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Report to Congressional Requesters

June 2006

CLEAN AIR ACT

EPA Should Improve the Management of Its Air Toxics Program

GAO-06-669

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Highlights

Highlights of GAO-06-669, a report to congressional requesters

Why GAO Did This Study

The Environmental Protection Agency's (EPA) most recent data indicate that 95 percent of all Americans face an increased likelihood of developing cancer as a result of breathing air toxics—pollutants such as benzene and asbestos that may cause cancer or other serious health problems. Sources of air toxics include large industrial facilities, smaller facilities such as dry cleaners, and cars and trucks. The 1990 Clean Air Act Amendments required EPA to regulate 190 pollutants from these sources through a multifaceted regulatory program. While EPA issues federal standards, state and local agencies generally administer these standards, and some develop their own rules to complement the federal standards. In this context, GAO was asked to assess (1) EPA's progress and challenges in implementing the air toxics program, (2) available information on the program's costs and benefits, and (3) practices of state and local air toxics programs.

What GAO Recommends

GAO recommends that EPA develop a plan for improving the management of its air toxics program, including a prioritization scheme, timelines, and estimates of resources needed to meet its statutory obligations. EPA agreed, in part, with our conclusions and recommendations, and provided clarifications on three statements in the report.

www.gao.gov/cgi-bin/getrpt?GAO-06-669.

To view the full product, including the scope and methodology, click on the link above. For more information, contact John Stephenson at (202) 512-3841 or stephensonj@gao.gov.

What GAO Found

While EPA has made some progress in implementing its air toxics program mandated by the 1990 Clean Air Act Amendments, most of its regulatory actions were completed late and major aspects of the program have still not been addressed. Most of EPA's progress relates to issuing emissions standards for large stationary sources, although EPA completed these standards about 4 years behind schedule. However, many of the unmet requirements pertain to limiting emissions from small stationary and mobile sources, which collectively account for most emissions of air toxics. The agency faces continuing implementation challenges stemming from the program's low priority relative to other programs and related funding constraints. To this end, the agency lacks a comprehensive strategy for completing the unmet requirements or estimates of resources necessary to do so. Senior EPA officials said the program's agenda is largely set by external stakeholders who file litigation when the agency misses deadlines. As a result of EPA's limited progress, the agency has not addressed health risks from air toxics to the extent or in the time frames envisioned in the Clean Air Act. Senior EPA officials said that issuing standards for large stationary sources had addressed the greatest risks from air toxics and that other clean air programs also control air toxics as a side benefit. However, EPA does not have reliable data on the degree of risk reduction achieved through its regulations. Furthermore, the data that are available suggest that the agency has substantial opportunities to reduce emissions from mobile and small stationary sources.

Available information on EPA's efforts to control air toxics is not sufficiently comprehensive to measure the program's total costs and benefits. Specifically, EPA has not comprehensively estimated the national economic costs of all air toxics standards and lacks the data necessary to assess the benefits of these standards, such as decreased incidence of cancer. Information on these impacts would help the agency assess the overall net benefits (total benefits minus total costs) of the air toxics program and compare these effects with those generated by higher-priority clean air programs, such as those intended to address smog. Data on other indicators of the program's effectiveness, such as changes in emissions, concentrations of air toxics in the (ambient) outdoor air, and data on compliance with air toxics standards are also limited and inconclusive.

The state and local programs we reviewed use practices that could potentially help EPA enhance the effectiveness of its air toxics program. For example, several state programs have systematic approaches for identifying and prioritizing new pollutants that could inform EPA's efforts to meet the act's requirement to review and update the list of regulated pollutants.

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Abbreviations

CRS	Congressional Research Service
DEP	New Jersey Department of Environmental Protection
DEQ	Oregon Department of Environmental Quality
DNR	Wisconsin Department of Natural Resources
EPA	Environmental Protection Agency
IRIS	Integrated Risk Information System
MACT	Maximum Achievable Control Technology
NATA	National Air Toxics Assessment
NSPS	New Source Performance Standards
OAQPS	Office of Air Quality Planning and Standards
OAR	Office of Air and Radiation
OMB	Office of Management and Budget
OPAR	Office of Policy Analysis and Review
ORD	Office of Research and Development
SAB	Science Advisory Board
STAPPA/ALAPCO	State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials
STAR	Strategic Toxic Air Reduction

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United States Government Accountability Office
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June 23, 2006

Congressional Requesters

The Environmental Protection Agency's (EPA) most recent data indicate that 95 percent of all Americans face an increased likelihood of developing cancer from air toxics—pollutants such as benzene, asbestos, and chlorine—by breathing outdoor air.[1] Other adverse health effects associated with air toxics include damage to reproductive functions and birth defects.[2] Air toxics are emitted into the air in the United States by large stationary sources such as industrial facilities, small stationary sources such as dry cleaners, and mobile sources such as automobiles. According to the most recent data available, EPA estimates that these and other sources emitted 4.6 million tons of air toxics in 2002.[3] The Clean Air Act of 1970 established a program to reduce emissions of air toxics, and the 1990 amendments to the act significantly expanded the program. Prior to the amendments, the act had required EPA to identify air toxics that posed unacceptable health risks and issue emissions standards for sources of these pollutants. In part because of the limited success of this approach—EPA established standards for seven air toxics over a 20-year period—the amendments identified 190 specific air toxics to be regulated, required EPA to list categories of sources to be regulated, and established implementation timelines.

Specifically, the 1990 amendments established a range of air toxics requirements for EPA to implement that generally fall into four categories: (1) establishing emission standards based on existing pollution control technologies, called Maximum Achievable Control Technology (MACT),

[1]Cancer risk data from EPA's 1999 National-Scale Air Toxics Assessment, released in February 2006, estimates that more than 270 million people in the United States are exposed at levels of risk that exceed 10 in 1 million due to the combined impacts of all sources of air toxics. This risk level implies that more than 10 persons out of a million may develop cancer if exposed continuously over their lifetime. Section 112 of the Clean Air Act identifies a lifetime cancer risk of 1 in 1 million as a threshold above which regulation may be warranted for individual sources of air toxics, considering feasibility and costs.

[2]The Clean Air Act refers to these substances as "hazardous air pollutants," which EPA uses interchangeably with the more common term "air toxics." In this report, we generally use the shorter term, air toxics.

[3]We discuss the limitations of EPA's emissions data later in this report.

for an estimated 84,000 major stationary sources within 158 industries;[4] (2) examining the remaining health risk (called the "residual risk") from these sources 8 years after implementing each MACT standard and, if warranted, issuing additional standards to protect public health or the environment; (3) regulating air toxics emissions from small stationary sources,[5] such as dry cleaners; and (4) evaluating the need for and feasibility of regulation of air toxics emissions from mobile sources, such as cars, and regulating these sources based on this evaluation. In addition, the 1990 amendments required EPA to periodically assess the costs and benefits of the entire Clean Air Act. This included an assessment of the act's costs and benefits prior to 1990 as well as projections of future economic impacts resulting from the amendments. Information on impacts, such as the costs to regulated industries and the public health benefits resulting from cleaner air, is necessary for analyzing whether the benefits of clean air regulations exceed the costs. Furthermore, estimating the economic impacts of individual regulations and clean air programs can help EPA compare the net benefits and cost-effectiveness of its programs under the act. Finally, the amendments required EPA to periodically review and revise the list of regulated air toxics. The agency currently regulates 187 substances.[6]

Prior GAO work dating to 1991 identified EPA's difficulties in regulating air toxics, including missed deadlines and inadequate funding.[7] Most recently, a May 2005 GAO report found that EPA had completed MACT standards for major stationary sources but issued most of them behind

[4]Major stationary sources are those that emit 10 or more tons per year of a single hazardous air pollutant or 25 or more tons per year of any combination of hazardous air pollutants.

[5]The Clean Air Act refers to small stationary sources as "area sources."

[6]In total, three chemicals and several substances from a listed group of chemicals have been removed from the list of air toxics originally provided in the 1990 amendments. By a joint resolution, Congress corrected the inadvertent addition of hydrogen sulfide to the substances originally listed in the 1990 amendments. EPA delisted caprolactam and methyl ethyl ketone. The agency also removed the compound ethylene glycol monobutyl ether (EGBE) and compounds called surfactant alcohol ethoxylates and their derivatives (SAED) from the listed glycol ethers category. The group glycol ethers is still listed.

[7]See GAO, *Air Pollution: EPA's Strategy and Resources May Be Inadequate to Control Air Toxics*, GAO/RCED-91-143 (Washington, D.C.: June 26, 1991); *Air Pollution: Progress and Problems in Implementing Selected Aspects of the Clean Air Act Amendments of 1990*, GAO/T-RCED-94-68 (Washington, D.C.: Oct. 29, 1993); *Air Pollution: Reductions in EPA's 1994 Air Quality Program's Budget*, GAO/RCED-95-31BR (Washington, D.C.: Nov. 29, 1994); and *Clean Air Rulemaking: Tracking System Would Help Measure Progress of Streamlining Initiatives*, GAO/RCED-95-70 (Washington, D.C.: Mar. 2, 1995).

schedule.[8] In addition, the EPA Inspector General, National Academies, Congressional Research Service, and Office of Management and Budget (OMB) have identified shortcomings with various aspects of the air toxics program.

While responsibility for establishing federal standards under the Clean Air Act rests with EPA, state and local air pollution control agencies generally implement EPA's emission standards. The act allows these agencies to impose more stringent requirements than the federal standards, and some state and local agencies have developed innovative air toxics programs that go beyond the federal program, thereby enabling them to address air toxics concerns that remain unaddressed by EPA's standards.

In this context, you asked us to assess (1) EPA's progress toward implementing the air toxics program and any implementation challenges the agency faces, (2) available information about the costs and benefits of EPA's efforts to control air toxics, and (3) the program design and management practices of state and local air toxics programs that could potentially help EPA enhance the effectiveness of the federal program. You also asked us to assess EPA's progress in responding to recommendations pertaining to the air toxics program made by the National Academies in 2004.[9]

To respond to the first objective, we updated our previous analysis of the agency's progress in implementing the air toxics requirements under the Clean Air Act and reviewed available studies by the National Academies, OMB, and the EPA Inspector General to identify potential implementation challenges. Based on this information, we conducted structured interviews with EPA officials and external stakeholders to identify the most important challenges. We met with senior air program officials to discuss the priority of the air toxics program relative to other air programs as well as priorities within the program. To respond to the second objective, we analyzed available information on the economic impacts of the program and data on trends in emissions, health risks, and compliance. We also met with EPA staff responsible for analyzing the economic effects of clean air

[8]See GAO, *Clean Air Act: EPA Has Completed Most of the Actions Required by the 1990 Amendments, but Many Were Completed Late*, GAO-05-613 (Washington, D.C.: May 27, 2005).

[9]The National Academies, National Research Council, *Air Quality Management in the United States* (Washington, D.C., 2004).

regulations. To respond to the third objective, we conducted interviews with officials from a nonprobability sample of four state and one local air toxics programs to identify innovative program designs or management practices. Among other criteria, we selected programs identified as innovative by EPA and other stakeholders and that used strategies that differ from those at the federal level. We focused primarily on practices that EPA might find useful in addressing its program implementation challenges and did not evaluate the effectiveness of these programs. Finally, we obtained information from EPA officials on the agency's progress in responding to the National Academies' recommendations pertaining to air toxics and describe the status of these efforts in appendix I. Our work included an assessment of data reliability and internal controls. Unless otherwise noted, data are sufficiently reliable for the purposes of this report. See appendix II for a more detailed description of our scope and methodology. We conducted our work from June 2005 to June 2006 in accordance with generally accepted government auditing standards.

Results in Brief

While EPA has made progress toward implementing the air toxics program mandated by the Clean Air Act, most of the completed requirements were met late and many requirements and significant challenges remain. EPA has completed one of the four categories of requirements—issuing 96 rules that set emissions standards for major stationary sources—but did not do so until 2004, which was 4 years behind the schedule outlined in the act. These delays, in turn, pushed back the evaluation of the residual health risks from these sources that EPA must complete 8 years after issuing each standard. Consequently, EPA will not complete the residual risk reviews—which are intended to provide information on any potential adverse health effects that may warrant further regulation—until 2012 at the earliest, rather than in 2008 as the act provided. Further, EPA has completed only 16 of 70 emissions standards for small stationary sources that cumulatively accounted for about one-third of all air toxic emissions in 2002 and has proposed, but not finalized, a required rule making covering mobile sources. Finally, EPA has not met the act's requirement to review and update, as appropriate, the list of regulated air toxics, despite evidence that potentially harmful chemicals remain unregulated. As a result of EPA's limited progress, the agency has not identified and reduced health risks from air toxics to the extent and in the time frame envisioned in the act. EPA's limited progress to date stems, in part, from the program's low priority relative to other air programs, such as those targeting smog, which the agency believes have a higher potential to reduce human health risks. Senior program officials also said that the

agency's progress in implementing the act's requirements does not reflect all of the agency's progress in limiting toxic emissions because other EPA programs decrease emissions of air toxics as a side benefit. In addition, within the air toxics program, senior EPA officials said that the agency's focus on issuing emissions standards for major stationary sources had addressed the greatest risks from air toxics. However, EPA does not have reliable data on the degree to which its programs have reduced risks. Furthermore, the data that are available suggest that the agency still has substantial opportunities to control emissions from mobile and small stationary sources.

EPA faces significant challenges in implementing the air toxics program, many of which stem from its relatively low priority within the agency. Importantly, the agency lacks a comprehensive strategy for managing its implementation of the remaining air toxics requirements. Senior EPA officials said that the program's agenda is largely set by external stakeholders who file litigation when the agency misses deadlines. For example, EPA currently faces a court order to issue emissions standards for small stationary sources. Previous reports by GAO identified inadequate funding for the air toxics program as a challenge, and key stakeholders—including senior EPA officials, environmental advocates, and state and local agency officials—said resource constraints continue to pose a major challenge. The percentage of funding for the air toxics program relative to all clean air programs ranged from 18 percent to 19 percent between 2000 and 2003 and declined to 15 percent in 2004 and 12 percent in 2005. EPA has not estimated the level of resources necessary to comply with the remaining requirements of the 1990 amendments, according to a senior program official. We believe that such estimates would help inform congressional oversight and appropriations decisions. Senior EPA officials and other stakeholders also cited a lack of information on the benefits of regulating air toxics as a major challenge, which, in turn, reinforces the program's relative priority because the agency cannot demonstrate its effectiveness. The stakeholders identified a number of other challenges, but perceptions varied by stakeholder group. For example, EPA and industry stakeholders rated the large number of statutory requirements as a challenge, while environmental stakeholders rated a lack of reliable data on air toxics sources and their emissions as a challenge.

Available information on the costs and benefits of EPA's efforts to control air toxics is not sufficiently comprehensive to measure the total economic impacts resulting from the air toxics program. As a result, it is difficult to compare the net benefits (total benefits minus total costs) of EPA's

investments in the air toxics program with those of other air quality programs. The agency's 1999 report responding to the act's mandate for a comprehensive cost-benefit analysis of all Clean Air Act programs contained limited information on the costs of regulating air toxics and no estimates of the human health benefits, such as likely reductions in cancer risk. The analysis estimated that the cost to industry of complying with the 21 control standards that had been issued by 1999 would total $780 million in 2000 and rise to $840 million in 2010. EPA officials said the agency plans to issue a revised analysis in 2007 that will estimate the costs of all standards issued before September 2005. However, the analysis will only provide limited data on the benefits of regulating air toxics because of the analytical challenges involved. These challenges include a lack of reliable data on changes in emissions attributable to air toxics regulations and difficulties in estimating the effects that changes in emissions have on health outcomes. Specifically, EPA has not monetized the health benefits of its air toxics regulations individually or in total because of the analytical difficulty of characterizing health outcomes associated with incremental reductions in exposure to 187 different chemicals. Instead of using a cost-benefit analysis to measure the program's effectiveness, EPA uses data on national trends in emissions of all air toxics. However, as EPA's Inspector General reported in 2004, the agency needs to improve its methods for estimating emissions before it can accurately gauge the extent to which its programs have actually reduced emissions. Other indicators of the program's effectiveness, such as changes in concentrations of air toxics in the ambient (outdoor) air over time and data on compliance with air toxics standards, are also limited and inconclusive. For example, the agency's data on compliance with air toxics standards cannot be generalized to describe compliance at the universe of regulated facilities because inspectors often target facilities where they suspect noncompliance.

The five state and local air toxics programs we reviewed use several program design and management practices that EPA could consider as part of efforts to enhance the effectiveness of the federal air toxics program. First, the programs we reviewed address gaps in the federal program by, for example, regulating more emissions sources than EPA, or setting more stringent standards to control emissions. As part of efforts to strengthen its program and establish priorities for meeting its remaining obligations under the act, EPA could benefit from assessing and considering what states perceive as the primary gaps in the federal program. Second, these programs use risk-based approaches to prioritize efforts to control air toxics. For example, Oregon's air toxics program is designed to monitor emissions in various parts of the state, identify areas

of elevated risk from air toxics, and then concentrate resources on the emissions sources that drive these risks. Third, some of these programs base their regulatory decisions on the risk posed by entire facilities, whereas, to date, EPA has limited the scope of its residual risk program to only those emission points within facilities that must comply with existing federal standards. As a result, according to several state and local officials, EPA's decision to exclude some emissions points from risk assessments may, in turn, cause it to underestimate the total risk from facilities and thereby enable some facilities to avoid further regulation. Fourth, several of the programs we reviewed have systematic approaches for identifying and prioritizing new chemicals. In contrast, EPA does not proactively consider new chemicals and instead has taken a reactive approach in which it considers petitions from external parties to list or delist chemicals. Considering the practices used by these programs could inform future EPA efforts to meet the act's requirement to periodically review and update the list of regulated chemicals. In addition to these practices, all of the programs we reviewed highlighted the importance of reliable data on emissions and chemical toxicity. Several require major and small stationary sources to submit standardized emissions reports and certify their accuracy. In contrast, EPA, to date, generally has not required emissions sources or state or local agencies to systematically report these data. Such standardized data collection could enhance EPA's analysis and decision making in future air toxics rule makings. In addition, several officials said that EPA does not regularly update chemical toxicity values that inform the work of state and local programs.

We are recommending that EPA develop an air toxics program improvement plan that, among other things, (1) provides a schedule for completing its mandated requirements under the act and identifies the resources necessary to complete these actions, (2) prioritizes activities within the air toxics program, (3) establishes a process and timeline for meeting the act's requirement to review and update the list of air toxics, (4) outlines an approach and timelines for improving the agency's ability to measure the program's costs and benefits, and (5) describes how the agency plans to improve its air toxics emissions inventory. In commenting on the report, EPA's Acting Assistant Administrator for Air and Radiation said that EPA agrees in part with our conclusions and recommendations. The agency did not identify specific aspects of our conclusions or recommendations with which it disagreed, but offered clarifications on our statements regarding information on the costs and benefits of the agency's efforts to control air toxics, the agency's progress in completing certain air toxics requirements of the Clean Air Act, and EPA's management of the remaining requirements. EPA also provided technical

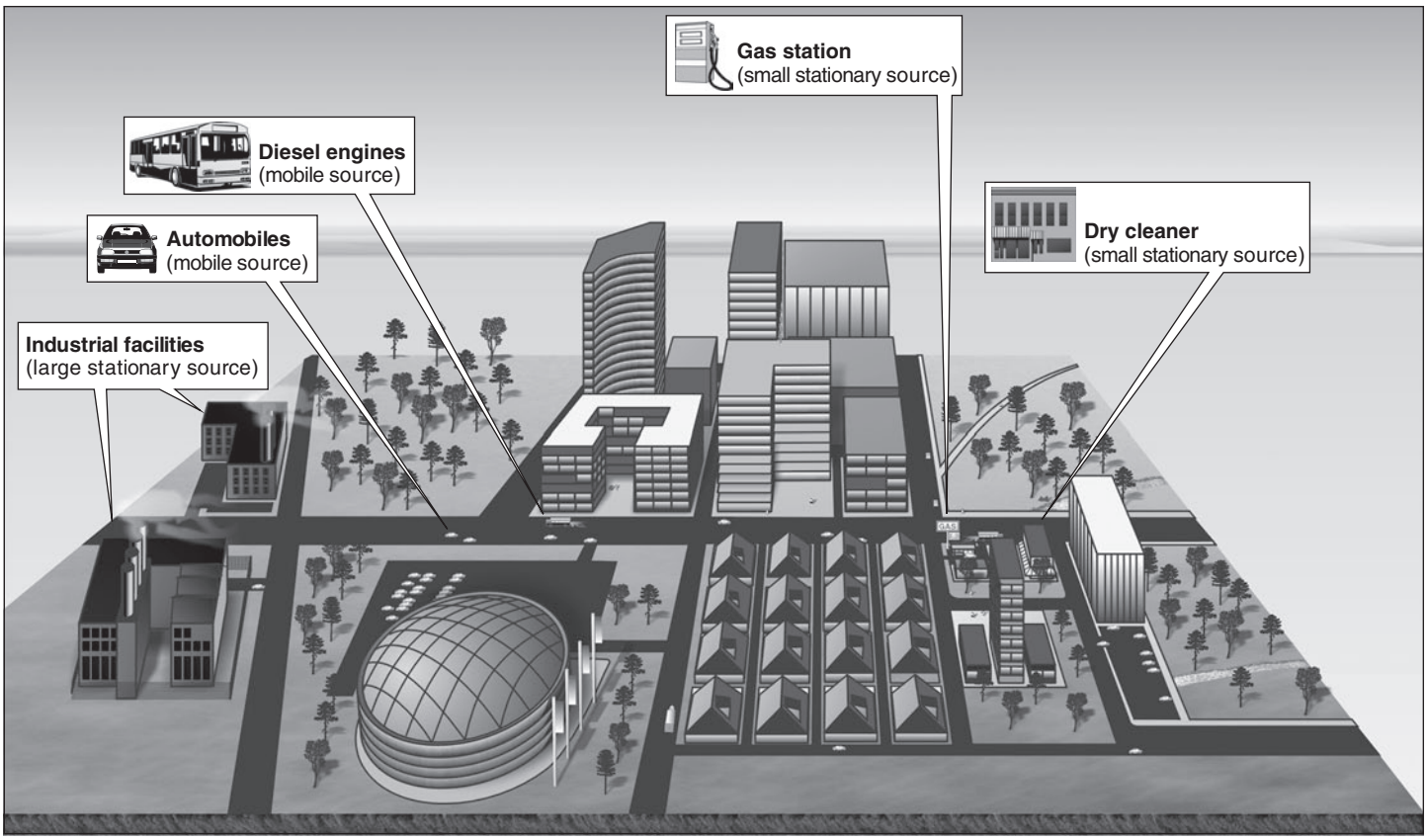
comments, which we have incorporated, as appropriate. EPA's letter, and our response, are included as appendix IV.

Background

Under the Clean Air Act, EPA regulates two primary types of air pollutants. The first category—the so-called "criteria pollutants" for which EPA has established air quality criteria that limit the allowable concentrations in the ambient air—includes carbon monoxide, ground-level ozone (smog), lead, nitrogen oxides, particulate matter, and sulfur dioxide. EPA sets these standards at a level it believes protects public health and the needs of sensitive populations such as asthmatics, children, and the elderly. EPA and the states use air quality monitoring to measure compliance with the standards and develop pollution control strategies to help bring areas with poor air quality into compliance.

The second category consists of hazardous air pollutants (or "air toxics") for which no ambient air quality standards exist, and includes 187 chemicals that cause a variety of adverse health effects, including cancer. A variety of sources emit one or more of these air toxics (see fig. 1). In 2002, mobile sources emitted 41 percent of all air toxics, small stationary sources emitted 30 percent, major stationary sources emitted 20 percent, and other sources, such as fires, emitted 9 percent, according to EPA's most recent data.

Figure 1: Common Sources of Air Toxics Emissions



Sources: EPA (data); GAO, Art Explosion (images).

Table 1 identifies the most widely emitted air toxics, the primary sources of these pollutants, and some of the adverse health effects associated with exposure to these substances. It is important to note that the health risks posed by air toxics vary considerably. Thus, small quantities of more harmful pollutants can pose greater health threats than large quantities of less harmful pollutants.

Table 1: The Five Most Commonly Emitted Air Toxics, 2002

Pollutant	Percentage of total air toxics emissions	Primary sources of emissions	Health effects
Toluene	18	Mobile sources	Impairment of the nervous system with symptoms including tiredness, dizziness, sleepiness, confusion, weakness, memory loss, nausea, loss of appetite, and hearing and color vision loss; kidney problems; unconsciousness; and death.
Xylenes	13	Mobile sources, asphalt paving	Irritation of the skin, eyes, nose, and throat; headaches, dizziness, memory loss, and changes in sense of balance; lung problems; stomach discomfort; possible effects on the liver and kidneys; unconsciousness; and death.
Hydrochloric acid	12	Coal-fired utility and industrial boilers	Eye, nose, and respiratory tract irritation; corrosion of the skin, eyes, mucous membranes, esophagus, and stomach; severe burns; ulceration; scarring; inflammation of the stomach lining; chronic bronchitis; and inflammation of the skin.
Benzene	9	Mobile sources, open burning, pesticide application	Drowsiness, dizziness, vomiting, irritation of the stomach, sleepiness, convulsions, rapid heart rate, headaches, tremors, confusion, unconsciousness, anemia, excessive bleeding, weakened immune system, increased incidence of cancer (leukemia), and death.
Formaldehyde	7	Mobile sources, open burning	Irritation of the eyes, nose, throat, and skin; severe pain; vomiting; coma; limited evidence of cancer; and death.

Sources: EPA and Agency for Toxic Substances and Disease Registry.

Note: Health effects are dependent upon the concentration of the air toxic and the length of exposure.

Prior to 1990, the Clean Air Act required EPA to list air toxics it deemed hazardous and then promulgate regulations for them. However, by 1990, EPA had regulated only seven such pollutants. In 1990, Congress dramatically changed the program. Instead of requiring EPA to develop ambient standards for air toxics as it does for the six criteria pollutants, the Clean Air Act Amendments of 1990 listed the air toxics to be controlled and directed EPA to control them by, among other things, (1) developing technology-based emissions limits (MACT standards) for major stationary sources, such as incinerators and chemical plants; (2) regulating emissions from smaller sources, such as dry cleaners and gas stations; and (3) evaluating the need for and feasibility of regulations from mobile sources, such as cars, and regulating these sources based on this evaluation. The standards for major stationary sources generally require the use of available control technologies to achieve emissions reductions without the explicit consideration of a chemical's toxicity or potential risk. To develop MACT standards, the 1990 amendments directed EPA to group emissions points at industrial facilities into categories of similar sources and then

develop regulations for each "source category." Examples of source categories include cement manufacturing, hazardous waste combustion, and semiconductor manufacturing.[10] The next step consisted of evaluating the level of emissions control achieved by the best-performing facilities in each source category and using this as the minimum level of control required throughout the entire source category.[11]

Additionally, the amendments required EPA to review the MACT standards every 8 years to evaluate any remaining, or residual, health risks from these sources and identify developments in control technologies. EPA has combined the residual risk assessments and technology reviews into a concurrent process. Thus, the agency simultaneously evaluates the remaining risks from each source category and the availability of new pollution control technologies. The risk assessment process seeks to estimate the cancer and other health risks faced by individuals exposed to toxic emissions. As shown in table 2, the four steps of risk assessment include hazard identification, dose-response assessment, exposure assessment, and risk characterization.

[10]EPA currently regulates 158 major source categories. Some industrial facilities may belong to multiple source categories.

[11]MACT standards require all sources within a source category to control emissions to the same level. Existing sources generally must meet the average emission level achieved by the best performing 12 percent of sources in the source category. New sources must meet a more stringent emission level.

Table 2: Overview of the Risk Assessment Process

Step	Description
Hazard identification	Determine the association between pollutants and adverse health effects. This involves reviewing studies of illnesses among groups of people or laboratory animals exposed to air pollutants.
Dose-response assessment	Describe the adverse health effects associated with different levels of exposure to a particular pollutant.
Exposure assessment	Estimate the amount of an air toxic a person is likely to inhale in a given period of time using data on emissions, meteorological conditions, and information on the locations of homes and workplaces relative to emissions sources.
Risk characterization	Integrate the information from the three previous steps to describe the degree of increased risk faced by individuals. Typical results of this step include measures of excess lifetime cancer risk (e.g., a risk of 100 in 1 million), the population risk (e.g., the number of people that face a cancer risk exceeding 100 in 1 million), or the estimated number of additional cancer cases each year.

Source: GAO analysis of EPA documents.

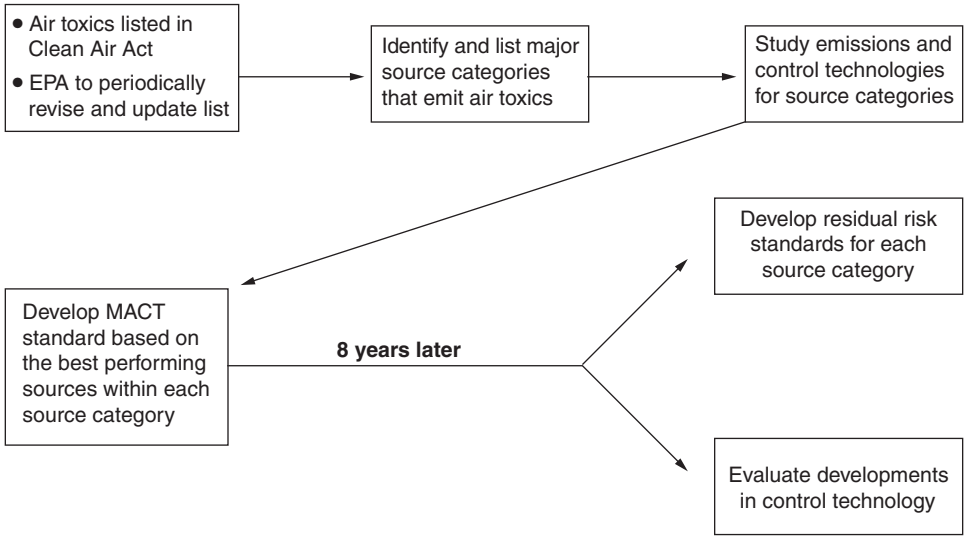
Notes: EPA maintains information used in the hazard identification and dose-response assessment stages of risk assessments in its Integrated Risk Information System (IRIS) database.

Lifetime excess cancer risk refers to the estimated additional risk of developing cancer that a person would have if exposed to a specific concentration of an air toxic 24 hours a day, 7 days a week, for 70 years.

The risk assessment process is limited by scientific uncertainty about the health effects associated with exposure to air toxics. Nonetheless, the Clean Air Act's residual risk program seeks to determine whether the most exposed individuals face excess cancer risk of more than 1 in 1 million. In cases where estimated risks exceed this threshold, EPA develops a residual risk standard that seeks to provide an ample margin of safety for affected individuals.[12] Figure 2 provides an overview of the regulatory process for major stationary sources of air toxics, including MACT standards and 8-year technology and residual risk reviews.

[12]EPA generally uses a lifetime cancer risk of 1 in 10,000 as the upper boundary of acceptability. As part of the ample margin of safety decision, EPA considers costs, technological feasibility, uncertainties, and other relevant factors. In this step, EPA must also assess whether to adopt more stringent standards to prevent adverse effects to wildlife, aquatic life, or natural resources considering cost, energy, and other relevant factors.

Figure 2: EPA Air Toxics Regulatory Framework for Major Stationary Sources



Source: GAO.

In addition to requirements for major sources, the act required EPA to develop a comprehensive strategy to control emissions of air toxics in urban areas, including identifying at least 30 small stationary source categories that account for 90 percent of the risk from these sources, and issue regulations by November 2000. EPA has listed 70 small stationary source categories for regulation. The act also required EPA to assess the need for and feasibility of air toxics standards for motor vehicles and fuels, and, based on that assessment, issue regulations to control air toxics from motor vehicles and fuels.

Table 3 summarizes the 453 actions required of EPA under the air toxics provisions of the 1990 amendments. Because these actions range in scope from developing MACT standards to issuing reports, they vary in their potential to reduce emissions.

Table 3: Number of Air Toxics Actions Required under the 1990 Clean Air Act Amendments

Air toxics category	Number of actions required
Major stationary sources regulated by MACT standards	158
8-year residual risk reviews for MACT standards	96
8-year technology reviews for MACT standards	96
Standards for small stationary sources	70
Mobile sources	2
Other (reports, studies, etc.)	31
Total	**453**

Source: GAO analysis of EPA documents.

Note: The act required EPA to list major and small source categories of the listed hazardous air pollutants (currently 187 chemicals). In response, EPA identified 158 major source categories and was required to issue a standard for each category. EPA responded by issuing 96 different standards, some of which apply to multiple source categories. The 8-year residual risk and technology reviews apply to the 96 standards, which accounts for the difference between the 158 requirements to regulate major sources and the 96 requirements each for residual risk and technology reviews.

EPA's Office of Air and Radiation has primary responsibility for completing air toxics actions required under the Clean Air Act. Within the Office of Air and Radiation, responsibility for implementing the air toxics requirements of the Act rests primarily with the Office of Air Quality Planning and Standards and, to a lesser extent, with the Office of Transportation and Air Quality. The responsibility for analyzing the health, economic, and other effects of individual air toxics programs also rests with these offices. The Office of Policy Analysis and Review supplements these program-specific analyses by conducting periodic assessments of the health, ecological, and economic effects of the overall Clean Air Act, including the air toxics provisions, and coordinating these studies as appropriate with other EPA offices. In conducting these broader studies, the Office of Policy Analysis and Review also works with the Advisory Council for Clean Air Act Compliance Analysis, an independent, multi-disciplinary panel of outside experts organized under the auspices of EPA's Science Advisory Board. The agency's Office of Research and Development performs scientific research on air toxics to support regulatory efforts. The Office of Enforcement and Compliance Assurance directs efforts to ensure compliance with air toxics requirements. In most cases, state and local air pollution control agencies implement the standards developed by EPA. Additionally, the act generally allows these agencies to impose more stringent requirements than the federal standards, although some states have enacted laws or rules prohibiting air

pollution control agencies from adopting more stringent requirements. Nonetheless, some state and local programs have developed innovative air toxics programs.

EPA Has Made Limited Progress in Addressing the Clean Air Act's Requirements for Air Toxics and Faces Significant Implementation Challenges

EPA has completed issuing emissions standards for major stationary sources but issued most of these standards late and has made limited progress toward completing the remaining air toxics requirements. In particular, EPA has made little progress and is behind schedule in completing residual risk and technology reviews and in issuing emissions standards for small stationary sources and mobile sources. EPA's limited progress and program implementation challenges have resulted primarily from the program's lower priority relative to other clean air programs. Furthermore, the agency lacks a program implementation strategy. Stakeholders we interviewed—including EPA, state and local agency officials, environmental groups, and industry representatives—provided additional perspective on EPA's implementation of the air toxics program and highlighted data limitations and inadequate funding as major challenges.

EPA Issued Most of the MACT Standards behind Schedule and Has Made Limited Progress in Completing the Other Air Toxics Requirements

EPA has completed issuing the MACT standards for major stationary sources but has made limited progress in addressing requirements related to residual risk and technology reviews, and in issuing standards for small stationary sources and mobile sources. As a result of the limited progress in implementing these requirements, EPA has not reduced human health risks from air toxics to the extent and in the time frames envisioned in the act. Table 4 summarizes EPA's overall progress in implementing air toxics requirements under the Clean Air Act.

Table 4: EPA Progress in Meeting Air Toxics Requirements

		Requirements met		Requirements unmet	
	Number of requirements	Met on time[a]	Met late	Unmet—past due	Unmet—not yet due
Issue MACT emission standards for major source categories	158	4	154	0	0
Residual risk reviews	96	0	5	16	75
Control technology reviews	96	0	5	16	75
Small stationary sources	70	0	16	54	0
Mobile sources	2	0	1	1	0
Other	31	8	21	2[b]	0
Total	**453**	**12**	**202**	**89**	**150**

Source: GAO analysis of EPA documents.

Notes: This analysis reflects the status of the requirements as of April 2006.

[a]We count requirements met by EPA that did not have deadlines specified in the act as on time.

[b]EPA is required to periodically review the list of air toxics established by the act but has not yet done so. This requirement was not accompanied by a deadline. Based on other time frames required by the act, we list this requirement as unmet/past due instead of unmet/not yet due.

To meet the act's requirements for major stationary sources, EPA had to identify a list of major source categories and then issue standards beginning in 1992, with all standards due by November 2000. In response, EPA identified 158 major source categories and issued 96 standards covering these categories between 1993 and 2004. Table 5 summarizes the timeliness of EPA's MACT standards relative to the act's deadlines. While the agency missed most of the deadlines, a senior EPA official said that issuing the 96 standards represented a major achievement and that the agency had never previously issued so many standards for one program in such a limited period of time.

Table 5: Timeliness of MACT Emission Control Standards for Major Source Categories

	Requirements met according to the schedule specified in the Clean Air Act				
	Number of requirements	On time or early	0-1 years late	1-2 years late	More than 2 years late
Issue MACT emission standards for major source categories	158	4	23	68	63

Source: GAO analysis.

Note: This analysis reflects the status of the requirements as of April 2006.

Because EPA issued most of the MACT standards well behind schedule, the residual risk and control technology reviews, which EPA is to complete 8 years after issuing each standard, have been pushed back commensurately, thereby delaying any additional public health protection that these reviews may provide. Specifically, instead of completing the initial residual risk assessments and technology reviews for all of the MACT standards by 2008 as specified by the act, EPA is not required to complete all of the initial reviews until 2012 because it issued many MACT standards behind schedule. For example, because EPA issued the MACT standard for industrial boilers in 2004 rather than 2000, as required, the residual risk assessment and technology review for this source category become due in 2012, almost 4 years later than the act's intended timeline. Furthermore, EPA is behind schedule on the residual risk assessments and technology reviews. As of April 2006, EPA had finalized only five of these reviews, and all of these were late. Three additional reviews have court-ordered deadlines and will be completed by the end of 2006, according to EPA.

The act required EPA to develop regulations for small stationary sources by November 2000.[13] However, the agency has not met this schedule. In July 2000, EPA outlined its plans for issuing standards for small stationary sources in a report to Congress describing its strategy for reducing threats

[13]EPA was to promulgate regulations for small stationary sources listed under section 112(k) of the act by November 2000. Small stationary sources not listed under section 112(k) were subject to a different schedule.

from air toxics in urban areas.[14] This report identified 16 categories of small stationary sources that it described as "already subject to regulation" or "will be subject to regulation." The report also identified 13 additional categories for which it planned to issue standards by 2004. In 2002, EPA expanded the list to include a total of 70 source categories. However, as of April 2006, EPA has issued standards for only 16 categories of sources, leaving standards for 54 source categories past due. Furthermore, the agency faces court-ordered deadlines to complete standards for all of the remaining categories of small stationary sources by June 15, 2009.

The act also required EPA to study the need and feasibility of air toxics standards for motor vehicles and fuels and, based on the study, develop a regulation to control air toxics from motor vehicles and fuels by 1995. EPA completed the study in 1993 (about 11 months after the deadline) and, after missing the 1995 deadline for the regulation, faced a court-ordered consent decree to complete the regulation by 2001. To comply, EPA issued an initial rule in 2001 that stated that a second and final rule making would follow in 2004.[15] The agency missed this deadline and eventually proposed a second rule in February 2006, with a final rule planned for February 2007.[16] The proposed rule would limit the benzene content of gasoline and reduce toxic emissions from passenger vehicles and gas cans according to EPA.

Finally, the act contained 31 requirements that do not fit into the categories discussed above, including reports to Congress and guidance for state and local programs. As of April 2006, EPA has met 29 of these requirements. One of the key areas where EPA has not taken action relates to the act's requirement for the agency to periodically review and update, as appropriate, the list of air toxics. Officials responsible for the program said the agency does not proactively conduct such reviews and instead has

[14]U.S. Environmental Protection Agency, *National Air Toxics Program: The Integrated Urban Strategy, Report to Congress* (Research Triangle Park, North Carolina, 2000).

[15]Among other things, the 2001 rule required refiners to maintain current levels of compliance with air toxic performance standards and did not require refiners to install new equipment or use technologies beyond those already in use. EPA did not set additional air toxics requirements for vehicles at that time because the agency had already established other standards for vehicles and fuels that it believed represented the greatest degree of toxics control achievable at that time. See Control of Hazardous Air Pollutants From Mobile Sources, 66 Fed. Reg. 17229 (Mar. 29, 2001).

[16]Control of Hazardous Air Pollutants from Mobile Sources, 71 Fed. Reg. 15804 (Mar. 29, 2006).

adopted a reactive approach, whereby the agency responds to petitions filed by external stakeholders seeking to add or delete chemicals. EPA officials, citing insufficient resources to develop a more proactive approach, said that their efforts have focused on reviewing petitions for additions and deletions filed by external stakeholders.

Since 1990, EPA has received one petition to list a new air toxic (diesel exhaust) and seven petitions to delist. The petition to list diesel exhaust is under review, and of the seven petitions to delist, three have been granted, two have been denied, and two are under review, according to EPA. Overall, EPA has not added any new chemicals to the list of regulated pollutants, but three chemicals and several substances from a listed group of chemicals have been removed. The agency's consideration of diesel exhaust in response to an environmental group's petition has taken more than 2 years, resulting in a lawsuit when the agency did not complete its review within 18 months, as required by the act. EPA and the environmental group reached an agreement in February 2006 that requires the agency to decide by June 2006 whether to list diesel exhaust as an air toxic.

A 2004 report by the National Academies highlighted EPA's lack of a process for reviewing new pollutants despite the estimated 300 chemicals that enter commerce each year. The report recommended that EPA "establish a more dynamic process for considering new pollutants." To date, EPA has not addressed this recommendation, according to senior agency officials. Furthermore, a 2004 study published in the Journal of the Air & Waste Management Association screened 1,086 chemicals for potential addition to the list of regulated air toxics and found that 44 merited further consideration for addition to the list based on available toxicity and emissions data.

Senior EPA air program officials said the agency's progress in meeting the act's air toxics requirements should be viewed within the context of limited funding for clean air programs and the agency's need to focus its resources on the areas where it expects the greatest health-risk reductions. Scientific information on the health effects of air toxics is less comprehensive than that available for higher-priority clean air programs, such as those targeting smog and particulate matter. Additionally, several

officials said that other regulatory and voluntary programs limit emissions of air toxics as a side benefit.[17]

EPA Faces Implementation Challenges and Lacks an Overall Management Strategy

EPA considers the air toxics program a lower priority than its three other major clean air programs—including those to address criteria pollutants, international environmental issues such as climate change, and indoor air quality issues such as exposure to radon gas—because senior officials in EPA's Office of Air and Radiation believe these programs have more potential to reduce health risks. As shown in table 6, the percentage of funding for air toxics relative to all clean air programs ranged from 18 percent to 19 percent between 2000 and 2003, but declined to 15 percent in 2004 and 12 percent in 2005. However, the total dollar amounts (in inflation-adjusted 2005 dollars) devoted to air toxics increased each year between 2000 and 2004, with a decline in 2005.

Table 6: EPA Funding for Air Toxics Program as a Percentage of Funding for All Clean Air Programs, Fiscal Years 2000 through 2005

Thousands of dollars			
Fiscal year	**Funding for air toxics program**	**Funding for all clean air programs**	**Funding for air toxics program as a percentage of all clean air programs**
2000	106,475	605,574	18
2001	118,331	640,056	18
2002	121,668	636,851	19
2003	122,118	641,514	19
2004	143,575	936,286	15
2005	112,986	909,219	12

Source: GAO analysis of EPA data.

Note: Dollar amounts are in inflation-adjusted 2005 dollars.

Within the air toxics program, EPA's initial priority was to complete the MACT standards because the agency believed that this aspect of the program had the greatest potential to address risks from air toxics. Despite EPA placing a priority on issuing the MACT standards, the agency

[17]EPA officials cited the Toxics Release Inventory, various rules affecting motor vehicle fuel formulations, Design for the Environment, the Green Suppliers Network, and community-based initiatives such as Community Action for a Renewed Environment (CARE).

still fell behind schedule when it missed deadlines for the first round of standards (due in 1992) and has never caught up to the act's implementation schedule. EPA officials said they missed some of the MACT deadlines because of technical challenges, including a lack of emissions data from affected source categories and the complexity of many of the regulated facilities. The missed deadlines led to lawsuits filed by external parties seeking compliance with the act's implementation schedule, resulting in court-ordered deadlines for the agency to complete standards. Furthermore, senior EPA officials said these court-ordered deadlines largely drive the program's agenda. In this way, EPA ceded control of the priority-setting process, and this problem is still evident. For example, a senior official responsible for the development of regulations said that the agency's highest priority for the remaining requirements is addressing residual risk reviews and small stationary source standards with court-ordered deadlines.

The lower priority of the air toxics program in general and the priority given to MACT standards within the program, as well as technical challenges, have caused delays in completing the residual risk and technology reviews, as well as standards for small stationary and mobile sources. Further, as shown in table 7, available EPA data indicate that small stationary and mobile sources in total have accounted for more emissions than major stationary sources in every emissions inventory completed since the 1990 amendments. Furthermore, the agency has estimated that benzene—a known carcinogen emitted primarily by mobile sources—accounts for about 25 percent of the cancer risk posed by air toxics across the nation. Benzene is also the only air toxic that, to date, EPA has determined poses sufficient risks to qualify as a "national cancer risk driver."[18]

[18]EPA applies the term "national cancer risk driver" to any air toxic that poses an estimated maximum lifetime cancer risk exceeding 10 in 1 million to more than 25 million people.

Table 7: Percentage of Estimated Total Air Toxics Emissions by Source Type, 1993, 1999, and 2002

Percent					
Year	Estimated total emissions (million tons)	Mobile sources	Small stationary sources	Major stationary sources	Other
2002	4.6	41	30	20	9
1999	5.1	43	25	25	6
1993	7.1	46	24	27	3

Source: GAO analysis of EPA data.

Note: Totals may not add to 100 percent due to rounding.

EPA developed air toxics emission inventories for 1993, 1996, 1999, and 2002. A large part of the 1993 baseline inventory is based on data obtained from 1990. For simplicity, and because EPA has traditionally referred to it as such, we refer to this data as the 1993 baseline inventory. EPA said it did not provide data for 1996 because the agency has not updated the information from that year for consistency with the methodology used for the 1993, 1999, and 2002 data.

EPA expects that the proposed mobile source air toxics rule will reduce benzene emissions. In addition, a senior EPA air program official said that other regulations for mobile sources, including standards that affect gasoline formulations as well as programs addressing emissions from diesel engines, will also reduce emissions of air toxics as a side benefit. Nonetheless, mobile sources will continue to represent an area of significant opportunity to reduce emissions and related human health risks.

Addressing the remaining requirements for residual risk standards and small stationary sources will require overcoming significant technical challenges. Regarding residual risk standards, the Clean Air Act's requirement that EPA introduce a risk element into the regulatory decision-making process marks a departure from the approach the act used with MACT standards, which generally did not require EPA to take the inherent toxicity or health risks from pollutants into account. EPA officials said that conducting the residual risk assessments requires a large amount of data, much of which is difficult to obtain. For example, to adequately assess the human health risk posed by a particular source, EPA needs data on the health effects associated with each pollutant, the

location of sources, distances between sources and affected populations, and the concentrations of emissions at different distances from facilities.

Challenges in regulating small stationary sources center on difficulty in characterizing the large number of widely dispersed facilities such as industrial boilers, paint-stripping operations, and auto-body shops. In some cases, data do not exist on the number or location of facilities potentially subject to a regulation. Furthermore, unlike the large stationary sources affected by MACT standards, owners and operators of these sources have limited resources to implement regulations and will require extensive outreach and compliance assistance.

EPA's challenges in meeting the act's remaining requirements are exacerbated by the lack of a management plan that identifies priorities and necessary resources. The agency's overall strategic plan outlines the goals and targets for emissions and risk reduction across all clean air programs but does not specify priorities or necessary levels of funding for the air toxics program. Similarly, the agency's budget requests provide limited information on the agency's air toxic program activities or priorities. Furthermore, a senior EPA official said that the agency has not estimated how much funding the air toxics program needs to meet the act's remaining requirements. Such information could assist Congress in making its appropriations decisions, enhance the program's transparency to the public, and guide the agency in implementing the program.

Key Program Stakeholders Provided Further Insights on EPA's Implementation Challenges

To better understand the challenges facing EPA's air toxics program, we interviewed various stakeholders, including officials from EPA, industry and environmental groups, and state and local air pollution control agencies.[19] Each respondent rated the extent to which nine specific issues posed a challenge to EPA in implementing the air toxics program, and we then averaged the responses within each stakeholder group. As shown, in table 8, the average response within each group identified at least one of seven different issues as a challenge to a large or very great extent.[20] Although perceptions varied among the stakeholder groups, three issues emerged as primary challenges—the availability of reliable data to assess

[19]See appendix II for information on our methodology for interviewing stakeholders.

[20]The two challenges not rated as significant by any stakeholder groups were "complexity of required analyses to support regulatory actions" and "rigidity of Clean Air Act requirements."

the benefits of regulating air toxics, the adequacy of program funding, and the program's low priority relative to other clean air programs. As shown in the table, respondents from at least three of the four stakeholder groups we interviewed identified each of these challenges as significant.

Table 8: Issues Rated by Stakeholders as Challenges to a Large or Great Extent

	Stakeholder groups			
Challenges	**EPA**	**Industry**	**Environmental**	**State and local**
Availability of reliable data to assess benefits of regulating hazardous air pollutants	✓	✓		✓
Adequacy of program funding	✓		✓	✓
Priority of program relative to other air programs	✓		✓	✓
Number of Clean Air Act requirements pertaining to hazardous air pollutants	✓	✓		
Adequacy of resources at the state, local, and tribal levels to implement regulations	✓			✓
Strain on resources due to litigation	✓			
Availability of reliable data on sources and their emissions			✓	

Source: GAO.

Several stakeholders identified linkages among the three primary challenges. For example, some stakeholders said that the problems with limited resources stemmed from the program's low priority. In addition, some stakeholders said that the lack of information on the benefits of regulating air toxics reinforced the program's low priority because the agency cannot demonstrate the results it achieves through investments in the program.

In addition, industry and EPA stakeholders cited the number of air toxics requirements as a challenge to a large or very great extent. Respondents from both groups stated that the agency has insufficient resources to meet such a large number of requirements in the specified time frames. Industry officials noted that the number of requirements was unrealistic, and some EPA stakeholders said that Congress did not understand the number of emissions sources involved or the level of effort required to write standards. EPA and state and local stakeholders also cited the adequacy of resources at the state, local, and tribal levels to implement regulations as a significant challenge.

Available Information on Costs and Benefits Is Not Sufficient to Measure the Program's Effectiveness

The information available on the costs and benefits of EPA's air toxics program is not sufficiently comprehensive to measure the overall effectiveness of the program. For example, because of limited data, EPA's major economic assessments of the Clean Air Act have not included monetized estimates of the program's benefits, such as reduced incidence of cancer, and have provided only limited information on costs. The absence of information on benefits stems from a lack of data on the extent to which incremental reductions in exposure to air toxics affect an average person's chance of developing adverse health effects. The agency also lacks reliable data on the quantities of each pollutant emitted prior to the adoption of air toxics regulations or in the years thereafter. Furthermore, other potential indicators of the program's effectiveness, such as data on compliance with air toxics regulations, are inconclusive. As a result, it is difficult to compare the results of investments in the air toxics program with those generated by clean air programs on which EPA has placed a higher priority.

EPA's Assessments of the Clean Air Act Have Not Estimated the Economic Benefits of the Air Toxics Program

Although EPA has conducted two major assessments of the costs and benefits of its programs under the Clean Air Act, the agency has not fully analyzed the air toxics program primarily because of difficulty in characterizing the program's effects on public health.[21] Without a comprehensive assessment of costs and benefits, it is difficult to gauge the program's cost effectiveness or net benefits (total benefits minus total costs) or compare these effects with those of higher-priority air pollution control programs.

The two assessments of the act's costs and benefits focused on separate time periods. EPA refers to the first assessment, completed in 1997, as the "retrospective" analysis because it covered the period 1970 to 1990. It is of limited use in understanding the economic effects of the current air toxics program because this time period predates the significant expansion of the program after the 1990 amendments.

The second analysis, completed in 1999, is referred to as the "prospective" analysis because it covered the period 1990 to 2010. This study attempted to forecast the future economic impacts of the 1990 amendments and

[21]U.S. Environmental Protection Agency, *The Benefits and Costs of the Clean Air Act, 1970 to 1990* (Washington D.C., 1997); and *The Benefits and Costs of the Clean Air Act, 1990 to 2010* (Washington D.C., 1999).

estimated that the overall net benefits of clean air regulations from 1990 to 2010 would total $510 billion (1990 dollars), with a benefit-to-cost ratio of four to one. Most (over 90 percent) of the monetized benefits included in the analysis stemmed from reduced incidence of health effects associated with exposure to five of the six criteria pollutants—carbon monoxide, ground-level ozone, particulate matter, nitrogen oxides, and sulfur dioxide. EPA places the highest priority within its clean air programs on the criteria pollutants.

The prospective analysis is of limited use in understanding the effects of the air toxics program because it provided incomplete information on the costs of air toxics standards and did not include estimates of the human health or other benefits of these standards. Specifically, the cost estimates reflect only the 21 standards EPA had issued at the time of the study—a number that has since grown to 96. EPA estimated that the cost to industry of complying with these 21 MACT standards would total $780 million in 2000 and rise to $840 million by 2010. According to EPA, these estimates primarily reflect the cost of purchasing, operating, and maintaining pollution control equipment. As shown in table 9, these costs represent a relatively small fraction of the total estimated costs of the 1990 amendments over that time period.

Table 9: Summary of Annual Costs Imposed by the 1990 Clean Air Act Amendments

Dollars (in millions)

Programs	Costs in 2000	Percentage of total costs	Costs in 2010	Percentage of total costs
Title I—Ambient air quality standards	$8,600	44	$14,500	54
Title II—Mobile sources	7,400	38	9,050	34
Title III—Air toxics	780	4	840	3
Title IV—Acid rain	2,300	12	2,040	8
Title V—Permitting	300	2	300	1
Total annual costs	**$19,400**	**100**	**$26,800**	**100**

Source: EPA.

Note: Dollar Amounts are in 1990 dollars.

An EPA official responsible for the prospective study said that the agency did not include estimates for the aspects of the program that it had not yet implemented—such as the 75 remaining MACT standards—because, at the time, the agency did not have information on the number of facilities that would have to comply with future standards or the level of emissions control the standards would require. Without this information, the official

said it was appropriate to exclude these future standards from the analysis. Nonetheless, EPA acknowledged the lack of information on the costs of future air toxics standards as a key uncertainty of the analysis.[22]

EPA plans to update its cost estimates as part of a new prospective analysis covering 1990 to 2020. The revised cost estimates will include all of the completed MACT standards as well as any other air toxics rules issued by September 2005 (except the residual risk rule for coke ovens, which entails emissions reductions and compliance costs that would have a negligible effect on the overall analysis). An EPA official responsible for the analysis said the agency expects to have preliminary results of the revised cost estimates in late 2006, with a final report expected in 2007.

EPA Lacks Key Data Needed to Estimate the Benefits of Air Toxics Regulations

The prospective analysis of the 1990 Clean Air Act amendments did not include monetized estimates of the benefits of air toxics regulations, such as decreased cancer risks to affected individuals, because the agency did not have sufficient data to estimate these effects. As shown in table 10, estimating the benefits of EPA's air toxics program requires a substantial amount of scientific data. Specifically, this process involves determining the extent to which reductions in exposure to air toxics have decreased the incidence of adverse health effects, including cancer and noncancer illnesses. This, in turn, requires estimating the extent of adverse health effects stemming from exposure to air toxics both before (see steps 1 to 3 below) and after (see steps 4 to 6 below) adopting air toxics regulations. For example, exposure to air toxics prior to the adoption of a regulation may have caused 1,000 cases of cancer per year but the presence of a regulation may have decreased this number to 500 cases per year. The 500 avoided cases would represent a key health benefit of the regulation. The final step of the process (step 7) involves assigning dollar values to these health benefits.

[22]EPA identified other key uncertainties with its cost analysis, including that the estimates were based on the costs of pollution control technologies that were available at the time and did not account for potential reductions in future costs due to technological innovation.

Table 10: Key Steps in Estimating the Benefits of Controlling Air Toxics

Step	Task	Data requirements
1	Characterize the relationship between pollutants and the adverse health effects associated with exposure to these pollutants (referred to as "dose-response" relationships).	Information on cancer and noncancer effects of 187 different pollutants, as well as on how incremental decreases in exposure to these pollutants affect the incidence of each adverse health effect.
2	Determine the baseline level of human exposure to pollutants in the absence of air toxics regulations.	Information on concentrations of each pollutant in the ambient air prior to adoption of air toxics regulations, and on human exposures to these pollutants. This requires information on the amount of each pollutant emitted prior to the regulations, as well as computer models that calculate human exposures based on emissions data and other key variables such as meteorological conditions.
3	Use data from steps 1 and 2 above to determine the number of cases of each adverse health effect in the absence of regulations.	No additional data required.
4	Determine level of human exposure to pollutants after the regulation. This involves estimating the extent to which the regulation has decreased emissions of each pollutant and related human exposures.	Information on the amount of each pollutant emitted after adopting air toxics regulations, and computer models used in step 2 to estimate the remaining level of exposure to each pollutant.
5	Calculate the remaining incidence of each health effect after implementing the regulation.	Same as step 3; no additional data required.
6	Determine the number of cases of each health effect avoided as a result of the regulation by subtracting the number of remaining cases of adverse health effects (identified in step 5) from the number of baseline cases prior to the regulation (identified in step 3).	No additional data required.
7	Assign dollar values to the number of avoided cases identified in step 6.	Economic studies on the value of reducing incidence of cancer and noncancer health effects.

Source: GAO analysis of EPA data.

Two primary factors limit EPA's ability to estimate the benefits of air toxics regulations. First, EPA lacks adequate information on the extent to which incremental reductions in exposure affect an average person's chance of developing adverse health effects. The limited information on these "dose-response" relationships represents the greatest challenge for the agency in conducting a benefits assessment for the air toxics program, according to a senior EPA official responsible for the retrospective and prospective analyses. A senior EPA official responsible for risk analysis drew a distinction between the type of data needed for a risk assessment, which often involves extrapolation from studies involving laboratory animals, and the type of data that economists need for a benefits assessment, which generally requires studies of human exposures. The official said that EPA currently has sufficient toxicological data, primarily from animal studies, to assess risks from 133 of the 187 air toxics.

However, the official said the agency only has the type of dose-response data needed to estimate the economic benefits for a handful of pollutants.[23]

Second, EPA lacks reliable information on the quantities of each pollutant emitted prior to the adoption of air toxics regulations or in the years after adopting the regulations. EPA has tracked emissions of air toxics since 1993 and prepares a National Emissions Inventory every 3 years. In 2006, EPA completed its most recent inventory, which has information on emissions in 2002. While the inventory represents the best available data on emissions of air toxics and is useful for identifying the relative contribution of emissions from different sources, a 2004 EPA Inspector General report identified shortcomings of the inventory that raise questions about its reliability and usefulness in measuring the effects of the air toxics program.[24] For example, the report said that EPA cannot tell whether apparent reductions or increases in the inventory have resulted from changes in the way the agency estimated the inventory or from real reductions or increases in emissions. The report also cited problems with the limited involvement of state agencies in the development and validation of the inventory.

Although the data in the emissions inventory are limited, EPA has used the emissions inventory and other available data to estimate human exposures to these pollutants. In 1999, EPA released its first National-Scale Air Toxics Assessment (NATA), which relied on data from the 1996 emissions inventory to estimate the potential health risks posed by air toxics in different geographic areas. EPA updated this analysis in 2006 using data from the 1999 emissions inventory. While NATA is a useful indicator of potential health risks from air toxics at a given point in time, it is not useful as a measure of the agency's effectiveness in implementing the air toxics program because, according to EPA, the agency revised the number of stationary sources and pollutants included in its analysis. For example, the analysis based on the 1996 emissions inventory assessed risks from 33 pollutants, while the most recent analysis included 177 pollutants. As a

[23]EPA has some dose-response data for benzene and plans to include the results of a case study assessing the benefits of reductions in benzene emissions in the Houston area in the next comprehensive assessment of Clean Air Act programs, which the agency expects to issue in 2007.

[24]U.S. Environmental Protection Agency, Office of Inspector General, *EPA's Method for Calculating Air Toxics Emissions for Reporting Results Needs Improvement* (Washington, D.C., 2004).

result, EPA believes it is not meaningful to compare the results of the two assessments.

Overall, the limited information on health outcomes associated with changes in exposure to air toxics hinders EPA's ability to quantify or monetize the economic benefits resulting from the air toxics program. In turn, this limits EPA's ability to develop monetized estimates of the program's net benefits or cost effectiveness. Such information would be useful not only for better understanding the economic effects of the air toxics program, but also for comparing the cost effectiveness of different air quality programs, which would help prioritize funding in addressing human health problems caused by air pollution. This information would also help EPA prioritize its remaining obligations under the 1990 amendments. In May 2002, EPA's Office of Research and Development (ORD) released a draft air toxics research strategy that discussed the agency's plans for improving information on dose-response relationships.[25] In addition, ORD issued an air toxics plan in April 2003 that identified the shortcomings of existing dose-response data and plans for improving this information.[26] In reviewing these documents, the agency's Science Advisory Board identified several concerns, including poor linkages across the two documents, inadequate research funding, and the need for a better research prioritization scheme.[27]

Other Indicators of the Program's Effectiveness Are Inconclusive

Without sufficient information to conduct a comprehensive cost-benefit analysis, EPA measures the effectiveness of its air toxics program based on estimated data from its emissions inventory. Specifically, EPA measures the changes in aggregate emissions (measured in tons per year) of all air toxics by comparing estimates from the most recent emissions inventory with the 1993 baseline inventory. While estimated emissions decreased by about 35 percent between 1993 and 2002 according to EPA, the data quality problems discussed above limit their usefulness in measuring the program's effectiveness.

[25]U.S. Environmental Protection Agency, Office of Research and Development, *Air Toxics Research Strategy* (external review draft) (Washington, D.C., 2002).

[26]U.S. Environmental Protection Agency, Office of Research and Development, *Air Toxics Multi-Year Plan*, (Washington, D.C., 2003).

[27]U.S. Environmental Protection Agency, Science Advisory Board, *EPA's Air Toxics Research Strategy and Air Toxics Multi-Year Plan* (Washington, D.C., 2004).

Two other problems also limit the usefulness of the emissions data as a performance measure. First, because pollutants differ substantially in their toxicity—small quantities of some chemicals pose greater risks than large quantities of less harmful chemicals—measuring changes in the total tons of all air toxics emitted does not necessarily provide a strong indication of the program's effectiveness in addressing health risks. The EPA Inspector General report discussed above recommended developing performance measures that address progress toward reductions in human exposure and health risk. Such measures would provide a better indication of changes in risks from air toxics. In the justification for its proposed fiscal year 2007 budget, EPA said that it was developing a "toxicity-weighted" emissions measure for the program.

Second, EPA's practice of measuring the air toxics program's performance using estimated aggregate emissions data may not accurately measure the effect that the program has had on changes in emissions. The current performance measure attributes all changes in emissions to the federal air toxics program, but emissions may change for reasons unrelated to the agency's regulations. Some decreases in emissions may reflect cases where state and local air pollution control agencies have issued rules to control emissions that go beyond the federal regulations. As discussed in the next section of this report, some states set more stringent standards than EPA. On the other hand, a senior EPA official responsible for the economic analysis of air pollution regulations said that the agency may actually underestimate the program's effect. The official said that because of economic growth and related increases in industrial production over time, emissions would far exceed the current levels without the existing EPA air toxics regulations.

We also evaluated two other potential indicators of the program's effectiveness—data on levels of air toxics in the ambient air and information on the degree of compliance with clean air regulations—to determine their usefulness as indicators of the program's effectiveness. While both could eventually serve as useful performance indicators, the available data are currently limited and inconclusive. Regarding data on ambient levels of air toxics, EPA has a monitoring network that includes 22 locations nationwide. The monitors generally track ambient levels of

six priority air toxics that EPA believes pose a concern in all geographic areas of the United States.[28]

A 2005 EPA Inspector General report found shortcomings of the monitoring network, including limited monitoring in areas with the highest estimated cancer risks from air toxics as well as inconsistencies in the operation of the monitors.[29] In responding to the report, EPA said that the Inspector General's concerns generally aligned with the agency's monitoring improvement efforts. It is currently unclear whether the existing monitoring data are representative or reliable indicators of the program's effectiveness. Nonetheless, ambient monitoring is a valuable component of the air toxics program and could eventually serve as a useful performance measure. It is also important to note that, while not part of the national monitoring network, a number of state and local agencies conduct their own air toxics monitoring.

Finally, we reviewed available information on the degree of compliance with air toxics standards identified through evaluations of regulated facilities conducted by federal and state enforcement officials. As shown in table 11, inspectors have found most facilities in compliance with air toxics standards, with some degree of noncompliance at about one-quarter of all facilities. Compliance rates for these facilities may not represent the degree of compliance at all facilities because enforcement officials do not visit each facility every year and often target facilities where they suspect noncompliance.[30] EPA enforcement officials said they do not currently have comprehensive data explaining the magnitude of the noncompliance in cases where inspectors found violations. For example, noncompliance could range from record-keeping problems to more serious violations, such as exceeding an emissions standard. Furthermore, it is important to note that, while EPA has completed issuing all of the MACT standards, 16 standards have compliance dates after June 2006. Thus, information on

[28]The six priority air toxics include acrolein, arsenic, benzene, hexavalent chromium, formaldehyde, and 1,3 butadiene. EPA currently monitors for arsenic, benzene, hexavalent chromium, formaldehyde, and 1,3 butadiene at all locations, and plans to monitor for acrolein at all locations beginning January 1, 2007.

[29]U.S. Environmental Protection Agency, Office of Inspector General, *Progress Made in Monitoring Ambient Air Toxics, But Further Improvements Can Increase Effectiveness* (Washington, D.C., 2005).

[30]According to EPA, a total of 4,271 facilities were required to comply with MACT standards as of 2004.

compliance with these standards will not become available until after that time.

Table 11: Results of Inspections at Facilities Regulated by Air Toxics Standards, 2003 and 2004

Year	Total facilities inspected	Facilities in compliance (percentage of total)	Facilities in noncompliance (percentage of total)	Facilities with unknown compliance status (percentage of total)
2004	**731**	483 (66)	194 (27)	54 (7)
2003	**664**	432 (65)	174 (26)	58 (9)

Source: GAO analysis of EPA data.

While the available enforcement data are limited, EPA has identified cases of significant noncompliance with air toxics regulations. Specifically, the agency has initiated a nationwide air toxics enforcement strategy to identify and correct noncompliance and achieve emissions reductions in targeted industry sectors. According to EPA, in 2005, the agency took enforcement actions against facilities that failed to comply with targeted MACT standards which resulted in air toxics reductions of more than 160 tons and fines exceeding $600,000 (2005 dollars). Furthermore, an official in EPA's Office of Enforcement and Compliance Assurance said that the agency achieved about 190 additional tons of air toxics reductions in 2005 through enforcement actions that were not associated with the national air toxics enforcement strategy.

State and Local Programs Employ Practices That Could Potentially Help EPA Enhance the Effectiveness of the Federal Air Toxics Program

State programs we reviewed in California, New Jersey, Oregon, and Wisconsin, and the local program we reviewed in Louisville, Kentucky, have air toxics programs that go beyond the federal program and employ practices that might help EPA enhance the effectiveness of its program. First, these programs address some public health risks that have not been addressed by the federal program. EPA could potentially strengthen its program by assessing and considering what states perceive as the primary gaps in the federal program. Second, the programs generally prioritize air toxics activities based on their risk reduction potential, which could serve as an example for EPA in prioritizing its remaining obligations under the act. Third, some of the programs conduct comprehensive risk assessments to identify the risk posed by all emissions from a facility, while EPA's residual risk program assesses risk in a more piecemeal and limited fashion. Fourth, several of the programs employ systematic approaches to identify and prioritize chemicals for addition to their lists of regulated air toxics, whereas EPA does not have such a process. Finally, the agencies stressed the importance of reliable data on emissions and chemical

toxicity, and several programs have processes to better ensure the accuracy of emissions data submitted by regulated facilities. (See app. III for information on the key features of the state and local programs we reviewed.)

Several State and Local Programs Address Gaps in EPA's Program

The five programs we reviewed address some public health risks that EPA's program does not. For example, the programs regulate smaller sources than EPA, set more stringent technology standards to control emissions, and include some large stationary sources that EPA does not address.[31] In Wisconsin, any facility that emits one of 535 air toxics in amounts that exceed certain thresholds may be subject to the state's air toxics program. In some cases, annual emissions of less than 1 pound per year from a facility could trigger the state rule, depending upon the toxicity of the chemical. Wisconsin officials said that they use lower thresholds than the Clean Air Act's 10- or 25-ton thresholds because even small emissions of very toxic chemicals can present risks to the public. Similarly, New Jersey officials said that their state program addresses smaller facilities than EPA because most of the numerous chemical facilities in the state are not subject to MACT standards since they do not emit air toxics at levels that exceed federal thresholds. In contrast, in accordance with the Clean Air Act, MACT standards for major sources and the corresponding residual risk reviews apply to facilities in 158 industries with emissions of 10 tons or more of a single air toxic or 25 tons or more of a mixture of the 187 federal air toxics.

In terms of the stringency of the technology standards used to limit emissions of air toxics, California and New Jersey officials said that the technology standards in their states were often more stringent than EPA's MACT standards. For example, California officials said that petroleum refineries in their state use more stringent control technologies, and they noted that EPA chose not to include these technologies as part of its survey of controls already in use when it developed the MACT standard for this industry.

Regarding the types of facilities that are regulated by EPA, some state officials expressed concern that EPA did not develop MACT standards for some major stationary sources of air toxics in their states. For example,

[31]Establishing more stringent pollution control requirements generally involves trade-offs between regulatory costs and potential public health benefits.

Oregon officials said that they requested EPA to issue MACT standards for several categories of sources, including ceiling tile manufacturing and titanium smelting if it found that they were major sources of air toxics. Oregon officials expressed concern with EPA's apparent lack of response to their request because these significant emitters of air toxics in Oregon do not fall into one of the 158 major source categories that EPA identified and regulates. Further, the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) has compiled a list of over 40 major emission source categories of air toxics that were not regulated by EPA MACT standards. While the five programs we reviewed would generally address such sources, similar sources would be unregulated in the states whose programs are based entirely on the federal program. Importantly, in a number of cases, state law limits the ability of state and local programs to go beyond federal requirements. For example, in 2002, STAPPA/ALAPCO found that 26 states from every region in the country have precluded their state air pollution control agencies from imposing clean air requirements beyond those established by EPA.

State and Local Programs Prioritize Their Actions Based on Risk Reduction Potential

The approaches some state and local agencies use to develop their air toxics programs differ from EPA's approach in that they direct resources to the areas of highest risk, whereas, given the Clean Air Act's prescribed schedule, EPA has primarily focused on regulating emissions from certain large stationary sources. In contrast, several state and local programs generally rely on monitoring (the measurement of air toxics in the ambient air) and modeling (estimating toxics in the air using computer models) to identify chemicals, geographic areas, or facilities of concern and develop measures to address these risks.

The Oregon and Louisville, Kentucky, programs illustrate the use of risk-based prioritization. Oregon's air toxics program seeks to identify geographic areas of high risk through modeling and monitoring and to then concentrate resources on those areas. While not yet fully implemented, the program plans to conduct statewide modeling using its emissions inventory to identify areas of potential concern and then conduct monitoring to delineate geographic areas of high risk. According to program staff, the geographic approach is an efficient way to address risk because it is targeted and focuses on the greatest risks. Because public health risks from air toxics may vary depending on proximity to emissions sources and other factors, the practice of identifying areas of high risk and taking steps to address these risks shows promise as part of an overall risk reduction strategy.

Similarly, Louisville created a program to address high health risks near an industrial complex and in the surrounding community that were identified through monitoring of pollutants in the ambient air. According to program officials, toxic emissions from a section of Louisville called "Rubbertown"—home to a complex of chemical facilities and other manufacturers—have been the subject of public concern since the 1940s. From 2000 through 2001, program officials worked with the University of Louisville, EPA, and other stakeholders to monitor the ambient air near Rubbertown and the surrounding community to assess the extent of the problem. A risk assessment based on the monitoring data determined that 18 chemicals posed an unacceptable risk to the public. Consequently, Louisville officials designed the program to target large emitters of these 18 chemicals before targeting smaller emitters of air toxics.

In addition to some states' focus on identifying geographic areas or chemicals of concern, the state and local programs we reviewed use monitoring and modeling data to focus their efforts on specific facilities that pose risks to the public. For example, California requires certain large and small sources of air toxics to conduct facilitywide risk assessments using a standardized risk-screening model. If the modeling results show that risks exceed certain thresholds, the facility must conduct a more comprehensive risk assessment. This process allows California's state and local agencies to identify and focus on the sources that pose high risks to the public. In addition, Louisville and Wisconsin require certain sources to conduct facilitywide risk assessments as part of the permitting process.[32]

In contrast, several state and local officials said that EPA's program has not focused on the greatest risks. While EPA may have been driven by certain deadlines in the act, some state and local officials said that the agency has chosen to focus on certain large stationary sources even though EPA's data suggest that emissions from small stationary sources and mobile sources may pose greater risks. Further, EPA is currently developing a rule that would exempt MACT-regulated facilities from regulation under its residual risk program if, on the basis of risk assessments, the facilities demonstrate that the cumulative risks from all of their toxic emissions do not exceed certain thresholds. According to EPA, this strategy could achieve voluntary risk reductions from facilities

[32]New Jersey may also require some sources to conduct facilitywide risk assessments as part of the permitting process, but this is not a routine practice, according to a New Jersey program official.

that would not be required to reduce risks under the current residual risk program and will provide high-quality, site-specific emissions data for use in future assessments and emission reduction strategies. While this approach has the potential to ease the regulatory burden on low-risk facilities, EPA may have opportunities to apply its limited resources to approaches that have greater potential to reduce risks.

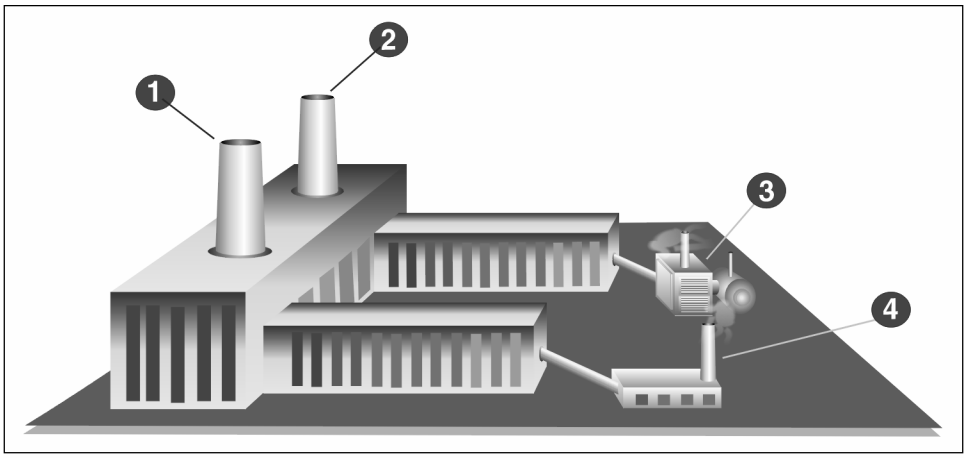
Several of the Programs We Reviewed Conduct More Comprehensive Facilitywide Risk Assessments Than EPA

Several state and local programs we reviewed generally evaluate the emissions from all of the emissions points within a facility in a single risk assessment in order to assess the health risks associated with the entire facility. In contrast, EPA's residual risk assessments—aimed at identifying and mitigating any remaining health risk from emissions sources subject to MACT standards—have only evaluated risk from a portion of the facilities. Specifically, to date, EPA has limited the scope of its residual risk determinations to emissions points within facilities that must comply with the MACT standards at issue, although other emissions points may also emit air toxics.[33] As a result, according to several state and local officials, some facilities with a high impact on public health may avoid additional control requirements because EPA's focus on limited portions of facilities may underestimate the risk posed by whole facilities.

Figure 3 illustrates a facility emitting air toxics from four emission points. Of the four emission points within the facility, points 1 and 2 are each covered by different MACT standards and, therefore, are subject to separate residual risk assessments. Emission points 3 and 4 emit air toxics, but are not subject to MACT standards, because emissions from these two points do not exceed the MACT threshold.

[33]The preamble to EPA's first final residual risk rule, the National Emission Standards for Coke Oven Batteries, 70 Fed. Reg. 19991, 19998 (Apr. 15, 2005), articulates the agency's approach for evaluating remaining health risks from facilities regulated by MACT standards. EPA relied on this approach in its five final residual risk rules to date.

Figure 3: Emission Points at an Industrial Facility Emitting Air Toxics



Source: GAO.

The programs we reviewed in California, Wisconsin, and Louisville would generally evaluate the emissions from all of the emissions points in this facility in a single risk assessment.[34] In contrast, EPA's approach to date would be to conduct a residual risk assessment for emission point 1 that would consider the exposure and human health risk attributable to emissions from that emission point, and generally would not consider the emissions from point 2, which falls under a different MACT standard, or the emissions from points 3 and 4. According to EPA, it is not entirely precluded from considering emissions from additional emissions points not covered by the MACT standards at issue, but the agency, to date, has not exercised this discretion in a final rule.

Several state and local stakeholders said that they were concerned that EPA's risk assessments may show a lower level of risk to the public than if the agency considered emissions from all of the emission points at the facility. They said that EPA's residual risk approach may exclude some facilities with a high impact on public health from more stringent control requirements. Several officials said it would make more sense, from a

[34]According to New Jersey officials, the program in that state does not routinely require sources to conduct facilitywide risk assessments. However, New Jersey's program may evaluate emissions from all emission points in a facility in a single risk assessment in situations where there is the potential for high risk.

public health perspective, to consider the impact from all sources at the facility at once, as some states do, rather than review each emission point individually. Along these lines, several EPA officials said that evaluating all of the emissions from a facility simultaneously would enhance the efficiency of the program and better protect public health.

Several Programs Have Systematic Approaches to Identify and Prioritize Air Toxics

Several of the state programs we reviewed use systematic approaches to identify and prioritize chemicals for addition to their air toxics lists. In contrast, EPA has not acted on the requirement to periodically review and revise the list of regulated federal air toxics.[35] For example, California officials work with the state's public health agency to determine if a substance qualifies as a state air toxic. This process includes assessing (1) the potential for human exposure to a substance, (2) the chemical's cancer-causing potential, (3) any noncancer effects such as irritation of the lungs or nausea, and (4) the impact on children's health, among other factors. A panel of scientific experts reviews the work for accuracy, followed by the formal development of a regulation, including a public hearing. Similarly, Oregon works with a committee composed of toxicology, public health, and technical experts to periodically identify air toxics for review and to develop health-based emission benchmarks. The committee prioritizes air toxics for review based on Oregon's emission inventory, the pollutant's toxicity or potency, the number of people at risk, and the impact on sensitive populations such as children, among other factors spelled out in state regulations. The systematic approaches of these programs could inform EPA's efforts to meet the act's requirement to review and update the federal list of regulated air toxics.

The Programs We Reviewed Stressed the Importance of Data on Emissions and Toxicology

Several of the state and local programs we reviewed require major and small stationary sources to submit standardized annual emissions reports and certify their accuracy. These programs, like EPA, rely on emissions inventory data to develop regulations and conduct risk assessments. For example, Wisconsin requires over 2,000 facilities to report emissions of 623 air toxics each year if the facility emits more than certain quantities of each pollutant. Facilities must certify the accuracy of their final submissions. The air toxics program in California similarly requires certain major and small stationary sources to report air toxics emissions of over 450 chemicals and to certify that the data are correct. New Jersey and

[35]As noted above, about 300 chemicals enter commerce each year.

Louisville have similar requirements for a smaller subset of air toxics and sources.

In contrast to the programs that require sources to report and certify their emissions, EPA, to date, generally has not required emissions sources or state or local agencies to systematically report these data.[36] Such data collection could enhance EPA's analysis and decision making in future air toxics rule makings. However, it is not clear how states without air toxics emissions inventories would comply with a federal requirement or the extent to which the data collected from the states would be comparable. For example, in 2002, EPA solicited comments on a rule to require state and local agencies to submit standardized air toxics emissions inventory data but the agency postponed consideration of the requirements partly due to concerns raised by state and local agencies about the lack of detail in EPA's proposal.[37] EPA officials also told us that they had concerns over whether there is adequate statutory authority to collect these data.

Officials representing the state and local programs we spoke with expressed mixed opinions about a potential EPA requirement to submit standardized air toxics emissions inventories. For example, officials in the states we reviewed except California supported a federal requirement to report air toxics emissions because it would improve the consistency of the federal inventory and its usefulness to states in activities such as risk assessment modeling. In addition, some state officials said that a federal requirement would enable states that are prohibited from having their own programs to collect information on emissions of air toxics. However, several officials cautioned that some programs would have difficulty meeting such a requirement without additional funding. California officials said that EPA should focus on states that do not currently have an inventory.

[36]For fiscal year 2006, EPA Region 4 included a grant commitment for the Louisville Metro Air Pollution Control District to submit its air toxics emission inventory as part of an air planning agreement to obtain federal funding for the local air program. EPA officials said that the agency's fiscal year 2007 grant guidance for state and local agencies does not require the submission of air toxics emissions inventories as a condition to obtain federal funding.

[37]EPA, in its Consolidated Emissions Reporting Rule, 67 Fed. Reg. 39602, 39604 (June 10, 2002), agreed with commenters and stated that it planned to develop air toxics reporting measures at a later date.

In addition, state and local officials said that EPA does not regularly update chemical toxicity values that describe the potency of different air toxics—key information for conducting risk assessments. These officials told us that their agencies generally do not have the resources to develop quantitative risk estimates for air toxics and must rely on other sources of data, such as EPA's Integrated Risk Information System (IRIS). According to several officials, the basic science necessary to develop air toxics regulations is lacking in many cases. For example, Oregon officials cited limited and out-of-date toxicity values for a number of common chemicals in the IRIS database. Officials from other programs expressed similar concerns and said that EPA needed to enhance its efforts to provide quantitative toxicity information and conduct studies of sufficient quality to make determinations about chemical toxicity. A 2004 report by the National Academies also identified the need for more timely updates to EPA's IRIS database. In addition, California officials pointed out that EPA does not have a cancer toxicity value for diesel particulate matter, so some states have developed a patchwork of different toxicity values. Further, state and local officials questioned EPA's use of a formaldehyde risk factor developed by an industry group instead of its peer-reviewed IRIS value when developing a recent MACT standard for plywood and composite wood products.[38] Several officials were concerned that the deviation from IRIS would cause confusion about what toxicology data were most accurate for state and local requirements.

Conclusions

EPA has made some progress in controlling emissions of air toxics, but its overall implementation of the air toxics program falls short of the agency's statutory obligations because of the limited progress in (1) addressing requirements to limit emissions from small stationary sources and mobile sources, (2) evaluating the residual health risks associated with existing emissions standards and setting additional standards as appropriate, and (3) reviewing and updating the list of regulated pollutants, as appropriate. While EPA places a lower priority on air toxics than other programs that it believes have a greater potential to reduce adverse health effects from air pollution, more comprehensive information on the air toxics program's costs and benefits would help the agency compare the cost effectiveness of its investments in various clean air programs. Key data issues affecting the agency's ability to develop more comprehensive cost and benefit

[38]National Emission Standards for Hazardous Air Pollutants: Plywood and Composite Wood Products, 71 Fed. Reg. 8342 (Feb. 16, 2006).

estimates include unreliable data on emissions and limited information on the extent to which changes in exposure to air toxics affect the incidence of adverse health effects. Until EPA supports efforts to address these data gaps that hinder its ability to evaluate the health risks of air toxics, the agency will not have assurance that its current priorities and programs necessarily target the areas of greatest opportunity for reducing health risks associated with air pollution.

EPA still has a significant number of remaining requirements under the act, including (1) setting 54 emissions standards for small stationary sources; (2) conducting more than 90 reviews of the remaining health risks associated with emissions sources covered by its existing standards, and issuing additional standards as necessary; and (3) reviewing and updating, as appropriate, the list of regulated air toxics. Over the past 15 years, the air toxics program has not met its statutory deadlines, in part, because of its low priority relative to other programs and related funding constraints. Obtaining sufficient funding will continue to pose a challenge for EPA, especially in light of the nation's current fiscal situation. We believe that developing an implementation plan that identifies the remaining tasks, data needed to estimate the benefits of reductions in exposure to air toxics, timelines, and required funding would improve the management of the program as well as its transparency and accountability to Congress and the public. In addition, EPA could examine state and local approaches to air toxics that may have the potential to more effectively address risks by focusing resources on sources, communities, and geographic areas that face the greatest risks. This would require EPA to evaluate opportunities to enhance its efforts to focus on the greatest risks to human health within the current legislative framework.

Recommendations for Executive Action

To improve the management of EPA's air toxics program and enhance its ability to reduce risks of cancer and other adverse health effects, we recommend that the EPA Administrator require the Assistant Administrator for Air and Radiation to develop an air toxics program improvement plan that incorporates the following five issues:

- provides a detailed schedule for completing its mandated air toxics activities and identifies the staffing and funding resources needed to meet the schedule and address the health risk assessment needs;
- prioritizes activities within the air toxics program, placing the highest priority on those actions that have the greatest potential to address health risks, to the extent permitted by the Clean Air Act;

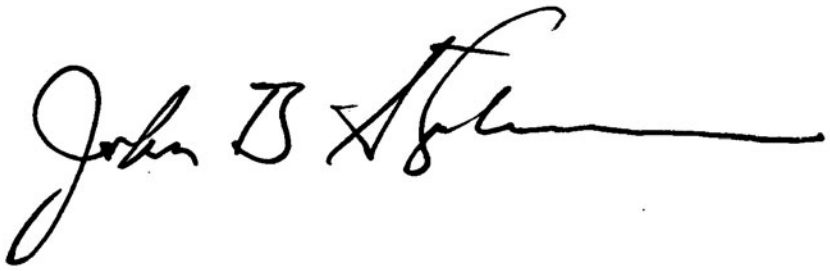
- establishes a process and timelines for meeting the act's requirements to periodically review and update the list of air toxics;
- outlines an approach and timelines for improving the agency's ability to measure the program's costs and benefits; and
- describes how the agency plans to improve its air toxics emissions inventory, including a discussion of the statutory authority for, and the merits of, requiring states and emissions sources to submit standardized emissions data.

Agency Comments

We provided EPA's Office of Air and Radiation with a copy of this report for review and comment. In commenting on the report, the Acting Assistant Administrator for Air and Radiation said that EPA agrees in part with the conclusions and recommendations in the report. The agency did not identify specific aspects of our conclusions or recommendations with which it disagreed, but rather provided only clarifications to statements in the report regarding the availability of information on the costs and benefits of the agency's efforts to control air toxics, the agency's progress in completing certain air toxics requirements of the Clean Air Act, and on EPA's management of the remaining requirements. EPA's letter and our response to their clarifications are included as appendix IV. EPA also provided technical comments, which we have incorporated, as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the EPA Administrator and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or stephensonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix V.



John B. Stephenson
Director, Natural Resources and Environment

List of Congressional Requesters

The Honorable James M. Jeffords
Ranking Minority Member
Committee on Environment and Public Works
United States Senate

The Honorable Lincoln Chafee
Chairman
Subcommittee on Fisheries, Wildlife and Water
Committee on Environment and Public Works
United States Senate

The Honorable Barbara Boxer
Ranking Minority Member
Subcommittee on Superfund and Waste Management
Committee on Environment and Public Works
United States Senate

The Honorable Thomas R. Carper
Ranking Minority Member
Subcommittee on Clean Air, Climate Change, and Nuclear Safety
Committee on Environment and Public Works
United States Senate

The Honorable Hillary Rodham Clinton
United States Senate

The Honorable Patrick J. Leahy
United States Senate

The Honorable Joseph I. Lieberman
United States Senate

The Honorably Paul Sarbanes
United States Senate

The Honorable Olympia J. Snowe
United States Senate

The Honorable John D. Dingell
Ranking Minority Member
Committee on Energy and Commerce
House of Representatives

The Honorable Tom Allen
House of Representatives

The Honorable Lois Capps
House of Representatives

The Honorable Edward J. Markey
House of Representatives

The Honorable Hilda L. Solis
House of Representatives

The Honorable Henry A. Waxman
House of Representatives

Appendix I: Status of EPA's Efforts to Respond to Recommendations in the National Academies' Report on Air Quality

This appendix discusses the Environmental Protection Agency's (EPA) response to the findings and recommendations of the National Academies' (Academies) report on air quality management. The Academies prepared this report in response to a congressional request for an independent evaluation of the effectiveness and implementation of the Clean Air Act. The report examined the roles of science and technology in the implementation of the act and recommended ways to improve air quality management. One of the report's key recommendations was for EPA to form a work group to evaluate the report and provide a detailed list of actions EPA could take to improve its implementation of clean air programs. The work group completed this review in December 2004 and provided the agency's Clean Air Act Advisory Committee with a list of 38 recommendations.

EPA's Office of Policy Analysis and Review has taken the lead in responding to the recommendations and provided an initial response in April 2005, which was updated in November 2005.[1] The response included information about ongoing and proposed activities to address the recommendations and estimated time frames for responding to each recommendation. The agency has prioritized the recommendations and developed a proposed schedule for completing its activities, with some actions already under way or completed and others not scheduled for completion until fiscal year 2008. Based on our review of available documents and discussions with EPA program managers, the agency has taken affirmative steps to respond to a number of the recommendations, and its proposed actions generally appear responsive to the Academies' findings. A comprehensive evaluation of EPA's response to the Academies' recommendations will not be possible until the agency has made further progress in implementing its proposed response actions.

[1]Environmental Protection Agency, *Compilation of Status Reports on the Implementation of Recommendations Made to EPA by the CAAAC on Air Quality Management* (Washington, D.C., November 2005)

Appendix II: Objectives, Scope, and Methodology

We were asked to assess (1) EPA's progress toward implementing the air toxics program and any implementation challenges the agency faces, (2) what available information indicates about the costs and benefits of EPA's efforts to control air toxics, and (3) the program design and management practices of state and local air toxics programs that could potentially help EPA enhance the effectiveness of the federal program. In addition, we were asked to assess EPA's progress in responding to recommendations pertaining to the air toxics program made by the National Academies in 2004.

To respond to the first objective, we updated our previous analysis of the agency's progress in implementing program requirements. We reviewed the requirements of the Clean Air Act Amendments of 1990 and EPA's actions to respond to these requirements, including the number of regulations the agency promulgated and other requirements to issue reports and guidance. Specifically, we considered EPA's Maximum Achievable Control Technology (MACT), small stationary source, mobile source, residual risk, and technology review activities, and other activities in the act that were specifically related to air toxics.

We also evaluated the timeliness of EPA's actions versus the schedule mandated by the act by comparing the dates specified in the act with the dates on which EPA published the rules in the Federal Register. We independently developed a list of actions required by EPA and worked with agency officials to refine and confirm the list we used. We made minor modifications to the list approved by EPA to account for the promulgation of residual risk and area source standards, to separately count area source standards issued in conjunction with MACT standards, and to delete source categories that were delisted.

To determine the priority of the air toxics program relative to other air programs, and the priorities within the air toxics program, we met with senior air program officials and analyzed budget data submitted by EPA. Specifically, we compared the funding for EPA's air program as a whole with the funding for the air toxics program.

To identify the implementation challenges EPA faces, we reviewed available studies by the National Academies, the Office of Management and Budget (OMB), and the EPA Inspector General. We identified nine implementation challenges, such as the adequacy of program funding and the priority of the program relative to other air programs, and developed a structured interview in order to evaluate the magnitude of the challenges identified by these studies in the opinions of various stakeholders. We

pretested the interview questions and made relevant changes to the questions based on the pretest.

We designed the structured interview so that respondents could rate each implementation challenge on a scale from 0 (not a challenge at all) to 4 (a challenge to a very great extent). When conducting the interviews, we asked followup questions if the respondents rated the challenge as a 3 (a challenge to a large extent) or 4, such as what they thought could be done to address the challenge. We also provided a list of key definitions, an explanation of the rating system, and a description of each challenge to respondents prior to conducting each interview.

We conducted structured interviews with a nonprobability sample[1] of 22 officials, including 8 EPA, 5 industry, 4 environmental, and 5 state and local officials. Specifically, for EPA, we interviewed senior officials within the Office of Air Quality Planning and Standards and the Office of Transportation and Air Quality. We identified national-level environmental and industry stakeholders through consultation with EPA (and referrals from contacts identified through this consultation) and membership on the Clean Air Act Advisory Committee. The five industry groups we interviewed were the American Forest & Paper Association, the American Petroleum Institute, the Council of Industrial Boiler Owners, the American Chemistry Council, and the Alliance of Automobile Manufacturers. The four environmental groups we interviewed were the Natural Resources Defense Council, Environmental Defense, Earth Justice, and an air toxics consultant recommended by environmental stakeholders and EPA. We interviewed officials from state and local programs in California, New Jersey, Oregon, Wisconsin, and Louisville, Kentucky.

Following the structured interviews, we determined the most significant challenges for all of the stakeholders by averaging the ratings from all 22 respondents for each challenge. However, because ratings of the most significant challenges differed for each stakeholder group, we also averaged the scores for each challenge for each stakeholder group. We identified the greatest challenges identified by each stakeholder group (an average rating of 3 or higher, or those rated as challenges to a large or very

[1]Results from nonprobability samples cannot be used to make inferences about a population, because in a nonprobability sample, some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

great extent) to assess how perceptions of the challenges differed among the stakeholder groups.

To respond to the second objective, we analyzed available information on the economic impacts of the program, as well as data on trends in emissions, health risks, and compliance. Regarding data on economic impacts, we reviewed EPA's 1997 and 1999 reports to Congress on the economic impacts of the Clean Air Act as well as the agency's guidance for analyzing the effects of air pollution regulations. We also met with EPA staff in the Office of Air Quality Planning and Standards and Office of Policy Analysis and Review responsible for analyzing the economic effects of clean air regulations. Regarding emissions and monitoring data, we met with EPA staff responsible for maintaining the National Emissions Inventory, reviewed the agency's documentation and plans for improving the inventory, and reviewed relevant reports by EPA's Inspector General. Regarding data on health and risks, we met with EPA staff responsible for risk assessment and the development of the National-Scale Air Toxics Assessment. We also reviewed EPA's methodology for developing the assessment and available information on the risk assessment process. We obtained compliance data from the Office of Enforcement and Compliance Assurance's Air Facility Subsystem. We reviewed these data for obvious completeness and consistency problems, reviewed available documentation, and interviewed the system administrator. Unless otherwise noted, we determined the data were sufficiently reliable for the purposes of this report.

To respond to the third objective, we reviewed a nonprobability sample of air toxics programs from California, New Jersey, Oregon, and Wisconsin and from Louisville, Kentucky to identify innovative program designs or management practices. We focused on programs that (1) went beyond federal standards, (2) were identified by EPA and other stakeholders as innovative programs, (3) used strategies to address air toxics that differed from those used by EPA, and (4) represented a range of geographic locations and experience addressing air toxics. Specifically, we asked EPA and the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO), the stakeholders most knowledgeable about state and local air toxics programs, whether there were specific programs we should review, and used their recommendations as selection criteria. GAO conducted independent research to confirm that the selections cited by these stakeholders were reasonable, including analyses of the stringency of state and local air toxics programs based on current law, policy, and guidance

documents and summary documents developed by EPA and state and local agencies.

We visited each program selected for review and conducted semistructured interviews with state and local officials. We developed an interview protocol and revised it after limited testing with respondents. The semistructured interview included questions about how the programs interact with EPA, how the program views EPA's current and future requirements, regulate different chemicals and sources, account for risk, collect emissions inventory data, and measure progress, among other factors. We focused primarily on practices that EPA might find useful in addressing its program implementation challenges and did not evaluate the effectiveness of the state and local programs we reviewed. Our discussion of the practices employed by these programs should not be construed as an endorsement of any particular approach but rather as an acknowledgement that alternative strategies exist.

In addition, we obtained information about EPA's response to the recommendations of the National Academies' 2004 report entitled *Air Quality Management in the United States*. We reviewed the recommendations in the report, the associated recommendations of the Clean Air Act Advisory Committee, and EPA's actions to respond to these recommendations. We worked with EPA officials to determine whether EPA's actions addressed the recommendations. Our work included an assessment of data reliability and internal controls. We conducted our work from June 2005 to June 2006 in accordance with generally accepted government auditing standards.

Appendix III: Profiles of State and Local Air Toxics Programs

This appendix provides general information on the nonprobability sample of four state and one local air toxics programs we reviewed to identify innovative program designs or management practices. We focused on programs that (1) went beyond federal standards, (2) were identified as innovative by EPA and other stakeholders, (3) used strategies to address air toxics that differ from EPA's, and (4) represented a range of geographic locations and experience addressing air toxics. Table 12 presents basic information about the programs we reviewed, followed by profiles of each program.

Table 12: Selected State and Local Air Toxics Programs

Program	Date created	Number of chemicals	Strategy	Description
State				
California	1983	245	Control technology	Requires certain large and small stationary sources to apply control technologies to reduce emissions.
	1987	451	Risk assessment	Requires certain large and small stationary sources to report emissions of air toxics, estimate the public health impact of their emissions, and reduce emissions as necessary to meet health-based standards.
New Jersey	1979	237	Control technology and risk assessment	Requires certain facilities seeking permits to apply air toxics emission control technology, estimate the risk posed by the remaining emissions, and take additional measures as necessary to meet health-based targets.
Oregon[a]	2003	49[b]	Geographic, control technology, and risk assessment	Requires facilities in specific geographic areas of high risk to develop, with other stakeholders, a risk reduction plan to meet health-based benchmarks. In addition, some stationary sources may be required to apply control technologies and estimate and mitigate the risk they pose to the public.
Wisconsin	1988	535	Control technology and risk assessment	Requires certain facilities that emit specific amounts of cancer-causing air toxics to apply control technology to reduce emissions. Certain facilities that emit specific amounts of other air toxics must estimate the risks posed by these chemicals and meet health based standards.
Local				
Louisville, Kentucky	2005	191	Risk assessment	Requires certain facilities seeking permits to construct or modify processes or equipment to estimate the risk posed by their air toxics emissions and to reduce the risk, potentially through the application of control technologies, to meet certain health-based goals. Certain existing facilities must meet similar requirements for 37 chemicals.

Source: GAO analysis of state and local agency data.

[a]Oregon's program is still being developed and has not been fully implemented. This description presents the requirements as spelled out in the 2003 state rule that created the program.

[b]The Oregon Department of Environmental Quality proposed to adopt benchmarks for 49 air toxics in February 2006. The benchmarks were not final as of the date of this report.

California

California's air toxics program regulates certain new and existing major stationary sources, small stationary sources, and mobile sources more stringently than EPA. In 1983, the state legislature adopted Assembly Bill 1807, the Toxic Air Contaminant Identification and Control Act, which defined a process for identifying chemicals that qualify as state air toxics and developing control standards to reduce emissions from certain sources based on the application of pollution control technology. California has listed 245 toxic air contaminants as of May 2006. The state regulates diesel particulate matter emissions from motor vehicles, such as school buses, under its program.

In 1987, the state legislature passed an additional law, Assembly Bill 2588, the Air Toxics "Hot Spots" Information and Assessment Act, which required the submission of air toxics emissions inventory data from certain facilities and notification of local residents of significant risk from nearby sources of air toxics. Under this act, certain sources of air toxics must conduct risk assessments to determine their health impact on the community. In conducting these risk assessments, regulated facilities must consider the risks posed by their emissions of 451 different chemicals.[1] In 1992, the legislature passed an amendment to the "hot spots" law that required facilities that pose a significant health risk to the community to develop risk management plans. Policy documents and other information are available at the program's Web site http://www.arb.ca.gov/toxics/toxics.htm.

New Jersey

New Jersey's air toxics program regulates certain large and small stationary sources more stringently than EPA through the state's permitting program. The New Jersey Air Pollution Control Act of 1954 requires new or modified sources that emit air pollutants, including air toxics, to incorporate state-of-the-art air pollution controls to reduce their

[1]California requires certain facilities to quantify and report emissions of 451 chemicals as part of its risk assessment program. In 2006, the state may consider the addition of several hundred chemicals to the list of chemicals reported and used in risk assessments. Some facilities are also required to report the use or manufacture of 310 additional chemicals for a potential total of 761 chemicals, but these chemicals are not currently considered in risk assessments.

emissions. In 1979, the New Jersey Department of Environmental Protection (DEP) adopted a regulation that specifically addressed air toxics emissions. This rule listed 11 air toxics and required sources emitting these chemicals to register with DEP and demonstrate that they utilize state-of-the-art controls to limit their emissions. The department incorporates control requirements for other air toxics on a case-by-case basis as part of the permitting process. In the early 1980s, the DEP instituted a risk assessment policy to better ensure that sources with state-of-the-art controls protect public health. The risk assessment policy requires certain facilities seeking permits to estimate the risk to the community that remains after the application of technology standards and to take additional measures as necessary to meet health-based targets established for 237 air toxics. General information about New Jersey's air toxics program is available at http://www.state.nj.us/dep/airmon/airtoxics/, and policy documents, such as risk assessment policies are available at http://www.state.nj.us/dep/aqpp/risk.html.

Oregon

Oregon's air toxics program is authorized to go beyond federal requirements for some large and small stationary sources. In November 1998, the Oregon Department of Environmental Quality (DEQ) convened a broad-based stakeholder group to outline a program to complement the existing federal program and reduce the impact of air toxics in Oregon. DEQ worked with stakeholders until the adoption of Oregon's air toxics rule on October 9, 2003. The rule requires sources in specific geographic areas of high risk to develop, with other stakeholders, a risk reduction plan to meet certain health based goals.[2] In addition, some stationary sources may be required to estimate and mitigate the risk they pose to the public and apply control technologies. The program is still being developed and has not been fully implemented. Policy and guidance documents and other information are available at the program's Web site http://www.deq.state.or.us/aq/hap/index.htm.

Wisconsin

Wisconsin's air toxics program regulates certain new and existing stationary sources more stringently than EPA. In 1983, the Wisconsin Department of Natural Resources (DNR) formed a group of scientists,

[2]The Oregon Department of Environmental Quality proposed to adopt benchmarks for 49 air toxics in February 2006. The benchmarks were not final as of the issue date of this report.

industry, environmental, and government stakeholders in response to public concern about the health effects of air toxics and the lack of policy and regulations at the federal level. The group recommended an approach for a state air toxics rule in 1985, and DNR developed a rule that became effective in 1988. This original rule was rewritten and redeveloped from 2000 through 2004 using an advisory committee process that included government, industry, and environmental stakeholders. The final rule became effective in July 2004. The rule lists 535 air toxics and requires certain facilities that emit specific amounts of cancer-causing air toxics to apply control technology to reduce emissions. In addition, certain facilities that emit other air toxics beyond specific thresholds must estimate the risks posed by these chemicals and meet health-based standards.[3] Guidance documents and other information are available on the program's Web site, http://www.dnr.state.wi.us/org/aw/air/health/airtoxics/.

Louisville, Kentucky

In September 2004, the Louisville Metro Air Pollution Control District prepared a draft Strategic Toxic Air Reduction (STAR) program in response to air monitoring that documented and modeled data that suggested that air toxics posed significant risks to the community. Adopted by the Louisville Metro Air Pollution Control Board in June 2005, the STAR program requires certain facilities to estimate the risk posed by their air toxics emissions and to reduce the risk, potentially through the application of control technologies, to meet certain health-based goals. Louisville's program first focuses on emissions of 18 air toxics that posed unacceptable risk to the public based on monitoring studies. In total, the STAR program applies to new or modified processes and process equipment that will emit any of 191 air toxics, and existing sources that emitted any of 37 air toxics in quantities that exceed certain thresholds. Policy documents and other information are available on the program's Web site, http://www.apcd.org/star/.

[3]Wisconsin state law provides that Wisconsin's air toxics program does not apply to emissions that are regulated by federal MACT standards under section 112 of the Clean Air Act.

Appendix IV: Comments from the Environmental Protection Agency

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

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

JUN - 8 2006

OFFICE OF
AIR AND RADIATION

Mr. John B. Stephenson
Director, Natural Resources and Environment
U. S. Government Accountability Office
Washington, DC 20548

Dear Mr. Stephenson:

The U. S. Environmental Protection Agency (EPA) appreciates the opportunity to review and comment on the Government Accountability Office (GAO) report, "Clean Air Act: EPA Should Improve the Management of Its Air Toxics Program" (GAO-06-669). EPA agrees in part with the conclusions and recommendations in the report and would like to provide clarification on several statements in the report.

"Available information on the costs and benefits of EPA's efforts to control air toxics is not sufficiently comprehensive to measure the total economic impacts resulting from the air toxics program."

See comment 1.

Realizing the limitations of a chemical-by-chemical decision framework based solely on risk, the 1990 Clean Air Act Amendments mandated a different, two-phased approach. In the first phase, EPA develops technology-based standards, requiring sources to meet specific emissions limits that are based on emissions levels already being achieved by many similar sources in the country. In the second phase, EPA applies a risk-based approach to assess how these technology-based emissions limits are reducing health and environmental risks, and EPA may implement additional standards to address any significant remaining risk (or "residual risk").

In February 2004, EPA completed the issuance of the technology-based standards for categories of industries that emit toxic emissions at major-source levels. In total, EPA issued 96 standards (known as Maximum Achievable Control Technology or MACT) standards covering 174 industrial operations. When all of these industry categories come into full compliance in 2007, these MACT standards will cut annual air toxics emissions by an estimated 1.7 million tons. Implementation of these standards results in significant reductions of volatile organic compounds (VOCs) and particulate matter (PM) which carry benefits with well-established means of quantification; quantification of the health benefits of reducing air toxics (e.g., reduced cancer risks and incidence, reduced risks of acute and chronic noncancer health effects) is more problematic.

Since completing the MACT standards, EPA has assessed the health risks associated with 8 of those standards and concluded that 4 of the standards present no significant known health risks that would warrant making them more stringent. For the other 4 standards, we have proposed or will propose more stringent standards to reduce health risks in order to provide public health protection with an ample margin of safety. Each of these proposed actions will reduce air toxics exposures and levels of individual cancer or other health risks for people living near the affected facilities. We are still developing ways of specifically quantifying these benefits. However, the two-step approach embodied in the 1990 Clean Air Act Amendments allows EPA to focus risk assessment and benefits analysis efforts on the smaller number of key HAPs posing potentially significant residual risks. EPA believes this more focused approach will provide better support to future air toxics rulemaking decisions than would the comprehensive assessment of the total benefits and costs of all air toxics controls referenced in GAO's comment.

"EPA has made little progress and is behind schedule in completing residual risk and technology reviews and in issuing emissions standards for small stationary and mobile sources."

See comment 2.

In several places, the GAO report refers to this "limited progress" in implementing mobile source requirements and in reducing mobile source emissions and risks. In fact, we estimate a 57% reduction in emissions of mobile source air toxics between 1990 and 2007. Since actions that address mobile source air toxics resulted in additional reductions prior to 1990, this is actually an underestimate of the overall reduction from EPA programs. These dramatic reductions will continue in the future, with a 60% reduction between 1999 and 2020. (See Attachment 1 for the contribution of source categories to air toxics emissions, 1990-2020, not including diesel particulate matter.) For diesel particulate matter emissions specifically, we expect a 70% reduction between 1999 and 2020.[1] These emission reductions, and the large number of standards EPA has promulgated since 1990 for many different mobile sources of toxics emissions, illustrate that EPA has in fact made significant progress in reducing mobile source air toxics.

The limited progress cited in the GAO report appears to use a measure of progress based on the number of actions taken under Clean Air Act section 202(l), which is the provision that specifically applies to motor vehicle air toxics. We believe that this is an inappropriately narrow measure of progress. EPA controls mobile source air toxics in the broader context of motor vehicle, nonroad engine and fuel standards, regardless of whether they are issued under 202(l) specifically. This is often done through standards which reduce hydrocarbons and particulate matter, because such standards also reduce air toxics.

The Clean Air Act itself recognizes that mobile source toxics control is achieved in the broader context of motor vehicle and fuel standards, regardless of whether they are issued under 202(l) specifically. For example, Clean Air Act section 202(l) recognizes

[1] 71 FR 15832-15833, March 29, 2006

See comment 3.

that mobile source air toxics are controlled under the broader authority of 202(a) and 211(c), which refer to standards for vehicles and fuels. It requires EPA to use these authorities for the purpose of controlling air toxics, and it also requires EPA, when setting such toxics standards, to consider the standards already established under section 202(a). In addition, the specific wording of section 202(l) applies only to "motor vehicles," a term which excludes nonroad equipment. However, EPA has clearly recognized that nonroad mobile sources are an important source of mobile source air toxics and has controlled them accordingly, through authorities other than 202(l). When EPA's actions under all these authorities are considered—along with the toxics emissions reductions they produce—it is clear that EPA has made significant progress in controlling mobile source air toxics. (See attachments 2 and 3 for more details.)

"The agency lacks a comprehensive strategy for managing its implementation of the remaining air toxics requirements."

The Clean Air Act itself presents a road map for air toxics with distinct phases and specific timeframes. EPA has supplemented the statutory roadmap with more specific strategies. First, in 1999 EPA finalized the Integrated Air Toxics Strategy. This strategy fulfilled the mandate from Congress to develop a strategy for air toxics in urban areas. The strategy includes specific actions to address the large number of smaller, area sources, and contains broader risk reduction goals encompassing all stationary sources. The Integrated Air Toxics Strategy is EPA's framework for addressing air toxics in urban areas by looking at stationary, mobile, and indoor source emissions. Air toxics can pose special threats in urban areas because of the large number of people and the variety of sources of toxic air pollutants, such as cars, trucks, large factories, gasoline stations, and dry cleaners. EPA is also concerned about the impact of toxic emissions on minority and low-income communities, which are often located close to industrial and commercial urbanized areas.

Second, EPA is developing a strategy to meet the aggressive schedule established by the U.S. Court of Appeals for the D.C. Circuit. The schedule requires completion of the remaining 50 standards governing emissions from area sources by mid-2009. The Agency is evaluating available information about the source categories and exploring different ways of writing standards that could address multiple source categories in one or a relatively smaller number of rules. We are also considering alternative standards that could support a more flexible and adaptive approach to controlling emissions from certain source categories in recognition of ongoing efforts by State and local agencies to comply with their own air toxics control programs and federally-mandated programs to reduce ozone and particulate matter. Under the court-imposed deadlines, the earliest set of standards may involve control requirements for source categories about which we have the most reliable information. Categories for which we have relatively less information or where more significant control efforts may be warranted will likely be addressed in the later deadlines contained in the court schedule.

Third, EPA is developing a strategy for completing the residual risk and technology review program. EPA recognizes that there have been problems with

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completing these reviews within the statutorily-required 8-year period following promulgation of the major source standards. However, we are learning important lessons from the experiences gained in our first eight reviews. The cost of these efforts in time, staff, and contract resources, relative to results achieved, lead us to seek different ways to meet our statutory obligations and ensure the public's health is adequately protected. For this reason, we are examining a variety of options that go beyond the conventional source category, standard-specific approach to consider such things as the risk posed comprehensively by all of the emitting activities at an affected facility, and evaluating screening options to determine which industries and/or standards merit more rigorous examination. We believe this approach will allow us to more efficiently identify and address significant remaining risks posed by air toxics from stationary sources, while reducing the expenditure of resources on standards likely to pose little or no residual risk.

Once again, thank you for the opportunity to respond.

Sincerely,

for Elizabeth Craig

William L. Wehrum
Acting Assistant Administrator

Enclosures

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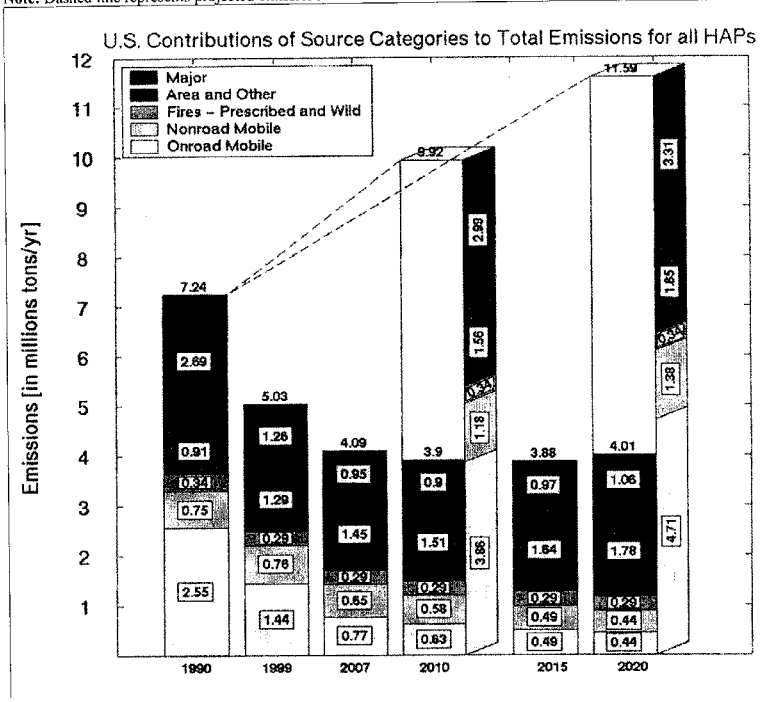
Attachment 1

Contribution of Source Categories to Air Toxic Emissions, 1990 to 2020 (not including diesel particulate matter).
Note: Dashed line represents projected emissions without Clean Air Act controls.



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Attachment 2

Current On-Highway Engine and Vehicle Programs Providing Significant Additional MSAT Reductions.

Category	Rule & FRM Date	Implementation Schedule	VOC Standards*	PM Standards
Light-duty cars and trucks	Tier 2 (including low sulfur fuel and enhanced evaporative emissions), February 10, 2000	2004 – 2009	✓	✓
	NLEV (National Low-Emitting Vehicle)	1999 – 2003	✓	✓
	SFTP (Supplemental FTP) Procedures	2001 (start)	✓	
Heavy-duty trucks	2004 Heavy-duty Rule October 6, 2000	2004 – 2007	✓	✓
	2007 Heavy-duty Rule (including low sulfur fuel), January 18, 2001	2007 - 2010	✓	✓
Urban Buses	HD Diesel Retrofit	1994 - 1998		✓
Highway motorcycles	December 2003	2006 - 2010	✓	

* Standards in various forms including HC, NMHC, NMOG, and NOx+NMHC

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Attachment 3

Current Nonroad Engine/Vehicle Programs.

Category	Rule & FRM Date	Implementation Schedule	VOC Standards*	PM Standards
Land-based diesel	Tier 2, October 23, 1998	2001-2006	✓	✓
	Tier 3, October 23, 1998	2006-2008	✓	✓
	Tier 4 (w/ low sulfur fuel) June 29, 2004	2008-2014	✓	✓
Locomotives	Tier 0, Tier 1, Tier 2 April 16, 1998	2002 – 2005	✓	✓
Marine	Spark-ignition Gasoline Engine Standards, October 4, 1996	1998 - 2006	✓	
	Diesel Engines, less than 50hp	1999 - 2005		✓
	Recreational Diesel, November 8, 2002	Starting 2006/2009	✓	✓
	Commercial Diesel, February 28, 2003	Starting 2004/2007	✓	✓
Large spark-ignition engines	Tier 1 Standards Tier 2 Standards November 8, 2002	2004 - 2007 Starting 2007	✓	
Small spark-ignition engines	Phase 1 Standards,	1997 - 2007	✓	
	Handheld Phase 2 Standards, April 25, 2000	2002 - 2007	✓	
	Non-handheld Phase 2 Standards, March 30, 1999	2001 - 2007		
Aircraft (NOx Std in 2005; Smoke Std in 1982)		No current/recent standards for VOC or PM		
Recreational vehicles	November 8, 2002	2006 - 2012	✓	

* Standards in various forms including HC, NMHC, NMOG, and NOx+NMHC

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GAO comments

1. Regarding our discussion of the economic effects of air toxics regulations, EPA stated that the agency finds it appropriate to focus risk assessments and benefits analysis on the air toxics that pose the most significant risks within the context of the residual risk program. EPA's letter also stated that such an approach would assist the rulemaking process to a greater extent than comprehensive assessments of the total benefits and costs of all air toxics controls. While EPA may hold this view, the Clean Air Act requires the agency not only to assess residual risks after completing the MACT standards, but also to periodically assess the costs and benefits of clean air programs. Regarding the first set of requirements, EPA was late in issuing almost all of the MACT standards and is already well behind schedule in completing the residual risk assessments. With respect to the second set of requirements, EPA's economic assessments of clean air programs have included limited information on the costs of regulating air toxics and have not included monetized estimates of the human health or other benefits—either for individual pollutants or for all of the pollutants in total. More complete information on costs and benefits would help the agency, Congress, and the public understand the effects of the air toxics program and enable the agency to compare the net benefits of the air toxics program with those achieved under other clean air programs on which the agency has placed a higher priority.

2. In its letter, EPA stated that GAO uses an inappropriately narrow measure of progress in regulating air toxics and that the agency has issued a number of regulations that control air toxics as a side benefit. However, as we discuss in the report, data limitations compromise the usefulness of other performance measures. EPA has indeed taken regulatory actions outside of the air toxics program that control toxic emissions as a side benefit. However, the progress—in terms of emissions reductions—that EPA cites should be considered in the context of the limitations of the emissions data discussed in this report. For example, the EPA Inspector General has reported that EPA cannot tell whether apparent reductions or increases in emissions have resulted from changes in the way the agency estimates emissions or from actual reductions. It is also important to note that EPA does not expect some of the emissions reductions cited in its letter to occur until 2020. Furthermore, EPA's most recent data on risks from air toxics identifies benzene—a known carcinogen emitted primarily by mobile sources—as a national risk driver that accounts for 25 percent of the cancer risks posed by air toxics across the nation. This suggests that EPA has substantial opportunities to further address air toxics risks from mobile sources. Finally, the Clean Air Act mandated specific

actions and timelines for evaluating and regulating toxic emissions from mobile sources. As discussed in this report, the agency has missed its deadlines for completing these actions but has proposed a mobile source air toxics rule that it intends to finalize in 2007.

3. In response to our finding that EPA lacks a strategy for managing its implementation of the remaining air toxics requirements, the agency's letter stated that the Clean Air Act provides a road map for air toxics and that EPA developed an integrated air toxics strategy in 1999. EPA also stated that the agency is developing a strategy to respond to its court-ordered deadlines for completing certain air toxics requirements. As discussed in the report, EPA has missed most of the act's deadlines related to air toxics and has not fully implemented the actions outlined in its integrated strategy. Additionally, EPA's discussion of its efforts to meet court-ordered deadlines underscores the need for more proactive management.

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

John B. Stephenson, (202) 512-3841 or stephensonj@gao.gov

Staff Acknowledgments

In addition to the contact named above, Christine Fishkin (Assistant Director), Jennifer Dougherty, Cindy Gilbert, Tim Guinane, Michael Hix, Andrew Huddleston, Karen Keegan, Alison O'Neill, Judy Pagano, Melissa Saddler, and Joseph Thompson made significant contributions to this report.

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