAAQS for carbon monoxide, sulfur dioxide, or lead.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request

Total Number of People Living in Areas Designated in Attainment with Clean Air Standards for CO, SO2, NO2, and Pb	27,718,000	31,100,000	44,333,286	44,683,286	People
Areas Designated to Attainment for the CO, SO2, NO2, and Pb Standards	13	10	14	10	Areas
Additional People Living in Newly Designated Areas with Demonstrated Attainment of the CO, SO2, NO2, and Pb Standards	4,918,531	3,410,000	13,223,286	350,000	People
CO Reduced from Mobile Sources	9,841,000	10,341,000	10,672,000	11,002,000	Tons
Total Number of People Living in Areas with Demonstrated Attainment of the NO2 Standard	13,000,000	13,000,000	13,000,000	13,000,000	People

Baseline: For SO2, Lead and CO, 107 areas with a population of 65,573,000 were classified as non-attainment or were unclassified in 1990. Through 2000, 56 of those areas with a population of 31.1 million have been redesignated to attainment. The 1995 baseline for mobile source emissions for CO was 70,947,000 tons.

Reduce Ozone and Ozone Precursors

In 2002 Certify that 3 new areas of the remaining 52 nonattainment areas have attained the 1-hour NAAQS for ozone, thus increasing the number of people living in areas with healthy air quality by 2.9 million.

In 2001 Maintain healthy air quality for 35.1 million people living in 44 areas attaining the ozone standard; increase by 1.9 million the number of people living in areas with healthy air quality that have newly attained the standard; and certify that 5 new areas have attained the 1-hour standard for ozone.

In 2000 Maintained healthy air quality for 33.4 million people living in 43 areas attaining the ozone standard.

In 1999 The Regions revoked the 1-hour standard in 10 areas. However, based upon the Circuit Court decision regarding the revised ozone standard, the Agency has proposed to reinstate the 1-hour standard.

In 1999 Healthy air quality maintained for 33.4 million people living in 43 areas attaining the ozone standard.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Total Number of People who Live in Areas Designated to Attainment of the Clean Air Standards for Ozone	33,363,000	35,063,000	36,976,000	39,861,000	People
Areas Designated to Attainment for the Ozone Standard	0	1	5	3	Areas
Additional People Living in Newly Designated Areas with Demonstrated Attainment of the					

Ozone Standard	0	1,700,000	1,876,000	2,885,000	People
VOCs Reduced from Mobile Sources	1,409,000	1,562,000	1,659,000	1,755,000	Tons
NOx Reduced from Mobile Sources	898,000	1,059,000	1,189,000	1,319,000	Tons

Baseline: As a result of the Clean Air Act Amendments of 1990, 101 areas with a population of 140,015,000 were designated nonattainment for the 1-hour standard. Through 2000, 44 areas with a population of 35.1 million have been redesignated to attainment and 57 areas remain in nonattainment. The 1995 baseline for VOCs reduced from mobile sources is 8,134,000 tons and 11,998,000 tons for NOx, both ozone precursors.

Reduce Particulate Matter

In 2002 Maintain healthy air quality for 1.3 million people living in 15 areas attaining the PM standards; increase by 60 thousand the number of people living in areas with healthy air quality that have newly attained the standard.

In 2001 Maintain healthy air quality for 1.276 million people living in 9 areas attaining the PM standards; increase by 60 thousand the number of people living in areas with healthy air quality that have newly attained the standard.

In 2000 Maintained healthy air quality for 1.2 million people living in 7 areas attaining the PM standards, and increased by 75.8 thousand the number of people living in areas with healthy air quality that have attained the standard.

In 1999 Healthy air quality maintained for 1.2 million people living in 7 areas attaining the PM standards.

In 1999 EPA deployed PM-2.5 ambient monitors including: mass, continuous, specification, and visibility sites resulting in a total of 1110 monitoring sites.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
National Guidance on PM-2.5 SIP and Attainment Demonstration Requirements	1 Draft				Issued
Provide Draft Documents to CASAC for PM NAAQS Review	30-Sep-2000				
Cumulative total number of monitoring sites deployed	1,110				Sites
Total Number of People who Live in Areas Designated in Attainment with Clean Air Standards for PM	1,200,000	1,275,800	1,336,000	1,396,000	People
Areas Designated to Attainment for the PM-10 Standard	0	2	6	6	Areas
Additional People Living in Newly Designated Areas with Demonstrated Attainment of the PM Standard 0	75,800	60,000	60,000	People	

PM-10 Reduced from Mobile Sources	18,000	20,000	22,000	23,000	Tons
PM-2.5 Reduced from Mobile Sources	13,500	15,000	16,500	17,250	Tons

Baseline: As a result of the Clean Air Act Amendments of 1990, 84 areas with a population of 31,114,000 were designated non-attainment for the PM-10 standard. Through 2000, 9 areas with a population of 1.3 million have been redesignated to attainment. The 1995 baseline for PM-10 reduced from mobile sources is 880,000 tons and 659,000 for PM-2.5.

Research

Ozone Measurement Research

In 2002 Provide tropospheric ozone precursor measurement methods, emissions based air quality models, observations based modeling methods, and source emissions information to guide State Implementation Plan (SIP) development to attain the ozone National Ambient Air Quality Standards.

In 2001 Develop tropospheric ozone precursor measurements methods, emissions based air quality models, observation based modeling methods, and source emissions information to guide State Implementation Plan (SIP) development under the current NAAQS.

In 2000 EPA developed tropospheric ozone precursor measurement methods, emissions-based air quality models, observations-based modeling methods, and source emissions information to guide State Implementation Plan (SIP) development under the current ozone NAAQS by completing the products below.

In 1999 Peer reviewed STAR research grants were awarded that focus on developing methodologies for assessing uncertainties in emission inventories and techniques for incorporating GOES satellite data to improve regional scale ozone modeling assessments.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Recommend method for measuring NOx (nitrogen oxides and their products)		30-Sep-2000			method
Complete development and begin evaluation of the "Morphecule" approach for including complex chemical reaction mechanisms in photochemical pollution models like Models-3/CMAQ to be used in SIP dev.		1			approach
Complete evaluation of Models-3/CMAQ against field data to demonstrate reliability in ozone NAAQS attainment planning		20-Jul-2000			model eval.
In 1999 report on quantifying the uncertainty in emissions, chemical parameters and meteorological conditions for trajectory model.	31-Dec-1999				
Complete evaluation of the "Morphecule" approach; and complete a requirements analysis for implementation and testing of the Morphecule mechanism in Models-3/CMAQ.			1		approach

Support development of future SIP inventories by upgrading Biogenic Emissions Inventory System Model to include data on how agricultural and forestry activities impact emissions of oxygenated VOCs.	1		upgrade
Conduct initial field evaluation of NOx methods and ozone indicator compounds, e.g. peroxide measurements.		1	methodology
Update a faster, more detailed approach (Morphecule mechanism) for modeling atmospheric chemistry and work with EPA staff to implement the mechanism in the Agency's principle Air Quality Model.		1	mechanism

Baseline: EPA will provide NAAQS implementation tools that quantify emissions, model air quality, and develop the science to support control strategies for attaining clean air standards. A key uncertainty in determining the adequacy of control strategies is understanding the sufficiency of NOx reductions and the necessary balance with VOC reductions to achieve full attainment. Methods and observations-based assessments in 2002 will provide a reliable means of determining state and local emissions reductions by developing techniques to measure ozone precursors and their transformation during meteorological transport. This research will develop observational- based methods, through intensive regional field studies, to complement emissions based, physical theory modeling. Research to improve the accuracy of emission estimates from biogenic (i.e., naturally occurring) and mobile sources will develop improved emission factors for vegetative types and compounds. Mobile source emissions research will focus on further development and validation of the Mobile Emissions Assessment System for Urban and Regional Evaluation (MEASURE), which provides more accurate emission estimates.

Ozone Research

In 2002 Complete the Air Quality Criteria Document for ozone and related photochemical oxidants to support review of the National Ambient Air Quality Standards (NAAQS) for tropospheric ozone and also provide SOx NAAQS support.

In 2001 Develop tropospheric ozone, NOx and SOx Air Quality Criteria Documents through planning, development, and consultation.

In 2000 EPA published results of the ozone epidemiology research program and research on the role of natural and anthropogenic stresses in ponderosa pine ecosystems. The Final Carbon Monoxide AQCD was completed. The draft Ozone AQCD has been deferred until FY01 to allow completion of the PM AQCD.

In 1999 Completed a release of Model-3/CMAQ-Version 2 for tropospheric ozone.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Final Carbon Monoxide Air Quality Criteria Document.		1			document
Publish First External Review Draft of					

Ozone Air Quality Criteria Document for public comment and Clean Air Scientific Advisory Committee (CASAC) review.			1		draft AQCD
Complete final Ozone Air Quality Criteria Document				1	final AQCD

Baseline: Key uncertainties exist in determining the effects of chronic ozone exposures on humans and ecosystem effects of tropospheric ozone exposures. Ongoing tropospheric ozone research efforts in FY2002 will continue with the development of improved risk assessment procedures and completion of the Air Quality Criteria Document (AQCD) for ozone. Planning, development and/or consultation will also continue for other related NAAQS including the SOx NAAQS.

PM Effects Research

In 2002 Provide data on the health effects and exposure to particulate matter (PM) and provide methods for assessing the exposure and toxicity of PM in healthy and potentially susceptible subpopulations to strengthen the scientific basis for reassessment of the NAAQS for PM.

In 2001 Provide new information on the atmospheric concentrations, human exposure, health effects and mechanisms of toxicity of particulate matter, and facilitate PM NAAQS review through Air Quality Criteria Document development and consultation.

In 2000 EPA provided new information on the atmospheric concentrations, human exposure, and health effects of particulate matter (PM), including PM2.5, and incorporated it and other peer-reviewed research findings in the second External Review Draft of the PM AQCD for NAAQS review.

In 1999 Three projects completed: 1) pilot study of methods to assess PM effects on changes in cardiovascular and inflammatory endpoints; 2) long-term exposures to PM and effects on mortality and lung function; and 3) Interagency agreement with NIAID to support EPAs part of Inner City Asthma study.

In 1999 Completed three reports on PM: (1) describing research designed to test a hypothesis about mechanisms of PM-induced toxicity; (2) characterizing factors affecting PM dosimetry in humans; and (3) identifying PM characteristics (e.g. composition) associated with biological responses.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Reports (1) describing research designed to \test a hypothesis about mechanisms of PM-induced toxicity; 2) charct. factors affecting PM dosimetry in humans; 3) ID PM characteristics (composition)	3				reports
Hold CASAC review of draft PM Air Quality Criteria Document.		1			review
Complete longitudinal panel study data collection & preliminary report on exposure of susceptible subpopulations to total PM &					

co-occurring gases of ambient origin and i.d. key exposure parameters.		1			report
Data generated from PM monitoring studies in Phoenix, Fresno, and Baltimore will be used to reduce uncertainties on atmospheric PM concentrations in support of Draft PM Air Quality Criteria Document.		30-Sep-2000			data
Reports on (1) role of host susceptibility factors, such as compromised cardiopulmonary systems, on responses to PM exposures and (2) data on regional deposited dose of inhaled ultrafine particles.		30-Sep-2000			reports
Report on results from Baltimore study evaluating the cardiovascular and immunological responses of elderly individuals to PM.		1			report
Delivery of computer model to assess the effect of spatial variability on human exposure as manifested by health.	1				model
Reports on (1) long-term exposures to PM and effects on mortality and lung function.	1				manuscript
Complete PM longitudinal panel study data collection and report exposure data.			1		study
Report on health effects of concentrated ambient PM in healthy animals and humans, in asthmatic and elderly humans, and in animal models of asthma and respiratory infection.			1		report
Final PM Air Quality Criteria Document completed.			1		final AQCD
Report on the effects of concentrated ambient PM on humans and animals believed most susceptible to adverse effects (e.g., elderly, people with lung disease, or animal models of such diseases).				1	report
Publish report on effects of particulate matter and volatile organic chemical air pollutants on children.				1	report
Publish report on the empirical and theoretical lung deposition dose of ultrafine, fine, and coarse particles in elderly and mild asthmatic subjects under various breathing conditions.				1	report

Publish report on the toxic effects of metallic and ultrafine PM constituents on lung cells and animals, and the molecular and biochemical mechanisms through which they occur.	1	report
Publish report on a series of studies of model and ambient PM effects in animal models of systemic hypertension, advanced cardiovascular disease, and chronic lung disease (asthma, COPD).	1	report
Report on animal and clinical toxicology studies using Utah Valley particulate matter (UVPM) to describe biological mechanisms that may underlie the reported epidemiological effects of UVPM.	1	report
Longitudinal PM exposure panel study final report.	1	report
Report on statistical associations of mortality/morbidity with source categories and other alternative indicators of PM exposure.	1	report
Capstone report on the physical, chemical, and toxicological characteristics of PM from heavy oil and coal combustion. The report provides data on the linkage between emissions and health effects.	1	report

Baseline: At present, there is substantial evidence from epidemiological studies that increased levels of PM are associated with increased frequency of death and disease, especially in the elderly and in individuals with cardiopulmonary disease. Children also have been shown to have increased illness as PM levels increase. Our understanding of the biological mechanisms underlying these associations, of the identification of components (e.g., organics, metals) or characteristics (e.g., size) of PM producing these effects, and of human exposures to the most important components of PM is only now beginning to emerge. As noted by the National Research Council, the EPA research program is well targeted to address these critical knowledge gaps and is well integrated with the extensive ambient air monitoring programs managed by State and local agencies. The results of the research efforts in 2002 will include development and application of new methods for assessing human exposure and testing of toxicity mechanisms that will yield an improved scientific basis for setting National Ambient Air Quality Standards for PM.

PM Measurement Research

In 2001 Provide new information on particulate matter source emissions, measurements, methods, and emissions-based air quality models to guide State Implementation Plan (SIP) development under the PM NAAQS.

In 2000 EPA developed particulate matter (PM) measurements, methods, emissions-based air quality models, and source emissions and control information to guide State Implementation Plan (SIP)

development under the current PM NAAQS by completing the products below and other research activities.

In 1999 Release of Models-3/CMAQ-Version 2 for PM was completed.

In 1999 Completed four reports on the following topics: 1) wood stove PM emissions (draft); 2) fine PM and organic specification of fireplace emissions (draft); 3) fine PM characterization of heavy duty diesel vehicle exhaust plumes (draft); and 4) characterizing PM emissions from mobile construction equipment.

In 1999 Awarded five (5) grants in June 1999 to establish Particulate Matter (PM) research centers for a period of five years, which will advance scientific understanding of the health effects of PM in the areas of exposure, dosimetry and modeling, toxicology, and epidemiology.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Produce data on the size distribution of particles emitted from residential wood combustion (fireplace)	2				reports
Produce improved receptor models (CMB8 and UNMIX) for measurement of source category emissions impacts on air quality.		2			models
Complete a preliminary evaluation of Models-3/Community Multi-Scale Air Quality (CMAQ) for PM, demonstrating its potential reliability for PM NAAQS attainment planning		30-Sep-2000			evaluation
In 1999 establish five airborne particulate matter (PM) research centers to conduct integrated studies on PM exposure, dosimetry and extrapolation modeling, toxicology and epidemiology.	5				Grant Awards
Publish a report on the size distribution of particles emitted from diesel trucks under various on-road conditions to improve source inventories for NAAQS implementation.			1		report
Publish peer reviewed documentation of the PM components of Models-3/CMAQ.			1		documentation

Baseline: The management of particulate matter involves extensive characterization of current conditions and modeling of emissions and atmospheric processes to identify effective control strategies. At present, few data are available on atmospheric concentrations and significant uncertainties exist in the methods and atmospheric models used to link sources of PM and precursors to ambient concentrations. In the area of emissions, there are extensive uncertainties about the total PM mass emitted and the size distribution and chemical composition of the primary particles emitted from a variety of sources (diesel trucks, residential wood combustion, off road vehicles, construction activities, industrial and energy production facilities). There are also uncertainties

about how best to measure these emissions to account for immediate changes in particles which occur in the exhaust plume. Emissions of precursors (nitrogen oxides, sulfur oxides and ammonia) are much better understood with the exception of ammonia. In the area of air quality models, the Agency has recently released Models-3 to the environmental monitoring community. This modeling system takes advantage of the most recent advances in chemical transport, transformation, and fate but also enhancement in computer and computer program technologies. New and improved data sets on emissions and models are needed to support effective State Implementation Plan development.

Verification and Validation of Performance Measures

Performance Measures: NAAQS

- Areas Designated for the 1-hour Ozone Standard and Associated Populations
- Areas Redesignated/ Areas Maintaining Healthful Standards for CO, SO2, NO2, and Lead and Associated Populations
- Areas Designated for PM 10 Standard and Associated Populations

Performance Databases:

- AIRS —Aerometric Information Retrieval System is comprised of two major subsystems: 1) the Air Quality Subsystem (AQS) stores ambient air quality data (used to determine if nonattainment areas have the three years of clean air data needed for redesignation), and 2) the Airs Facility Subsystem (AFS) stores emissions and compliance/enforcement information for facilities.
- FREDS—The Findings and Required Elements Data System is used to track progress of states and Regions in reviewing and approving the required data elements of the State Implementation Plans (SIP). SIPs define what actions a state will take to improve the air quality in areas that do not meet national ambient air quality standards

Data Source:

- AIRS: State and local agency data from State and Local Air Monitoring Stations (SLAMS).
- FREDS: Data are provided by EPA's Regional offices.

QA/QC Procedures:

- AIRS: The QA/QC of the national air monitoring program has several major components: the Data Quality Objective (DQO) process, reference and equivalent methods program, EPA's National Performance Audit Program (NPAP), system audits, and network reviews. To ensure quality data, the SLAMS are required to meet the following: 1) each site must meet network design and siting criteria; 2) each site must provide adequate QA assessment, control, and corrective action functions according to minimum program requirements; 3) all sampling methods and equipment must meet EPA reference or equivalent requirements; 4) acceptable data validation and recordkeeping procedures must be followed; and 5) data from SLAMS must be summarized and reported annually to EPA. Finally, there are system audits that regularly review the overall air quality data collection activity for any needed changes or corrections.
- FREDS: No formal QA/QC procedures.

Data Quality Review:

- AIRS: No external audits have been done in the last 3 years.
- FREDS: None.

Data Limitations:

- AIRS: Some potential data limitations: 1) incomplete or missing data (*e.g.*, some values may be absent due to incomplete reporting, and some values subsequently may be changed due to quality assurance activities); 2) inaccuracies due to imprecise measurement and recording (*e.g.*, faulty monitors; air pollution levels measured in the vicinity of a particular monitoring site may not be representative of the prevailing air quality of a county or urban area); and 3) inconsistent or non-standard methods of data collection and processing (*e.g.*, non-calibrated and non-operational monitors).
- FREDS: Potential data limitations include incomplete or missing data from Regions

New/Improved Data or Systems:

- AIRS: EPA is in the process of reengineering the AQS to make it a more user friendly, Windows-based system. As a result, air quality data will be more easily accessible via the Internet. The current AFS, which is a mainframe operation, will be replaced by a new ORACLE database that will also be accessible by the Internet. Both systems will be enhanced to include data standards (*e.g.*, latitude/longitude, chemical nomenclature) being developed under the Agency's Reinventing Environmental Information (REI) Initiative. Facility identification standards will be included so that air emission data in our data base can be linked with environmental data in other Agency databases for the same facility.
- FREDS: None

Performance Measure: Reductions in Mobile Source VOC Emissions and Reduction in Mobile Source NOx Emissions

Performance Database: AIRS

Data Source: AIRS: State and local agency data from State and Local Air Monitoring Stations (SLAMS).

QA/QC Procedures: AIRS: The QA/QC of the national air monitoring program has several major components: the Data Quality Objective (DQO) process, reference and equivalent methods program, the precision and accuracy of the collected data, EPA's National Performance Audit Program (NPAP), system audits, and network reviews. To ensure quality data, the SLAMS are required to meet the following: 1) each site must meet network design and siting criteria; 2) each site must provide adequate QA assessment, control, and corrective action functions according to minimum program requirements; 3) all sampling methods and equipment must meet EPA reference or equivalent requirements; 4) acceptable data validation and recordkeeping procedures must be followed; and 5) data from SLAMS must be summarized and reported annually to EPA. Finally, there are system audits that regularly review the overall air quality data collection activity for any needed changes or corrections.

Data Quality Review: AIRS: No external audits have been done in the last 3 years.

Data Limitations: AIRS: Some potential data limitations: 1) incomplete or missing data (*e.g.*, some values may be absent due to incomplete reporting, and some values subsequently may be changed due to quality assurance activities); 2) inaccuracies due to imprecise measurement and recording (*e.g.*, faulty monitors; air pollution levels measured in the vicinity of a particular monitoring site may not be representative of the prevailing air quality of a county or urban area); and 3) inconsistent or non-standard methods of data collection and processing (*e.g.*, non-calibrated and non-operational monitors).

EPA does make estimates of mobile source emissions, for both past and future years. The most complete and systematic process for making and recording such estimates is the "Trends" inventory process executed each year by OAQPS's Emissions, Monitoring, and Analysis Division (EMD). The Assessment and Modeling Division is the coordinator within the Office of Transportation and Air Quality for providing EMD information and methods for making the mobile source estimates. In addition, EMD's contractor(s) obtain some necessary information directly from other sources, for example weather data and the Federal Highway Administration's (FHWA) Vehicle Miles Traveled (VMT) estimates by state. EMD always creates and publishes the emission inventory estimate for the most recent historical year, detailed down to the county level and with 31 line items representing mobile sources. Usually, EMD also creates estimates of emissions in several future years. When the method for estimating emissions changes significantly, EMD sometimes creates revisions to its older estimates of emissions in years prior to the most recent year, to avoid a sudden discontinuity in the apparent emissions trend. EMD publishes on paper the national emission estimates; county-level estimates are available electronically.

It is useful to understand just what mobile source information is updated in Trends each year. An input is updated annually only if there is a convenient source of annual data for the input. Generally, VMT, the mix of VMT by type of vehicles (FHWA types, not EPA types, however), temperatures, gasoline properties, and the designs of Inspection/Maintenance (I/M) programs are updated each year. The age mix of highway vehicles is updated, using state registration data; this captures the effect of fleet turnover, assuming emission factors for older and newer vehicles are correct. Emission factors for all mobile sources and activity estimates for non-road sources are changed only when the Office of Transportation and Air Quality (OTAQ) requests this to be done and is able to provide the new information in a timely manner.

The limitations of the inventory estimates for mobile sources comes from limitations in the modeled emission factors in g/mile and also the estimate vehicle miles traveled for each vehicle class. For non-road emissions, the estimates come from a model using equipment populations, emission factors per hour or unit of work, and an estimate of usage. These input data are frequently being revised with newer data. Any limitations in the input data such as emission factors (based on emission factor testing and models predicting overall fleet emission factors such as in g/mile), vehicle miles traveled (which are derived from Department of Transportation data), and other factors will carry over into limitations in the emission inventory estimates.

New/Improved Data or Systems: AIRS: EPA is in the process of reengineering the AQS subsystem to make it a more user friendly, Windows-based system. As a result, air quality data will be more easily accessible via the Internet. The current AFS, which is a mainframe operation, will be replaced by a new ORACLE database that will also be accessible by the Internet. Both systems will be enhanced to include data standards (*e.g.*, latitude/longitude, chemical nomenclature) being developed under the Agency's Integrated Information Initiative. Facility identification standards will be included so that air emission data in our data base can be linked with environmental data in other Agency databases for the same facility.

Performance Measure: Reductions in Mobile Source PM_{10} Emissions and $PM_{2.5}$ Emissions

Performance Database: AIRS

Data Source: AIRS: State and local agency data from State and Local Air Monitoring Stations (SLAMS).

QA/QC Procedures: AIRS: The QA/QC of the national air monitoring program has several major components: the Data Quality Objective (DQO) process, reference and equivalent methods program, the precision and accuracy of the collected data, EPA's National Performance Audit Program (NPAP), system audits, and network reviews. To ensure quality data, the SLAMS are required to meet the following: 1) each site must meet network design and siting criteria; 2) each site must provide adequate QA assessment, control, and corrective action functions according to minimum program requirements; 3) all sampling methods and equipment must meet EPA reference or equivalent requirements; 4) acceptable data validation and recordkeeping procedures must be followed; and 5) data from SLAMS must be summarized and reported annually to EPA. Finally, there are system audits that regularly review the overall air quality data collection activity for any needed changes or corrections.

Data Quality Review: AIRS: No external audits have been done in the last 3 years.

Data Limitations: AIRS: Some potential data limitations: 1) incomplete or missing data (*e.g.*, some values may be absent due to incomplete reporting, and some values subsequently may be changed due to quality assurance activities); 2) inaccuracies due to imprecise measurement and recording (*e.g.*, faulty monitors; air pollution levels measured in the vicinity of a particular monitoring site may not be representative of the prevailing air quality of a county or urban area); and 3) inconsistent or non-standard methods of data collection and processing (*e.g.*, non-calibrated and non-operational monitors).

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It is useful to understand just what mobile source information is updated in Trends each year. An input is updated annually only if there is a convenient source of annual data for the input. Generally, VMT, the mix of VMT by type of vehicles (FHWA types, not EPA types, however), temperatures, gasoline properties, and the designs of Inspection/Maintenance (I/M) programs are updated each year. The age mix of highway vehicles is updated, using state registration data; this captures the effect of fleet turnover, assuming emission factors for older and newer vehicles are correct. Emission factors for all mobile sources and activity estimates for non-road sources are changed only when the Office of Transportation and Air Quality (OTAQ) requests this to be done and is able to provide the new information in a timely manner.

The limitations of the inventory estimates for mobile sources comes from limitations in the modeled emission factors in g/mile and also the estimate vehicle miles traveled for each vehicle class. For non-road emissions, the estimates come from a model using equipment populations, emission factors per hour or unit of work, and an estimate of usage. These input data are frequently being revised with newer data. Any limitations in the input data such as emission factors (based on emission factor testing and models predicting overall fleet emission factors such as in g/mile), vehicle miles traveled (which are derived from Department of Transportation data), and other factors will carry over into limitations in the emission inventory estimates.

New/Improved Data or Systems: AIRS: EPA is in the process of reengineering the AQS subsystem to make it a more user friendly, Windows-based system. As a result, air quality data will be more easily accessible via the Internet. The current AFS, which is a mainframe operation, will be replaced by a new ORACLE database that will also be accessible by the Internet. Both systems will be enhanced to include data standards (*e.g.*, latitude/longitude, chemical nomenclature) being developed under the Agency's Integrated Information Initiative. Facility identification standards will be included so that air emission data in our data base can be linked with environmental data in other Agency databases for the same facility.

Performance Measures:

- Report on the effects of concentrated ambient PM on humans and animals believed most susceptible to adverse effects (e.g., elderly, people with lung disease, or animal models of such diseases)

- Report on animal and clinical toxicology studies using Utah Valley particulate matter (UVPM) to describe biological mechanisms that may underlie the reported epidemiological effects of UVPM

Performance Database: Not applicable. This performance measure relates to an EPA scientific or technical product which is not tracked in an environmental database.

Data Source: Agency generated material

QA/QC Procedures: N/A

Data Quality Reviews: As required by the Agency-wide formal peer review policy issued in 1993, and reaffirmed in 1994 and 1998, all major scientific and technical work products used in Agency decision making are independently peer reviewed before their use. EPA has implemented a rigorous process of peer review for both its in-house and extramural research programs. Peer review panels include scientists and engineers from academia, industry, and other federal agencies.

Data Limitations: N/A

New/Improved Data or Systems: N/A

Research

Performance Measures:
- Report on the effects of concentrated ambient PM on humans and animals believed most susceptible to adverse effects (e.g., elderly, people with lung disease, or animal models of such diseases)
- Report on animal and clinical toxicology studies using Utah Valley particulate matter (UVPM) to describe biological mechanisms that may underlie the reported epidemiological effects of UVPM

Performance Database: Not applicable. This performance measure relates to an EPA scientific or technical product which is not tracked in an environmental database.

Data Source: Agency generated material

QA/QC Procedures: N/A

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Data Limitations: N/A

New/Improved Data or Systems: N/A

Coordination with Other Agencies

EPA cooperates with several other Federal, state and local agencies in achieving goals related to ground level ozone and PM. EPA continues to work closely with the Department of Agriculture and the Forest Service in developing its burning policy and reviewing practices that can reduce emissions. EPA, the Department of Transportation (DOT), and the Army Corps of Engineers work with state and local agencies to integrate transportation and air quality plans, reduce traffic congestion, and promote livable communities. EPA continues to work with the Department of the Interior, National Park Service, in developing its regional haze program and deploying the IMPROVE visibility monitoring network. The operation and analysis of data produced by the PM monitoring system is an example of the close coordination of effort between the EPA and state and Tribal governments.

EPA is working with the National Aeronautics and Space Administration (NASA) on technology transfer for using satellite imagery for pollution assessments and transports. We work with the Department of the Army, Department of Defense, on advancing emission measurement technology. We also work with the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce, for meteorological support for our modeling and monitoring efforts.

The Department of Energy (DOE) and DOT fund research projects to better understand the size, source, and causes of mobile source pollution. The DOT's mobile source projects include TRANSIMS (TRansportation ANalysis and SIMulation System) and other transportation modeling projects; DOE is funding these projects through the National Renewable Energy Lab. EPA also works closely with the DOE on refinery cost modeling analyses for EPA's clean fuel programs. For mobile sources program outreach, the Agency is participating in a collaborative effort with DOT's Federal Highway Administration and the Federal Transit Administration designed to educate the public about the impacts of transportation choices on traffic congestion, air quality and human health. This community-based public education initiative also includes the Centers for Disease Control. In addition, EPA is working with DOE to identify opportunities in the Clean Cities program.

Research

Tropospheric Ozone Research Program. Other than Criteria Document preparation which is EPA's responsibility alone, the Agency's core tropospheric ozone research program is coordinated with the research efforts of others and planned to achieve the most important unmet research needs that draw upon EPA's expertise. All exposure and risk management research in this area is coordinated through the efforts of the North American Consortium for Atmospheric Research in Support of Air Quality Management (NARSTO), a public/private partnership whose membership spans government, the utilities, industry, and academia throughout Mexico, the United States, and Canada. The remainder of the EPA tropospheric ozone research program develops the criteria document and research needs document associated with the review of the tropospheric ozone NAAQS.

Particulate Matter Research Program. The National Academy of Sciences PM research plan serves as the principal guideline for the Agency's particulate matter (PM) research. EPA coordinates with other federal agencies to review ongoing PM research activities and, where appropriate, to re-focus activities so

as to be consistent with the NAS plan. The EPA has chosen to take a broad-based approach to PM research planning and program development which extends participation to the private sector.

The PM science planning community has pointed to the need to conduct its health effects, exposure and monitoring research in close coordination, so that PM toxicology, epidemiology, and exposure research are each done in direct combination with the other two. They have stressed that none of the three should be planned and carried out on its own. EPA will continue to focus on such coordination and pursue a number of avenues to achieve public/private coordination and cooperation including: (1) playing a lead role in coordinating all federal agency research on PM health, exposure, and atmospheric processes under the Air Quality Research Subcommittee of the President's Committee on Environment and Natural Resources (CENR/AQRS); (2) creating an open inventory of all public and private ongoing PM research; and (3) completing an ORD Research Strategy for PM which will benefit all organizations engaged in PM related research.

One key opportunity for coordination of research related to standards implementation is through expansion of NARSTO, which has expanded its mission to include PM-related efforts. Complementary Federal/private coordination of effects-related research is under development, including that of the CENR/AQRS, and is being closely coordinated with the NARSTO expansion.

Statutory Authorities

Clean Air Act (42 U.S.C. 7401-7671q)

Motor Vehicle Information and Cost Savings Act and Alternative Motor Fuels Act of 1988 (AFMA)

National Highway System Designation Act

Objective #2: Reduce Risk from Air Toxics

By FY 2020, eliminate unacceptable risks of cancer and other significant health problems from air toxic emissions for at least 95 percent of the population, with particular attention to children and other sensitive sub-populations, and substantially reduce or eliminate adverse effects on our natural environment. By FY 2010, the tribes and EPA will have the information and tools to characterize and assess trends in air toxics in Indian country.

Resource Summary
(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
Reduce Air Toxics Risk	**$89,966.2**	**$94,748.6**	**$112,272.7**	**$109,247.2**
Environmental Program & Management	$46,345.0	$42,487.7	$56,274.6	$54,832.9
Science & Technology	$21,377.1	$22,864.0	$26,121.1	$22,811.2
State and Tribal Assistance Grants	$22,244.1	$29,396.9	$29,877.0	$31,603.1
Total Workyears	371.5	412.0	379.5	365.3

Key Programs
(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$22,244.1	$29,053.7	$29,877.0	$31,603.1
Air Toxics Research	$19,507.0	$18,121.7	$22,238.7	$18,924.4
EMPACT	$171.7	$0.0	$309.7	$0.0
Hazardous Air Pollutants	$45,256.0	$42,805.3	$52,044.2	$50,786.5
Rent, Utilities and Security	$0.0	$847.7	$4,288.9	$4,414.0

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Administrative Services	$0.0	$821.9	$736.9	$638.2
Regional Management	$0.0	$64.5	$68.7	$80.0

FY 2002 Request

Toxic air pollutants pose significant risks to public health by causing cancer and other serious health problems such as reproductive disorders, birth defects, and damage to the nervous system. Available data from U.S. cities indicate predicted increased lifetime cancer risks from air toxics may be on the order of 1 in 10,000. People who live near certain major industrial plants may face even higher cancer risks from air toxics.

The Clean Air Act Amendments of 1990 list 188 hazardous air pollutants (HAPs) that are emitted from a variety of sources, including mobile sources, stationary sources, and area sources. Emission rates vary across sources and by locale. For example, the 1996 National Toxics Inventory indicates that mobile sources account for approximately 45 percent of major air toxic emissions in urban areas, with point and area sources making up the remaining 55 percent. For several air toxics (e.g., benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and diesel particulate matter), mobile sources may contribute from 50 to70 percent of the total inventory.

The 1990 Amendments contain a variety of provisions that address toxic air pollutants from all categories of sources. Title II of the Amendments calls on EPA to develop standards to control hazardous air pollutants from motor vehicles and vehicle fuels. Vehicle and fuel standards must reflect the greatest degree of emission control that is technologically feasible, taking into account cost, noise, energy, and safety factors. Title III of the Amendments, which contains major stationary and area source requirements, lists the 188 HAPs and requires EPA to develop standards for major stationary sources of these pollutants. Eight years after promulgating these Maximum Achievable Control Technology (MACT) standards, EPA must evaluate the residual risk posed by these sources and revise the standards, if needed, to provide an ample margin of safety to protect public health or the environment.

Title III of the Amendments also requires EPA to develop a national urban air toxics strategy to ensure achievement of statutorily mandated cancer and non-cancer risk reduction goals, to identify at least 30 of the most hazardous air pollutants found in the largest number of urban areas, to develop MACT or Generally Available Control Technology (GACT) standards for area sources that emit those 30+ pollutants, and to encourage and work with state and local air pollution programs to reduce risks in urban areas. In addition, the Act requires EPA, through the Great Waters Program, to study the effect of air toxics on ecosystems, particularly on important water bodies. Finally, Title III mandates control of air toxics from combustion sources and analysis of emissions from steam-powered utilities.

To carry out Clean Air Act requirements, EPA developed an air toxics program comprised of four key areas: 1) the development of source-specific and sector-based standards; 2) national, regional, and

community-based initiatives to focus on multi-media and cumulative risks; 3) National Scale Air Toxics Assessment (NATA) activities; and; 4) education and outreach.

In carrying out the air toxics program, EPA is now moving from the first phase of the program, developing technology-based standards, to the second phase, using a risk-based, multi-media approach. The second phase focuses on urban areas and large water bodies to address the risk that remains after the first-phase controls are in place. In this second phase, the Agency will:

- Monitor and characterize the air toxics problem and identify the sources of the most toxic chemicals that are transported through the air and affect cumulative exposure, particularly in urban areas and major water bodies; and,

- Continue to implement strategies to reduce health and ecological risks from air toxics, targeting urban areas and major water bodies where exposure to air toxics is the greatest.

Characterizing Air Toxics

In FY 2002, EPA will continue to develop and apply assessment tools, develop regulations and guidance, and implement programs to reduce toxics risk to the public. EPA is now completing development of the information and tools to broadly characterize the air toxics problem on a national scale and measure progress in improving public health and reducing environmental impacts. These efforts will allow the Agency to better characterize the risks from air toxics and to establish a baseline for measuring risk in carrying out the Government Performance and Results Act (GPRA). For FY 2002, EPA will continue to invest in improved and innovative monitoring and modeling, emissions inventories, and risk assessment tools to allow better characterization of urban and local scale problems and to address multi-media issues and multi-pathway exposures.

For example, the EPA is building on existing state, Tribal, and local efforts to create a national monitoring and inventory program that better characterizes public exposures to hazardous air pollution. In general, existing monitoring efforts measure concentrations only for a limited number of toxic compounds and only at limited locations. EPA is working with states, tribes and local agencies to expand the air toxics monitoring program in urban areas and around major water bodies in order to better characterize air toxics; establish a centralized database on toxic compounds in urban areas including air, water, and solid waste; and update and improve the toxics emission inventories. EPA, in conjunction with the Department of Defense (DOD) and the Department of Energy (DOE), will continue to evaluate and advance the development of new and improved continuous source monitoring technology for emissions of air toxics.

EPA also will refine ongoing work with urban risk models to better estimate the human exposure to air toxics through various media and the risk to the public resulting from this exposure. As a first step, EPA has used a national-scale air quality model, the Assessment System for Population Exposure Nationwide (ASPEN), developed as part of the Cumulative Exposure Project (CEP), as part of the Agency's efforts to better characterize the air toxics problem. The CEP estimated 1990 outdoor concentrations of toxic air pollutants across the entire country for all source categories (e.g., cars, large stationary sources, and smaller sources). The National Scale Air Toxics Assessment (NATA) uses the ASPEN model based on an updated and more detailed emission inventory; evaluates the model with expanded ambient monitoring information; and

integrates an exposure model, the Hazardous Air Pollutant Exposure Model (HAPEM), to better assess the public health effects. The application of ASPEN and HAPEM provides a basis for evaluating the effectiveness of the nation's air toxics programs. In response to direction from Congress, EPA is developing plans to conduct and publish an uncertainty and variability analysis for the National Scale Air Toxics Assessment (NATA). As part of a preliminary analysis, EPA plans to develop a comprehensive plan for the analysis, recommend short-term approaches for an initial assessment of uncertainty and variability, and to implement the short-term approach to accompany the public release of NATA (scheduled for the summer 2001). Based on the preliminary assessment, a comprehensive analysis will be initiated (with completion in FY 2002) that includes stakeholder and peer scientific review.

Through the increased data collection efforts on air toxics underway, EPA also will be focusing on local hot spots and providing support in environmental justice issues. The Agency will evaluate and improve local-scale model efforts to support local evaluations and try to make them more resource efficient. The EPA also plans to model air deposition emissions on a national scale using REMSAD (Regulatory Modeling System for Aerosols and Deposition). The output from this assessment will be used to provide information to other programs, including states, which can then use the information in evaluating options for air toxic emissions reductions. The plan will also be used to identify national regulatory solutions to the air deposition problem.

In FY 2002, EPA will make further progress in linking release and exposure information from the various media programs to estimate multi-media toxics exposure and to develop cross-media strategies to more effectively reduce urban exposures to toxic emissions. EPA will continue to identify patterns in exposures to air toxics to better coordinate approaches for reducing exposure.

The Agency also will continue to evaluate health testing results and protocols from the motor fuels industry to increase information on public health risks. The Fuels and Fuel Additives Registration (FFAR) program will provide for the review and screening of potential toxic substances prior to introduction into motor vehicle fuel supplies. The FFAR program will continue involving approximately 2,000 fuel manufacturers, 3,000 gasoline and diesel fuels registrations and 6,000 additive registrations. Approximately 10,000 registration reports will be submitted. EPA will_ continue fuel additive health testing activities for Methylcyclopentadienyl Manganese Tricarbonyl (MMT) and Methyl Tertiary-Butyl Ether (MTBE).

In support of EPA regulatory efforts under Title II of the Act, the Agency will continue to assess the need for and the feasibility of controlling emissions of unregulated toxic air pollutants associated with motor vehicles and fuels. In FY 2001, EPA finalized a rule to address emissions of air toxics from mobile sources. This program identified 21 mobile source air toxics and established new gasoline toxic emission performance standards. The list of mobile source air toxics includes several volatile organic compounds and metals, as well as diesel particulate matter plus diesel emission organic gases. The rule also evaluated the effectiveness of existing mobile source emission control programs in reducing highway emissions of the identified mobile source toxics. The analysis showed that existing programs that reduce ozone and particulate matter (PM), including the reformulated gasoline program, national low emission vehicle program, emission standards for passenger vehicles and gasoline sulfur control requirements (Tier 2), and the 2007 heavy-duty vehicle standards and diesel fuel sulfur control requirements, are expected to yield significant reductions of mobile source air toxics. However, the Agency also recognizes that additional research and evaluation are needed to fully understand the extent of the mobile source air toxics problem. Thus, the rule also established a Technical Analysis Plan to continue to conduct research and analysis on mobile source air toxics. Based on the results of that research,

EPA may do a future rulemaking, to be completed no later than July 1, 2004, in which EPA will revisit the feasibility and need for additional controls for nonroad and highway engines and vehicles and their fuels. In FY 2002 to prepare for this review, EPA will be gathering emissions data, conducting exposure analyses, and evaluating the need for additional control. As part of our efforts, EPA will also be incorporating toxics emissions data into the mobile source models.

Reducing Emissions and Risk from Stationary and Mobile Sources

Under Title III of the Clean Air Act, EPA has completed all of the two-, four-, and seven-year MACT standards. Through January 2001, the Agency has proposed 20 10-year standards and promulgated two (of the total 58 standards covering 94 source categories). The estimated emission reductions from the rules already promulgated are over 1.5 million tons per year. Once all of the 10-year standards are promulgated, the Agency estimates an additional 500,000 tons of emission will be reduced per year.

In FY 2002, EPA will focus its efforts on completing the remaining 10-year MACT standards. These include a standard covering plywood and composite wood products with facilities in 41 states, reciprocating internal combustion engines with over 30,000 facilities; a standard covering over 10,000 municipal landfills; and a standard for miscellaneous organic hazardous air pollutants which covers 23 different source categories and is expected to reduce air toxic emissions by over 100,000 tons annually.

In developing the remaining 10-year MACT standards, EPA will continue to streamline the standard-setting process by building on experience from earlier standards and by providing greater flexibility for states and tribes that want to achieve the emission reductions, but in ways that are different from those proposed by EPA. For instance, the EPA will promulgate a generic MACT rule that covers carbon black production, cyanide chemical manufacturing, ethylene processes, and spandex production. By combining these four source categories into one standard, EPA eliminates the potential for duplicative or conflicting air emission control requirements, and assures consistency of the air emission control requirements for similar emission points.

While the work on developing MACT standards will be substantially completed in FY 2002, there will still be future work on implementing, delegating, and addressing issues such as process changes which may result in amendments to promulgated rules. The EPA believes that Federal standards for controlling emissions of hazardous air pollutants from area and major stationary sources can be most effectively implemented by states, tribes, and local agencies. EPA delegates its implementation authority and provides tools and guidance to ensure smooth and consistent implementation. EPA will publish guidance, provide support in issue resolution, and conduct outreach activities to help sources comply. EPA will use emissions testing and, where feasible, continuous emission monitoring to measure compliance with MACT and other air toxics standards. EPA also will develop capabilities for greater community right-to-know access (e.g., using the Internet) to data regarding air toxics.

EPA will, as required by the Clean Air Act Amendments of 1990, continue the extensive residual risk analyses for already promulgated MACT standards to determine if additional standards are necessary to reduce the remaining risks from these sources. These analyses will require significant source testing to measure the emissions post-MACT standards and will also require extensive work to determine exposures. These

additional standards will protect the public health by reducing the number of people exposed to unhealthful levels of hazardous air pollutants and prevent adverse environmental effects.

In addition to these other major source standards, as described in the December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units, EPA will continue the development of an electric utilities regulation to be proposed in 2003. Also, Section 129 of the Clean Air Act requires the establishment of performance standards for four categories of waste incinerators. These categories include: municipal waste combustors, medical waste incinerators, industrial and commercial waste incinerators, and other solid waste incinerators. The Federal Plans for small municipal waste combustors and for commercial and industrial solid waste incinerators (CISWIs) are scheduled for proposal in 2001, with the finals planned for FY 2002.

The Integrated Urban Air Toxics Strategy, released in 1999, identified the hazardous air pollutants that pose the greatest threat in the largest number of urban areas and the area source categories that emit these pollutants. EPA must assure that 90 percent of air toxic emissions from urban area sources are subject to regulation. The strategy contains a schedule of activities to: substantially reduce noncancer health risk; reduce cancer incidence by 75 percent; focus on disproportionate risk; reduce mobile source emissions contributions; and encourage state, local, and Tribal programs to develop strategies for their communities. In FY 2002, EPA will continue to develop the state, local, and Tribal component of the strategy, as well as community-based urban assessments and the sharing of data. The Agency will continue to reassess the area source category list and begin development of urban area source standards. Area source standards will be developed for hazardous air pollutants judged to pose the greatest threat to public health in the largest number of urban areas.

The EPA will continue its efforts to address and prevent adverse effects of atmospheric deposition of toxics and nitrogen compounds in the Great Waters. In FY 2002, EPA will continue to work with the Office of Water, the Office of Research and Development, and others to develop and support multi-media regulatory approaches to reduce risks, including enhancing technical tools for EPA and states to use to assess cross-media transport of pollutants, and facilitating state, tribal, and regional deposition reduction strategies. In FY 2002, EPA will continue to implement and revise as needed the air/water interface workplan. This workplan will include modeling atmospheric deposition emissions on a national level, examining the rules or activities in place to address impairment caused by atmospheric deposition, and determining what, if any, additional actions are necessary to address impairment caused by atmospheric deposition.

The EPA will continue an initiative begun in 2001 on concentrated animal feeding operations (CAFOs) to characterize the industry, identify appropriate sources and control practices, and estimate air emissions.

As directed in the 2001 Appropriation Report, $1.5 million was allocated in 2001 to upgrade the RACT/BACT/LAER Clearinghouse (RBLC) database system and to populate that database with all determinations from the past 10 years. When completed, this effort will make the RBLC database a user-friendly and useful database for states and stakeholders to acquire information on emission control technologies. To ensure the upgrades are consistent with the needs of the states and stakeholders, EPA has

planned open meetings with state, industry and environmental representatives to discuss the enhancements needed before making changes to the system.

EPA also will continue providing guidance in the implementation of the low sulfur gasoline rule and for Phase II of the reformulated gasoline (RFG) program. EPA will begin establishing sulfur baselines for all U.S. gasoline refiners and importers, and producing a new reporting system for the gasoline sulfur reduction program. The RFG program reduces toxic emissions by 22 percent from 1990 levels.

EPA also will implement its toxic control programs for mobile sources through existing engine certification, compliance, and fuel quality requirements related to emissions standards that also control toxics. Under these requirements, engine/vehicle manufacturers are required to certify any engine/vehicle entered into commerce in the United States as meeting the emission limits set by EPA. Fuel refineries demonstrate compliance by submitting survey data to EPA. These implementation requirements can be supplemented by state and local action in the form of vehicle inspection and maintenance programs and local fuel testing.

Finally, as part of its reinvention efforts, the Agency will continue to investigate opportunities for coordinated data gathering and rulemaking efforts considering releases across media and pollution prevention opportunities. EPA will bring together ongoing efforts such as the Persistent Bioaccumulative Toxics (PBT) program, and continue to develop integrated strategies to reduce toxics for major area and mobile sources.

Research

EPA estimates that about 2.7 million tons of toxic chemicals are emitted into the air annually, and that sites in the U.S. that emit, or have the potential to emit, more than 10 tons per year, number in the thousands. Volatile organic compound (VOC) emissions account for a significant amount of all air toxics. Mobile source emissions have been estimated to account for a significant portion of the national VOC emissions. In addition, data on the relative concentrations of a number of air toxics indoors and outdoors suggest that the contribution of indoor sources is also significant. Taken as a whole for all major sources emitting air toxics, the ecological and human health effects are of national and even international dimensions. While individuals living near emission sites are most exposed to elevated concentrations of these chemicals, air toxics exposures may also affect the general population.

In FY 2002, the Agency's Air Toxics research program will begin to implement the Air Toxics Research Strategy currently being completed, which will support the Agency's National Air Toxics Assessments (NATA) program. Efforts will include health effects, exposure, risk assessment, and risk management research. Specific research activities in each of these areas are described in more detail below.

Emissions characterization research will improve techniques to characterize hazardous air pollutant (HAP) emissions from outdoor and indoor sources. Studies will be conducted to refine estimates of toxic emissions from all classes of highway vehicles including how these emissions change under various vehicle operation modes (modal-based emissions models), and to improve emission factors and the temporal and spatial resolution of HAPs from small dispersed area sources. Additional studies will: develop an improved understanding of chemical reactions between toxic pollutants in the indoor environment; understand the factors

that influence how HAPs penetrate indoors; and identify better methods and models to quantify sources of these indoor HAP emissions. Research is also planned for FY 2002 to further develop techniques to measure toxic air pollutant emissions on a continuous basis from industrial and combustion sources.

Health effects research planned for FY 2002 will quantitatively characterize dose-response and health effects of air toxics through development of biomarkers, determination of exposure-dose response relationships, development of modes of action, and development of physiologically-based pharmacokinetic models. The range of non-cancer health effects of high priority air toxics (and their mixtures, including VOCs and mobile source-related pollutants) will be determined under various exposure scenarios. Synergistic or additive effects of mixtures and non-linearity in the dose-response at environmental exposures for polycyclic aromatic hydrocarbons cancer risks will be explored. Health effects methodology work will focus on high priority urban and mobile source air toxics (to include fuel and fuel additives).

Exposure research will focus on four major areas in FY 2002: mobile source emissions, air quality modeling of hazardous air pollutants (HAPs), the air chemistry of HAPs, and human exposure measurements and modeling. These four research areas play a critical role in improving the underlying science of the NATA program. Mobile source emissions characterization research will provide important information to help characterize the emissions from new and in-use vehicles which can then be used to improve the air toxics emissions inventories used at the front end of the assessment process. Research in air quality modeling will include the expansion of the Models3/Community Multiscale Air Quality (CMAQ) modeling system to include specific air toxics and the continued development of neighborhood scale modeling capabilities within Models3/CMAQ to support urban and local scale assessments. To improve the fate and transport component of EPA's air quality models, air chemistry research will characterize the lifetime and fate of the 33 urban air toxics pollutants through the development of air chemistry modules for these pollutants. Finally, a critical piece of the NATA process is to estimate actual human exposure to air toxics. This research will combine modeling and measurement efforts to provide tools and information to estimate human exposure to air toxics with greater certainty.

Assessment activities planned for FY 2002 will derive cancer unit risk and chronic and acute non-cancer reference values, as well as assist in the development of test rules to obtain missing data in order to assess risk to healthy and susceptible populations exposed to area, major, mobile, and indoor air sources. Cancer and non-cancer dose-response assessment methodologies will also be refined to reduce uncertainty in human health risk assessments. Testing data from fuel and fuel additives will be reviewed and assessments developed.

Risk management activities will include a modest effort to identify and develop pollution prevention alternatives for ambient area and indoor sources. All of the information generated through this research will support future NATA assessment activities. Emissions data will be incorporated into multi-media human exposure models and air quality models used to evaluate potential implementation strategies. Information on risk management options will, under the NATA framework, support development and implementation of future voluntary efforts and regulatory programs to reduce exposure to air toxic compounds.

In FY 2002, the Air Toxics research program will also include technical support activities. These will predominantly consist of providing guidance to other EPA offices and federal agencies; improving risk assessment guidance; and providing consultation and technical support for hazard identification, endpoint identification, risk assessment, and other regulatory needs for stationary, mobile, and indoor sources.

FY 2002 Change from FY 2001 Enacted Budget

EPM

- (-$2,030,300) This reduction reflects that resources have been decreased for MACT standard development since EPA plans to have all the 10-year standards proposed and completed in FY 2002. Some resources have been reprogrammed from MACT development for modeling and emission inventory efforts to characterize air toxics risk and exposure and for residual risk assessments on implemented MACT standards. In addition, resources were reduced for the one year effort to ensure all stakeholders have the latest information about air pollution control technologies and full access to RACT/BACT/LEAR Clearinghouse for Control Technologies.

- (-$309,700) This reduction reflects an elimination of the EMPACT program.

- (+$978,000) This increase reflects an increase in workforce costs.

Research

S&T

- (-$3,161,700) The FY 2002 Request is $3,161,700 below the FY 2001 Enacted budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

STAG

- (+$1,726,100) This increase will support the air toxics modeling network and state and local efforts to reduce air toxics emissions.

Annual Performance Goals and Performance Measures

Reduce Air Toxic Emissions

In 2002	Air toxics emissions nationwide from stationary and mobile sources combined will be reduced by 5% from 2001 (for a cumulative reduction of 40% from the 1993 level of 4.3 million tons per year.)
In 2001	Air toxics emissions nationwide from stationary and mobile sources combined will be reduced by 5% from 2000 (for a cumulative reduction of 35% from the 1993 level of 4.3 million tons per year.)

In 2000 End-of-year FY 2000 data will be available in late 2004 to verify that air toxics emissions nationwide from stationary and mobile sources combined will be reduced by 3% from 1999 (for a cumulative reduction of 30% from the 1993 level of 4.3 million tons.)

In 1999 Air toxics emissions nationwide from stationary and mobile sources combined were reduced by 12% from 1998 (for a cumulative reduction of 27% from the 1993 level of 4.3 million tons.)

Performance Measures:	FY 1999 Actuals	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Request	
Combined Stationary and Mobile Source Reductions in Air Toxics Emissions	12	3	5	5	percent

Baseline: In 1993, the last year before the MACT standards and mobile source regulations developed under the Clean Air Act were implemented, stationary and mobile sources emitted 4.3 million tons of air toxics. Air toxics emission data are revised every three years to generate inventories for the National Toxics Inventory. Reductions are estimated from regulatory controls in the years between the three year updates.

Promulgate Technology Based Standards

In 2002 Propose 7 and promulgate 30 technology based standards for control of hazardous air pollutants for the 10 year bin.

In 2001 Propose 27 technology based standards for control of hazardous air pollutants for the 10 year bin.

In 2000 EPA promulgated 3 MACT standards and proposed 8 MACT standards, exceeding its target for promulgating standards but not reaching its target for MACT standards proposed.

In 1999 Promulgated 16 MACT Standards for 26 source categories.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Number of MACT Standards Promulgated		3			sources
Promulgate 12 MACT Standards for 24 source categories	16				sources
Federal Register Publication of Final MACT Standards			10	30	notices
Number of proposed MACT standards.			27	7	proposed

Baseline: Following passage of the Clean Air Act Amendments, EPA identified 174 source categories for which MACT standards were to be promulgated. This became the baseline for MACT standards.

Reduce Risk of Cancer from Air Toxics

In 2002 Reduce risk of cancer incidence by 25-35% (from 1990 levels) from stationary source emissions.

Performance Measures:	FY 1999	FY 2000	FY 2001	FY 2002

	Actuals	Actuals	Estimate	Request	
Cancer Risk Reduced				25-35	< Percent

Baseline: Cancer risk reduction is based on emission reductions from 1990 levels. The baseline is calculated from the 1996 National Toxics Inventory of emissions using population- and toxicity-weighting for each county.

Research

Human Exposure and Health Effects Methods

In 2002 Provide new methods to estimate human exposure and health effects from high priority urban air toxics, and complete health assessments for the highest priority hazardous air pollutants including fuel/fuel additives to support national air toxics assessments.

In 2001 Provide new information and methods to estimate human exposure and health effects from high priority urban air toxics, and complete health assessments for the highest priority hazardous air pollutants, including fuel/fuel additives.

In 2000 EPA provided methods to estimate human exposure and health effects from high priority urban air toxics, and completed health assessments for the highest priority hazardous air pollutants (including fuel/fuel additives and vinyl chloride).

In 1999 Two reports were completed on pharmocokinetic models for cross-species and cross-pollutant extrapolation and extrapolation across concentration and time to support health risk assessment for acute exposures.

In 1999 Oral and inhalation non-cancer assessments were delayed but will be submitted for consensus review in FY 2001.

In 1999 Dose-response assessments for dichloropropene, cadmium, EGBE, and acetonitrile were completed in FY 1999. The fifth assessment, for vinyl chloride, was delayed and will be completed in FY 2000. This delay will not have an impact on achievement of the strategic objective.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Complete four toxicological reviews and assessments (RfC, RfD, cancer unit risks) of high priority to the Air Program.	4				assessments
Benchmark dose software available for public use.	31-Oct-1999				
Benzene RfD and RfC, Diesel, 1-3 Butadine Mobile Source Assessments	30-Sep-2001				
Produce process and framework for incorporating Acute Reference Exposure (ARE) values into IRIS		30-Sep-2000			framework
Submit for Agency consensus review three toxicological reviews and assessments (RfC, RfD, cancer unit risks) of high priority to the Air Program.		2			assessments

Report on extrapolation across concentration and time to support health risk assessment for acute ex	2			reports
Validation of a physiologically-based pharmacokinetic model for neurotoxic air toxics, including animal and human data.		1		model validat'n
Complete for external review three draft toxicological reviews and assessments of high priority to the Air Program to include fuel/fuel additives.		3		reviews
Publish interdisciplinary cross-organization strategy for developing health effects data to address the high priority research needs for high priority air toxics.			1	strategy
Develop for external review four draft toxicological reviews/assessments of high priority to the Air Program.			4	assessments

Baseline: There is a tremendous amount of uncertainty associated with the potential health risks, both cancer and non-cancer, and the levels of exposures that result from air toxics emissions. Current programmatic estimates of the health impact of air toxics are highly uncertain and generally assume chronic exposures; effects to susceptible populations and from mixtures have not been evaluated. Furthermore, exposure-dose-response relationships for effects from inhalation have not been developed for most urban HAPs. Relevant human exposure scenarios and levels have not been determined due to limitations in ambient and micro-environmental air monitoring methods and data. Research planned for FY2002 will develop methods to quantitatively characterize dose-response and health effects of air toxics; combine micro-environmental and ambient air toxics monitoring methods and modeling tools for personal to urban scale assessments; and develop assessment methodologies and derive cancer unit risk and chronic and acute non-cancer reference values for high priority urban air toxics such as acrolein and MTBE.

Air Quality Model Incorporating Air Toxics

In 2002 Improve emissions information and advance the development of air quality models for air toxics, focusing on those identified under the urban air toxics strategy and on mobile sources.

In 2001 Develop (1) an air quality model incorporating air toxics as their air chemistry and emissions become known and (2) source emissions and control information for both mobile and stationary sources to guide cost-effective risk management

In 2000 EPA developed an air quality model incorporating air toxics and source emissions and control information for both mobile and stationary sources to guide cost-effective risk management options by completing the products below and other research activities.

In 1999 A preliminary version of the urban scale Models-3/Toxics Model for a community-based human exposure assessment for air toxics was scheduled to be completed in October 1999.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request
Complete four toxicological reviews				

and assessments (RfC, RfD, cancer unit risks) of high priority to the Air Program	4			assessments
Begin evaluation of the recently dev. urban scale Models-3/Toxics Model, to be used for community-based human exposure assessment for air toxics, using data sets for mercury and semi-volatile compounds.		30-Sep-2000		evaluation
Complete operational evaluation of Models-3/CMAQ for mercury.			1	evaluation
Synthesis document summarizing air toxic emissions data from open burning of various materials to assess commonalities between sources and develop methodologies for estimating emissions.			1	report

Baseline: Mobile, major, urban, and indoor air sources all contribute significantly to the national air toxics problem, although accurate emissions data (especially at the temporal and spatial distributions needed) remains absent due to the large number of air toxics, the ranges of their concentrations, and the myriad sources. Data on the relative concentrations of a number of indoor and outdoor air toxics suggest that the contribution of indoor sources is significant. Research in air toxics emissions characterization and air quality modeling will develop improved techniques to characterize hazardous air pollutant emissions. These techniques will be used to better understand the relative contribution of specific sources to actual human exposure, and identify innovative low-cost approaches to control or prevent HAP emissions. The Models3/Community Multiscale Air Quality (CMAQ) modeling system is also being expanded to include specific air toxics and neighborhood scale modeling capabilities within Models3/CMAQ to support urban and local scale assessments.

Verification and Validation of Performance Measures

Performance Measure: Combined Stationary and Mobile Source Reductions in Air Toxics Emissions

Performance Database: National Toxics Inventory (NTI)

Data Source: The first NTI (for base year 1993) includes emissions information for 188 hazardous air pollutants from more than 900 stationary sources. It is based on data collected during the development of Maximum Achievable Control Technology (MACT) standards, state and local data, Toxic Release Inventory (TRI) data, and emissions estimates using accepted emission inventory methodologies. The 1996 NTI contains facility-specific estimates and will be used as input to National Air Toxics Assessment (NATA) modeling. (ASPEN, a dispersion model, contributes to NATA modeling.) The primary source of data in the 1996 NTI is state and local data. The 1996 state and local facility data are supplemented with data collected during the development of the MACT standards and TRI data. The NTI includes emissions from large industrial or point sources, smaller stationary area sources, and mobile sources.

QA/QC Procedures: Since the NTI is primarily a database designed to house information from other primary sources, most of the QA/QC efforts have been to identify duplicate data from the different data sources and to supplement missing data. There has been no effort to validate information collected from other databases,

but a significant effort is underway to determine the best primary source data when a discrepancy among data sources is found. Mobile source data are validated by using speciated test data from the mobile source emission factor program, along with peer-reviewed models which estimate national tons for the relevant year.

Data Quality Review: Each base year's NTI has been reviewed by internal EPA staff, state and local agencies, and industry.

Data Limitations: The NTI contains data from other primary references. Because of the different data sources, not all information in the NTI has been compiled using identical methods. Also, for the same reason, there are likely some geographic areas with more detail and accuracy than others. Because of the lesser level of detail in the 1993 NTI, it is not suitable for input to dispersion models.

New/Improved Data or Systems: The 1996 NTI is a significant improvement over the 1993 NTI because of the added facility-level detail (e.g., stack heights, latitude/longitude locations, *etc.*), making it useful for dispersion model input. Future inventories (1999, 2002, *etc.*) are expected to improve significantly because of increased interest in the NTIs by regulatory agencies, environmental interests, and industry, and the greater potential for modeling and trends analysis.

Coordination with Other Agencies

EPA coordinates with many other agencies and organizations to achieve reductions of risk from air toxics. EPA works with the Department of Energy (DOE) on several fuels programs. Other programs targeted towards the reduction of air toxics from mobile sources are coordinated with the Department of Transportation (DOT). These partnerships can involve policy assessments and toxic emission reduction strategies in different regions of the country. Other Federal agency partnerships have been created to share costs for researching health effects and collecting ambient air toxic monitoring data.

EPA is also forming partnerships with the Department of Defense (DOD) in the development of new continuous source monitoring technology for toxic metals emitted from smokestacks. This partnership will provide a new source monitoring tool that will streamline source monitoring requirements that a number of DOD incinerators are required to meet and improve the operation of DOD incinerators with real-time emissions information resulting in reduced releases of air toxics to the environment. In time, this technology is expected to be available for use at non-DOD facilities.

EPA also works closely with the DOE on refinery cost modeling analyses for EPA's clean fuel programs. For mobile sources program outreach, the Agency is participating in a collaborative effort with DOT's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) designed to educate the public about the impacts of transportation choices on traffic congestion, air quality and public health. This community-based public education initiative also includes the Centers for Disease Control (CDC). In addition, EPA is working with DOE to identify opportunities in the Clean Cities program.

The Agency is continuing to work closely with the Office of Safety Health Administration (OSHA) to coordinate the development of EPA and OSHA standards, where necessary, to ensure that MACT standards designed to reduce air toxic emissions do not inadvertently increase worker exposures. EPA also works closely with other health agencies such as the CDC and the National Institute of Environmental Health Sciences on health risk characterization. To assess atmospheric deposition and characterize ecological effects, EPA works with the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service.

The Agency has worked extensively with the Department of Health and Human Services (HHS) on the National Health and Nutritional Evaluation Study (NHANES) to identify mercury accumulations in humans. EPA also has worked with DOE on the 'Fate of Mercury' study to characterize mercury transport and traceability in Lake Superior.

Research

EPA's air toxics research is coordinated with other federal agencies through the Subcommittee on Air Quality Research of the Committee on Environment and Natural Resources Research (CENR). The CENR is charged with improving coordination among Federal agencies involved in environmental and natural resources research and development and developing a Federal environment and natural resources research and development strategy that responds to national and international issues. In addition, the Agency works with other federal agencies, such as the National Institute of Environmental Health Sciences (NIEHS) and the National Toxicology Program (NTP) on an ad hoc basis to identify and coordinate research needs.

Statutory Authorities

Clean Air Act Title I, Part A and Part D, Subparts 3 and 5 (42 U.S.C. 7401-7431, 7512-7512a, 7514-7514a) (15 U.S.C. 2605)

Clean Air Act Amendments, Title II (42 U.S.C. 7521-7590)

Clean Air Act Amendments, Title IV (42 U.S.C. 7651-7661f)

Research: Clean Air Act (CAA) (42 U.S.C. 7401-7671q)

Objective #3: Acid Rain

By FY 2005, reduce ambient nitrates and total nitrogen deposition to 1990 levels. By 2010, reduce ambient sulfates and total sulfur deposition by up to 30 percent from 1990 levels.

Resource Summary
(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Actual	FY 2001 Enacted	FY 2002 Request
Reduce Acid Rain.	**$18,136.2**	**$19,249.3**	**$21,789.8**	**$18,910.5**
Environmental Program & Management	$10,526.5	$10,556.9	$13,489.2	$13,919.3
Science & Technology	$4,002.1	$4,394.8	$4,240.6	$3,991.2
State and Tribal Assistance Grants	$3,607.6	$4,297.6	$4,060.0	$1,000.0
Total Workyears	86.6	77.5	96.6	93.8

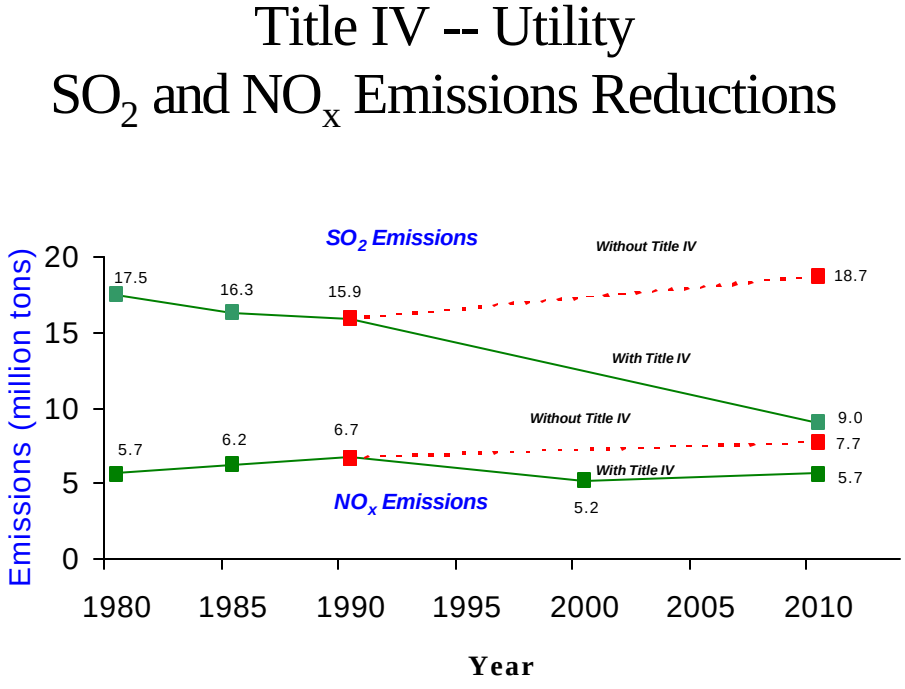
Key Programs
(Dollars in thousands)

	FY 1999 Enacted	FY 2000 Enacted	FY 2001 Enacted	FY 2002 Request
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$3,607.6	$4,069.0	$4,060.0	$1,000.0
Acid Rain -Program Implementation	$10,309.4	$10,606.3	$12,248.7	$12,581.3
Acid Rain -CASTNet	$4,000.0	$4,000.0	$3,991.2	$3,991.2
Administrative Services	$0.0	$208.2	$297.8	$201.6
Regional Management	$0.0	$7.3	$7.8	$9.1

FY 2002 Request

Emissions of sulfur dioxide (SO_2, mostly from power plants and other industrial sources) and nitrogen oxides (NO_x, mostly from power plants and motor vehicles) react in the atmosphere and fall to earth as acid rain, causing acidification of lakes and streams and contributing to the damage of trees at high elevations. Acid rain also accelerates the decay of building materials and paints, and contributes to degradation of irreplaceable cultural objects such as statues and sculptures. NO_x emissions are also a major precursor of ozone, which affects human health and damages crops, forests, and materials. NO_x deposition also contributes to eutrophication of coastal waters, such as the Chesapeake Bay and Tampa Bay. Additionally, before falling to earth, SO_2 and NO_x gases form fine particles that could affect human health by contributing to premature mortality, chronic bronchitis, and other respiratory problems. The fine particles also contribute to reduced visibility, including national parks.

The Acid Rain Program, authorized under Title IV of the Clean Air Act Amendments of 1990, is primarily focused on SO_2 and NO_x emissions from electric utilities, and has numerous statutory deadlines. Reductions in NO_x emissions from mobile sources are required under Title II of the Clean Air Act. The U.S. is also committed to reductions in SO_2 and NO_x emissions under the US-Canada Air Quality Agreement of 1991. EPA's Acid Rain Program uses market-based approaches to achieve these emission reductions. The Program provides affected sources with flexibility to meet required emission reductions at the lowest cost (both to industry and government). The SO_2 component features tradeable units called "allowances" (one allowance authorizes the emission of one ton of SO_2), accurate and verifiable measurements of emissions, and a cap on total emissions. The Acid Rain Program continues to be recognized as a model for flexible and effective regulation both in the U.S. and abroad.



Major program activities include measurement, quality assurance, and tracking of SO_2, NO_x, and CO_2 emissions, as recorded by Continuous Emissions Monitors (CEMs) or equivalent continuous monitoring methods at more than 2,500 electric utility units; conducting field audits and certifying emissions monitors; operation of an SO_2 allowance tracking system to record transfers of emission allowances between different

parties; reconciliation of emissions and allowances for all affected sources to ensure compliance; and processing of permit actions.

Phase I of the Program began in FY 1995, requiring SO_2 reductions from approximately 400 electric utility units. Approximately 250 of these units were also required to make NO_x reductions beginning in FY 1996. Phase II of the Program began in FY 2000 and requires reductions in SO_2 emissions from more than 2,500 electric utility units (gas-fired, oil-fired, and coal-fired) and reductions in year-round NO_x emissions from approximately 1,000 coal-fired units. Despite this increase in affected units, the number of quarterly emission reports processed (8,000 per year) remained- unchanged because Phase II electric utility units were already required to report their emissions. However, there is more than a four-fold increase in the number of units for which EPA will conduct an annual reconciliation of allowances with measured emissions. In addition, there is likely to be a significant increase in SO_2 allowance trading activities in Phase II of the program. (EPA processed more than 1,000 private allowance transfers per year in Phase I, and expects this number to triple during Phase II .) This increased workload will be handled through improved information resource management and through improved program operation and efficiency from rule revisions. The Program has launched a multi-year effort to re-engineer the information technology support structure for the Allowance and Emissions Tracking Systems. System modernization is needed to handle increased emissions reporting and allowance trading activities, to improve public access, and to provide timely exchange of data with state partners. Much of the current system is based on FY 1992 programming technology which has become outdated and cumbersome.

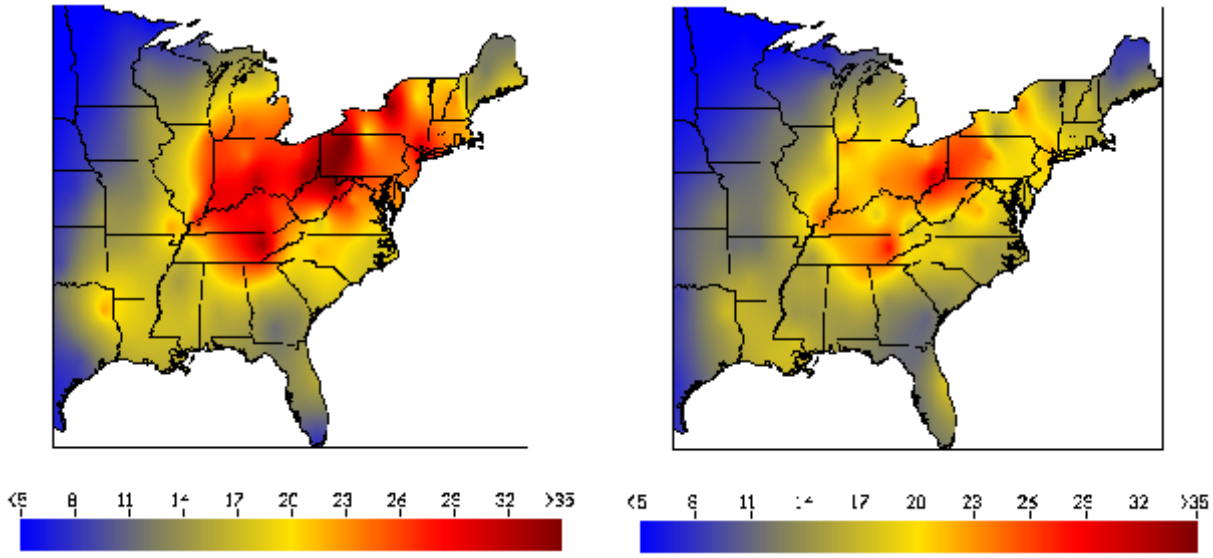
In addition to these operational activities, the Acid Rain Program is responsible for managing the Clean Air Status and Trends Network (CASTNet), a dry deposition monitoring network, as well as providing critical operational support for the National Atmospheric Deposition Program (NADP), a wet deposition network. These monitoring efforts play a crucial role in the Program's ongoing assessment activities, including reporting outcomes under the Government Performance and Results Act (GPRA), and fulfilling assessment responsibilities under the US-Canada Air Quality Agreement and Title IX of the Clean Air Act Amendments. In addition, the Program provides analytical support for the National Acid Precipitation Assessment Program (NAPAP), which was reauthorized under the Clean Air Act Amendments of 1990. NAPAP coordinates Federal acid deposition research and monitoring of emissions, acidic depositions, and their effects, including assessing the costs and benefits of Title IV. In FY 2001, the Acid Rain Program will complete work on NAPAP's 2000 Integrated Assessment Report and continue analyzing the costs and benefits of the Program for inclusion in NAPAP's 2004 Integrated Assessment Report. In addition, the Program will initiate an integrated assessment of its effectiveness in addressing visibility, fine particle, and ozone impacts resulting from Phase II operations for the Ozone Transport Region.

States also carry out activities to implement the SO_2 and NO_x portions of the Acid Rain Program, including certification and recertification of CEMs, field audits of CEMs, and permitting activities. Some States have elected to use their acid rain grant funds for monitoring activities to help assess the effectiveness of the program in reducing environmental risks.

When fully implemented in FY 2010, the SO_2 reductions alone under Title IV will provide $50 billion (1997 dollars) in health benefits (mostly from an estimated reduction in premature mortality of 9,000 cases per year) and $1 billion in additional benefits due to improved visibility, from an expected 30 percent

improvement in visibility at national parks in the eastern United States. The Acid Rain Program will also produce significant benefits in terms of lowered surface water acidity and less damage to materials and high elevation forests and materials. Nevertheless, after full implementation of the program, significant residual risks will remain to human health, ecological systems, and quality of life.

Sulfate Deposition in Acid Rain Reduced (kg/ha)



1989-91 **1995-97**

C These maps represent snapshots of wet sulfate deposition over time. As illustrated in the 1995-1997 map, following the 1995 implementation of the Acid Rain Program, total sulfur deposition fell in a dramatic and unprecedented reduction of up to 25 percent over a large area of the Eastern United States.

FY 2002 Change from FY 2001 Enacted Budget

EPM

- (+$332,600) This increase reflects an increase in workforce costs.

S&T

- (-$249,400) The FY 2002 Request is $249,400 below the FY 2001 Enacted Budget level due to Congressional earmarks received during the FY 2001 appropriations process which are not included in the FY 2002 President's Request.

STAG

- (-$3,060,000) This reduction reflects a decrease in grant funding to support the Acid Rain program. The state programs will now be supported through permit fees collected by the states. Working with the states, the grant funding formerly dedicated to the Acid Rain program will now be reprogrammed to support air toxics and the NAAQS programs. Remaining acid rain funding will focus on environmental assessment efforts by the states.

Annual Performance Goals and Performance Measures

Reduce SO2 Emissions

In 2002 Maintain or increase annual SO2 emission reduction of approximately 5 million tons from the 1980 baseline. Keep annual emissions below level authorized by allowance holdings and make progress towards achievement of Year 2010 SO2 emissions cap for utilities.

In 2001 Maintain annual reduction of approximately 5 million tons of SO_2 emissions from utility sources from 1980 baseline. Keep annual emissions below level authorized by allowance holdings and make progress towards achievement of Year 2010 SO2 emissions cap.

In 2000 End-of-year FY 2000 data will be available in late 2001 to verify that 5 million tons of SO_2 emissions from utility sources were reduced from the 1980 baseline.

In 1999 Maintained annual reduction of approximately 5.04 million tons of SO_2 emissions from utility sources from 1080 baseline.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
SO2 Emission Reductions		On track	5,000,000	5,000,000	tons reduced
Nox Reductions	30-Oct-2000				

Baseline: Base of comparison for assessing progress on the annual performance goal is the 1980 emissions baseline. The 1980 SO2 emissions inventory totals 17.5 million tons for electric utility sources. This inventory was developed by National Acid Precipitation Assessment Program (NAPAP) and used as the basis for reductions in Title IV of the Clean Air Act Amendments. This data is also contained in EPA's National Air Pollutant Emissions Trends Report. Statutory SO2 emissions cap for year 2010 and later is at 8.95 million tons below 1980 emissions level. "Allowable SO2 emission level" consists of allowance allocations granted to sources each year under several provisions of the Act and additional allowances carried over, or banked, from previous years.

Reduce NOx Emissions

In 2002 2 million tons of NOx from coal-fired utility sources will be reduced from levels that would have been emitted without implementation of Title IV of the Clean Air Act Amendments.

In 2001 2 million tons of NOx from coal-fired utility sources will be reduced from levels that would have been emitted without implementation of Title IV of the Clean Air Act Amendments.

In 2000 End-of-year FY 2000 data will be available in late 2001 to verify that 2 million tons of NOx from coal-fired utility sources were reduced from levels before implementation of Title IV of the Clean Air Act Amendments.

In 1999 Maintained reduction of 420,000 tons on NOx from coal-fired utility sources.

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
NOx Emission Reductions		On track	2,000,000	2,000,000	tons reduced

Baseline: Base of comparison for assessing progress on this annual performance goal is emissions that would have occurred in the absence of Title IV of the Clean Air Act Amendments. These emissions levels are calculated using actual annual heat input and the baseline (uncontrolled) NOx emission rates by boiler type from the preamble to the final rule (61 FR 67112, December 19, 1996).

Reduce Ozone Season NOx Emissions

In 2002 Control NOx emissions during ozone season from participating utility and industrial sources to below allowable level authorized by allowances.

In 2001 Control NOx emissions during ozone season from participating utility and industrial sources to below allowable level authorized by allowance (approximately 50% reduction from 1990 baseline).

Performance Measures:	FY 1999 Actuals	FY 2000 Actuals	FY 2001 Estimate	FY 2002 Request	
Ozone Season NOx Reductions			220,000	220,000	tons reduced

Baseline: Base of comparison for assessing performance on annual performance goals is the 1990 emissions baselines adopted in the state rules. The ozone season is 5 months long, May 1 to September 30. "Allowable NOx emissions level" is defined by the sum of allowance allocations authorized by various provisions in enabling state rules and allowances carried over, or banked, from previous years discounted by the Progressive Flow Control ratio. An allowance authorizes a source to emit one ton of NOx during the ozone season.

Verification and Validation of Performance Measures

Performance Measure: SO_2 and NO_X emission reductions

Performance Database:

- Emissions Tracking System (ETS) [SO_2 and NO_X emissions collected by Continuous Emission Monitoring Systems (CEMS)]
- CASTNet (dry deposition) and
- NADP (wet deposition)

Data Source:

- ETS, on a quarterly basis, receives hourly measurements of SO_2, NO_x, volumetric flow, CO_2, and other emission-related parameters from more than 2,000 units affected by Title IV.
- CASTNet measures particle and gas acidic deposition chemistry. Specifically, CASTNet measures sulfate and nitrate dry deposition and meteorological information at approximately 70 active monitoring sites. CASTNet is primarily an eastern, long-term dry deposition network funded and operated by EPA/OAR. Database is maintained by OAR.
- National Atmospheric Deposition Program (NADP) is a national long-term wet deposition network that measures precipitation chemistry and provides long-term geographic and temporal trends in concentration and deposition of major cations and anions. Specifically, NADP provides measurements of sulfate and nitrate wet deposition at approximately 200 active monitoring sites. EPA, along with several other Federal agencies, states, and other private organizations, provides funding and support for NADP. The NADP database is maintained by the Illinois State Water Survey/University of Illinois.

QA/QC Procedures:

- Our QA/QC requirements dictate performing a series of quality assurance tests of CEMS performance. For these tests, emissions data are collected under highly structured, carefully designed testing conditions, which involve either high quality standard reference materials or multiple instruments performing simultaneous emission measurements. The resulting data are screened and analyzed using a battery of statistical procedures, including one that tests for systematic bias. If the CEMS fails the bias test, indicating a potential for systematic underestimation of emissions, then either the problem must be identified and corrected or the data is adjusted to prevent the low bias.
- CASTNet has established data quality objectives and quality control procedures for accuracy and precision.
- NADP has established data quality objectives and quality control procedures for accuracy, precision and representativeness. The intended use of these data is to establish spatial and temporal trends in wet deposition and precipitation chemistry.

Data Quality Review:

- ETS provides instant feedback to sources in order to identify any data reporting problems. EPA staff then conducts data quality review on each quarterly ETS file. In addition, states or EPA staff conduct random audits on selected sources' data submission.
- CASTNet underwent formal Agency peer review by an external Panel.
- NADP methods of determining wet deposition values have undergone extensive peer review, handled entirely by the NADP housed at the Illinois State Water Survey/ University of Illinois. Assessments of changes in NADP methods are developed primarily through the academic community and reviewed through the technical literature process.

Data Limitations: None

New/Improved Data or Systems: To improve the spatial resolution of the Network (CASTNet), additional monitoring sites are needed.

Coordination with Other Agencies

EPA participates with NAPAP, which coordinates Federal acid rain research and monitoring under the auspices of the National Science and Technology Council Committee on Environment and Natural Resources. As required by Title IX of the 1990 Clean Air Act Amendments, NAPAP prepares a biennial report that evaluates the costs, benefits, and effectiveness of the Acid Deposition Control Program under Title IV of the 1990 Amendments. The NAPAP assessment is a multi-agency effort requiring cooperation and coordination among EPA, the Department of Energy, the Department of Agriculture, the Department of the Interior, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration.

Statutory Authorities

Clean Air Act Amendments, Title I (42 U.S.C. 7401-7514a)

Clean Air Act Amendments, Title IV (42 U.S.C. 7651-7661f)

Clean Air Act Amendments, Title IX (42 U.S.C. 7403-7404)