ENVIRONMENTAL PROTECTION AGENCY

[FRL–6376–7; Docket No. A–97–44]

National Air Toxics Program: The Integrated Urban Strategy

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: This document provides an overview of EPA's national effort to reduce air toxics, including stationary and mobile source standards, cumulative risk initiatives, assessment approaches, and education and outreach. This national air toxics program includes activities under multiple Clean Air Act (Act) authorities to reduce air toxics emissions from all sources, including major industrial sources, smaller stationary sources, and mobile sources such as cars and trucks. By integrating activities under different parts of the Act, EPA can better address cumulative public health risks and adverse environmental impacts posed by exposures to multiple air toxics in areas where the emissions and risks are most significant.

In addition, this document describes a new major component of our national effort, the Integrated Urban Air Toxics Strategy (Strategy) developed under the authority of sections 112(k) and 112(c)(3) of the Act. The Strategy reflects the public comments received on the draft Strategy, which was published on September 14, 1998 (63 FR 49240).

The Strategy includes a description of risk reduction goals; a list of 33 hazardous air pollutants (HAPs) judged to pose the greatest potential threat to public health in the largest number of urban areas, including 30 HAPs specifically identified as being emitted from smaller industrial sources known as ''area'' sources; and a list of area source categories which emit a substantial portion of these HAPs, and which are being considered for regulation under section 112(d). Because mobile sources are an important contributor to the urban air toxics problem, the Strategy also describes actions under Title II (including section 202(l)) of the Act to reduce toxics from these sources, including those which address diesel particulate matter (PM).

The Strategy by itself doesn't automatically result in regulation or control of emissions. The EPA will perform further analyses of HAP emissions, control methods, and health impacts, as appropriate, for stationary and mobile sources. These analyses will inform any ultimate regulatory requirements that EPA develops under the Strategy.

ADDRESSES: A docket containing information relating to the development of this notice (Docket No. A–97–44) is available for public inspection and copying between 8:00 a.m. and 5:30 p.m., Monday through Friday except for Federal holidays, in the Air and Radiation Docket and Information Center (MC–6102), Room M–1500, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; telephone (202) 260–7548. The docket office may charge a reasonable fee for copying.

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SUPPLEMENTARY INFORMATION:

Plain Language

In compliance with President Clinton's June 1, 1998 Executive Memorandum on Plain Language in Government Writing, this package is written using plain language. Thus, the use of ''we'' in this package refers to EPA. The use of ''you'' refers to the reader and may include State, local or Tribal government agencies, industry, environmental groups, or other interested individuals.

Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4,1993), the Agency must determine whether a regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines ''significant'' regulatory action as one that is likely to lead to a rule that may either: (1) have an annual effect on this economy of $100 million or more, or adversely and materially affect a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or Tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another Agency; (3) materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

This notice was submitted to OMB for review. Any written comments from OMB and written EPA responses are available in the docket.

Docket

The docket is an organized file containing information related to the development of the Strategy. The main purpose of this docket is to allow you to readily identify and locate documents relevant to the development of the Strategy. The docket is available for public inspection at the EPA's Air and Radiation Docket and Information Center, which is listed in the **ADDRESSES** section of this document.

Electronic Access and Filing Addresses

You can get this notice and other background information in Docket No. A–97–44 by contacting our Air and Radiation Docket and Information Center (see **ADDRESSES**), or by visiting our website at ''http://www.epa.gov/ttn/uatw/urban/urbanpg.html'' for electronic versions of the notice and other information. For assistance in downloading files, call the TTN HELP line at (919) 541–5384.

Outline

The information in this document is organized as follows:

I. National Efforts to Reduce Air Toxics

The 1990 Clean Air Act Amendments provided the foundation for our current air toxics program. This program is designed to characterize, prioritize and equitably address the serious impacts of HAPs on the public health and the environment through a strategic combination of regulatory approaches, voluntary partnerships, ongoing research and assessments, and education and outreach. Since 1990, we've made considerable progress in reducing emissions of air toxics [1] through regulatory, voluntary and other programs. To date, our overall air toxics program, summarized in section I.A., has focused on reducing emissions of toxic air pollutants from major stationary sources through the implementation of technology-based emissions standards as required in section 112(d). These actions have resulted, or are projected to result, in substantial reductions in HAP emissions.[2] Additionally, actions to address mobile and stationary sources under other Clean Air Act programs are achieving reductions in HAP emissions (for example, the phase-out of lead from gasoline). However, we expect that the emission reductions that will result from these other actions are only part of what will be necessary to protect public health and the environment from toxic air pollutants. In identifying additional steps, we'll use a risk-based focus to develop, implement and facilitate additional Federal and local regulatory and voluntary measures.

In considering additional steps towards protecting human health and the environment, we need to identify and focus on issues of highest priority. Current information indicates that there are potentially significant health risks associated with air toxics exposures affecting large numbers of people in urban areas, as discussed in section I.B. Recognizing this, Congress instructed us to develop a strategy for air toxics in urban areas that includes specific actions to address the large number of smaller, area sources,[3] and that contains broader risk reduction goals encompassing all stationary sources. More specifically, section 112(k)(1) states:

> The Congress finds that emissions of hazardous air pollutants from area sources may individually, or in the aggregate, present significant risks to the public health in urban areas. Considering the large number of persons exposed and the risks of carcinogenic and other adverse health effects from hazardous air pollutants, ambient concentrations characteristic of large urban areas should be reduced to levels substantially below those currently experienced.

As the ambient concentrations of HAPs in urban areas result from a combination of different sources (e.g., area, major,[4] and mobile [5]) emitting many of the same pollutants, we need to recognize contributions from all types of sources in achieving the reductions in ambient concentrations referred to in this subsection. Therefore, in addition to addressing specific statutory requirements for area sources, we've devised an integrated strategy for reducing cumulative public health risks in urban areas posed by the aggregated exposures to air toxics from all sources. The Integrated Urban Air Toxics Strategy (the Strategy) presented here, and summarized in section I.C. below, is one part of our overall national effort to reduce toxics. The basic components of the Strategy consist of the same basic elements as those of the overall air toxics program but with a specific focus on the particular needs of urban areas.

Before we describe the national efforts to control air toxics in more detail, we want to provide a brief overview of what air toxics are, their health and environmental effects, and their sources. These topics are discussed in more detail later in the notice, but their introduction here will help ensure that the remaining discussion in section I is based on a common understanding of the nature of the air toxics problem.

- What are air toxics?

The Act identifies 188 compounds as HAPs. They include pollutants like benzene found in gasoline, perchloroethylene emitted from dry cleaners, methylene chloride used as an industrial solvent, heavy metals like mercury and lead, polychlorinated biphenyls (PCBs), dioxins and some pesticides. These pollutants may cause cancer or other serious effects in humans or in the environment. Health concerns result from both short-and long-term exposures to these pollutants. They may disperse locally, regionally, nationally, or globally and after deposition may persist in the environment and/or bioaccumulate in the food chain, depending on their characteristics (such as vapor pressures, atmospheric transformation rates). Although not specifically listed as a HAP in section 112(b) of the Act, diesel emissions contain many HAPs, and are thus collectively considered under our overall program and the Strategy.

- What health and environmental effects do they cause?

Hazardous air pollutants can cause many health effects. More than half are known or suspected to be human carcinogens. Many are known to have respiratory, neurological, immune or reproductive effects, particularly for more susceptible or sensitive populations, such as children. Many of the HAPs are known to also cause adverse effects in many fish and animal species, including toxicity in fish or causing reproductive decline in bird species, including endangered species. These environmental effects may be felt by individual species within a single level of the food chain or by the entire ecosystem where multiple species are affected.

- What are the sources of air toxics?

There are literally millions of sources of air toxics, including large industrial complexes like chemical plants, oil refineries and steel mills; small (area) sources such as dry cleaners, gas stations, and small manufacturers; and mobile sources including cars, trucks, buses, and nonroad vehicles like ships and farm equipment.

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[1] Our use of the terms ''air toxics'' or ''toxic air pollutants'' in this notice refers specifically to those pollutants which are listed under section 112(b) of the Act as ''hazardous air pollutants'' or HAPs. There are currently 188 HAPs listed.

[2] We project that by 2002, the full implementation of section 112(d) maximum achievable control technology (MACT) standards adopted to date will yield emissions reductions of approximately one million tons of HAPs per year. Within the next six years, completion and full implementation of section 112(d) technology-based standards for the remaining stationary source categories listed pursuant to section 112(c) will contribute additional emissions reductions.

[3] Area sources are those stationary sources that emit, or have the potential to emit, less than 10 tons per year of any one HAP or less than 25 tons per year of a combination of HAPs. Examples include hospital sterilizers and small publicly owned treatment works.

[4] Major stationary sources are sources that emit, or have the potential to emit, more than 10 tons per year of any one HAP or 25 tons per year of a combination of HAPs. Examples include chemical plants, oil refineries, aerospace manufacturers and steel mills.

[5] Mobile sources include motor vehicles (e.g., cars and trucks) and off-road equipment (e.g., construction equipment and lawn mowers), and their fuels.

A. What is Our Overall Air Toxics Program?

Our overall approach to reducing air toxics reflects the mandates under the Act to develop technology-based standards and then subsequently to implement a risk-based program to ensure the protection of public health and the environment. For example, in amending the Act in 1990, Congress required us to establish national standards to reduce emissions of air toxics from stationary and mobile sources. Under section 112(d), Congress emphasized the implementation of technology-based standards for stationary source categories emitting air toxics. These emission standards are known as maximum achievable control technology (MACT) standards, and generally available control technology (GACT) standards. Section 112(k) requires us to list area source categories and to ensure 90 percent of the emissions from area sources are subject to standards pursuant to section 112(d). In addition, under section 202, Congress requires us to set standards to control HAPs from motor vehicles and their fuels.

Further, the Act contains additional provisions that have a risk-based focus. Section 112(f) of the Act requires us to evaluate the risk remaining after implementation of MACT standards (i.e., the ''residual risk'') in order to evaluate the need for additional stationary source standards to protect public health and the environment.

Under section 112(k), the Act specifically mandated that we develop a Strategy (the subject of this notice) to address public health risks posed by air toxics from area sources in urban areas and report to Congress on this issue. In addition, section 112(k) of the Act also mandates that the Strategy achieve a 75-percent reduction in cancer incidence attributable to HAPs emitted by stationary sources.

Other sections of the Act call for study of other types of specific air toxics problems including a focus on certain HAPs that persist and bioaccumulate in the environment. These studies include the deposition of air toxics to Great Waters,[6] HAP emissions from electric utilities, and the health and environmental effects of mercury emissions, in particular.[7]

Our current national air toxics goal was developed to meet requirements of the Government Performance and Results Act (GPRA), which requires us to report on the status of our progress in implementing our programs. That goal is to reduce air toxics emissions by 75 percent from 1993 levels and to significantly reduce the risk to the public of cancer and other serious adverse health effects caused by airborne toxics. Because our knowledge and tools to assess the impacts of these emissions on public health and the environment were limited when we set this current goal, it reflects the straightforward intent to reduce total air toxics emissions as a means to reduce risks associated with exposure to air toxics. However, as we extend our knowledge, develop better assessment tools and begin to address the risks associated with these emissions as required by the Clean Air Act, we intend to modify our goal to one directed specifically at risk reductions associated with exposure to air toxics. In working toward such a risk-based goal, we'll focus particularly on populations and areas disproportionately impacted, including, for example, densely populated areas, children at risk of developmental effects and people who are highly exposed to water and food affected by air toxics (e.g., subsistence fishers living near contaminated water bodies). For more information on assessments, see section IV for an explanation of the assessment methods.

We intend to progress toward the program goal through a combination of our authorities, regulatory activities and voluntary initiatives. The overall approach to reducing air toxics consists of the following four key components:

- *Source-specific standards and sector-based standards.* As previously mentioned, section 112 specifies MACT/GACT standards, and residual risk standards, as well as those area source standards which are contemplated by the Integrated Urban Air Toxics Strategy. Additionally, section 129 requires standards for solid waste incineration and section 202(l) requires EPA, based on the mobile-source related Air Toxics Study, to promulgate reasonable requirements to control HAPs from motor vehicles and their fuels.
- *National, regional, and community-based initiatives to focus on multi-media and cumulative risks.* Section 112(k)(4) requires us to ''encourage and support area wide strategies developed by the State or local air pollution control agencies.'' Our risk initiatives will include State, local and Tribal program activities consistent with the Integrated Urban Air Toxics Strategy on the local level as well as Federal and regional activities associated with the multimedia aspects of HAPs, such as the Great Waters program[8] and initiatives concerning mercury, and other persistent bioaccumulative toxics (PBTs). Other Agency initiatives include collaboration between the air and water programs on the impact of air deposition on water quality (e.g., by accounting for the contribution of air deposition to the total maximum daily load (TMDL) of pollutants to a water body), and collaboration between offices within EPA's air program to assess the risks from exposures to air toxics indoors and to develop non-regulatory, voluntary programs to address those risks.
- *National air toxics assessments (NATA).* National air toxics assessments will help us identify areas of concern, characterize risks, and track our progress toward meeting our overall air toxics program goals, as well as the risk-based goals of the various activities and initiatives within the program, such as the Integrated Urban Air Toxics Strategy. The NATA activities include expansion of air toxics monitoring, improving and periodically updating emissions inventories, national- and local-scale air quality, multi-media and exposure modeling (including modeling which considers stationary and mobile sources), continued research on health effects and exposures to both ambient and indoor air, and use and improvement of exposure and assessment tools. These activities will provide us with improved characterizations of air toxics risk and risk reductions resulting from emissions control standards and initiatives for both stationary and mobile source programs.
- *Education and outreach.* In light of the scientific complexity inherent in air toxics issues, we recognize that the success of our overall air toxics program depends in part on our ability to communicate effectively with the public about air toxics risks and activities necessary to reduce those risks. This includes education and outreach efforts on air toxics in the ambient as well as indoor environments.

Following is a more detailed discussion of the activities under each of the four components of the national program.

[6] The Great Lakes, Chesapeake Bay, Lake Champlain and coastal waters are collectively referred to as the ''Great Waters.''

[7] These studies are required by sections 112(m), 112(n)(1)(A), and 112(n)(1)(B), respectively.

[8] Under section 112(m) of the Act, we assess and report to Congress on the deposition of air pollutants in the Great Lakes, Chesapeake Bay, Lake Champlain, and coastal waters. The third report to Congress on ''The Deposition of Air Pollutants to the Great Waters'' will be released later this year.

1. Source-specific Standards and Sector-based Standards

Maximum achievable control technology. The 1990 Clean Air Act Amendments required us to use a ''technology-based'' and a performance-based approach to significantly reduce emissions of air toxics from major sources of air pollution. These reductions are to be followed by a risk-based approach to address any remaining, or residual risks. Under the ''technology-based'' approach we develop standards for controlling the ''routine'' emissions of air toxics from each major source within an industry group (or ''source category''). These standards—known as ''maximum achievable control technology (MACT) standards''—are based on emissions levels that are already being achieved by the better controlled sources in an industry. This approach assures citizens nationwide that each major source of HAPs will be required to employ effective measures to limit its emissions.

Under this program, we listed for regulation 174 source categories that emit the 188 HAPs listed under section 112(b). To date, we've promulgated 43 standards regulating 78 source categories. We've proposed an additional 7 standards covering 8 source categories. Five source categories have been delisted. We're continuing to develop standards to cover the remaining source categories.

Combustion standards. We've also issued final rules to control emissions of certain air toxics from certain types of solid waste combustion facilities. These rules, required under section 129 of the Act, set emission limits for new solid waste combustion facilities and provide emissions guidelines for existing solid waste combustion facilities. These rules affect municipal waste combustors and hospital/medical/infectious waste incinerators, which account for 30 percent of the national mercury emissions to the air. By the time these rules are fully implemented we expect them to reduce mercury emissions from these sources by about 90 percent from current levels, and reduce dioxin/furan emissions by more than 95 percent from current levels. We're working on additional rules to address industrial and commercial waste incinerators, other solid waste incinerators and small municipal waste combustor units.

Residual risk. The residual risk program, required under section 112(f) of the Act, is designed to assess the risk from source categories after MACT standards are implemented. If we find a remaining, or residual, risk, we're required, within 8 years of the promulgation of the MACT standard, to set additional standards if the level of residual risk doesn't provide an ''ample margin of safety to protect public health'' or ''to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect.'' [9]

In analyzing residual risk, we'll conduct risk assessments consistent with the Agency's human health and ecosystem risk assessment technical guidance and policies. We'll use a tiered approach, usually first conducting a screening level assessment for a source category, and move to a refined assessment only where the risks identified in the screening assessment appear unacceptable. Depending on the characteristics of the HAPs, these assessments will address single or multiple pathways of exposure as well as human and ecological endpoints.

Risk management decisions will be consistent with Agency policies. For carcinogens, we'll use a linear dose-response model unless data support nonlinear mechanisms. We'll follow the Agency's mixtures guidelines where a source category emits multiple HAPs.

For non-cancer effects, we'll use the EPA reference concentration or comparable criteria from other government agencies. As with the cancer effects, we'll follow the mixtures guidelines for emissions of multiple non-carcinogens.

In general, we'll base decisions on exposures predicted from modeling HAP emissions in air and, where appropriate, other media. Where available, we'll include monitoring data as part of our analysis for refined assessments. We'll estimate the size and characteristics of the exposed population, and conduct uncertainty and variability analysis where appropriate.

Currently we're conducting analyses on 13 of the earliest standards that we promulgated. We're conducting these analyses on a source category basis. Depending on the outcome of these analyses, we may find it necessary to modify our residual risk approach.

Mobile source standards. We started enforcing the first federal emission standards for passenger cars in 1968. Since then, acting under specific mandates from the Congress and under general authority, we've developed emission standards for all types of highway vehicles, their fuels, and engines used in virtually all varieties of mobile or portable nonroad equipment such as tractors, construction vehicles, recreational and commercial vessels, and lawn and garden equipment. We've also made the emission standards more stringent over time. New highway vehicles using gasoline are now all equipped with advanced catalysts and computer-controlled fuel systems. Diesel vehicles and most nonroad engines have been substantially redesigned to meet our emission standards as well. Diesel buses in urban areas are subject to a special limit on their emissions of particulate matter. All gasoline and highway diesel fuel used in the United States is subject to emission-reducing standards for volatility and sulfur, respectively. About one-quarter of the gasoline used in the United States is now subject to our reformulated gasoline program, and has lower volatility, reduced concentrations of benzene and other aromatics, and other beneficial changes. In May of this year, we proposed stringent new standards for all cars and light trucks, and the gasoline they use. At the same time we issued an advanced notice of proposed rulemaking to solicit information relating to control of diesel fuel quality. This year, we're also reviewing our standards for heavy-duty highway vehicles. In 2001, we'll do the same for heavy-duty nonroad engines.

To date, most of our emission standards have been aimed at improving urban air quality for the criteria pollutants carbon monoxide, ozone, and PM10. However, the emission control equipment on engines and vehicles, along with the fuel changes that have been needed to meet our emission standards, are also effective at reducing emissions of many HAPs. Our requirement to reduce and then end the use of lead additives in gasoline is an example of a standard that specifically reduced emissions of toxic pollutants. The reformulated gasoline program is another example, as it includes a performance standard for the emissions of several important HAPs.

Because of the time it takes for older vehicles to retire and be replaced with newer vehicles that comply with the latest emission standards, total mobile source toxics emissions will decline for many years into the future.

While the toxic reductions from our emission standards have been large, prior to 1990 we had no specific directions from Congress for a planned program to control toxic emissions from mobile sources. However, section 202(l), added by the Clean Air Act Amendments of 1990, requires us to complete a study of motor vehicle-related air toxics, and to promulgate

[9] The Residual Risk Report to Congress, March 3, 1999, describes our approach on risk assessment methods for use across the air toxics program, and our approach for conducting residual risk analyses. (EPA–453–/R–99–001)

requirements for the control of HAPs from motor vehicles based on that study. We completed the required study in 1993, and are presently preparing an update to that study, and considering rulemaking under section 202(l)(2). In addition, the 1990 Amendments give us discretionary authority to control toxic emissions from nonroad mobile engines. We plan to study the role of nonroad engines in the air toxics problem over the next couple of years, and may propose standards if appropriate.

2. National, Regional, and Community-based Initiative to Focus on Multi-media and Cumulative Risks

The Clean Air Act requires a number of risk studies to help us better characterize risk to the public and the environment from HAPs. Information from these studies will provide information for rulemaking in some cases but will also provide information to support national and local efforts to address risks through other voluntary and pollution prevention programs. The following paragraphs describe these studies.

Utility study. Section 112(n)(1)(A) of the Act requires ''a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection [112(b)].'' We completed this study in February of 1998. We're currently collecting additional information to support a determination on whether regulations are appropriate and necessary to address risks from HAPs from these sources. We expect all test reports required under our information requests by May 31, 2000. We'll use this information to conduct additional analysis of the emissions of mercury from utilities and potential control technologies. In addition, we'll continue the analysis of health-related issues. We plan to make our determination about the need for regulation by December 15, 2000.

Great Waters Program. Section 112(m) requires us to monitor, assess and report on the deposition of HAPs to the ''Great Waters,'' which include the Chesapeake Bay, Lake Champlain, the Great Lakes, National Estuary Programs, and National Estuarine Research Reserves. We're required to assess deposition to these waters by: establishing a deposition monitoring network; investigating the sources of pollution; improving monitoring methods; evaluating adverse effects; and sampling for the pollutants in aquatic plants and wildlife. Pollutants of concern to the Great Waters include mercury, lead, cadmium, nitrogen compounds, polycylic organic matter/polynuclear aromatic hydrocarbons (POM/PAHs), dioxin and furans, PCBs and seven banned or restricted pesticides.

We're also required to provide an update to Congress every two years on any new information relating to deposition of HAPs to the Great Waters. We issued the first two reports to Congress in 1994 and 1997. In addition, in March 1998, we made a determination under section 112(m)(6) that we have enough authority under the Act to address the HAPs impacting the Great Waters. The third report to Congress is scheduled for September 1999, and will focus on the contribution of atmospheric deposition, environmental and public health effects, sources of pollution, and exceedences of standards.

As part of the Great Waters Program, we're funding special monitoring studies at 13 different coastal areas. In addition, we're expanding the National Atmospheric Deposition Program to include more coastal sites for long-term deposition records. We'll continue to develop a coastal monitoring network and to improve air deposition monitoring methods.

In an effort to coordinate programs under the Clean Air Act and the Clean Water Act, we're conducting a pilot study to link air dispersion and deposition models with watershed fate and transport models. The results of this study will help us to improve our multimedia analysis efforts and will allow us to look at the connection between our legal authorities under the two Acts.

Mercury study. Section 112(n)(1)(B) requires that we issue a report to Congress on the sources and impacts of mercury. We released the report in December 1997. The report included an assessment of the emissions of mercury from all known anthropogenic sources in the United States, the health and environmental implications of these emissions, and the availability and cost of control of these emissions.

Urban Air Toxics Strategy. Section 112(k) of the Act requires us to develop a strategy to identify and address risks to the public in urban areas. We'll describe the Integrated Urban Air Toxics Strategy in more detail in later sections of this document.

3. National Air Toxics Assessments (NATA)

As mentioned previously, in order for the national air toxics program to move to a more risk-based program, it's imperative that we have strong analytical tools to support activities to identify risks, to track progress toward risk goals and to help prioritize our efforts to address emissions and risks from air toxics. Several assessment activities are under way to support the national air toxics program, as described in the following paragraphs.

Federal air toxics monitoring. Ambient air toxics information is a key component in supporting assessment activities, helping to determine exposure, tracking progress of the air toxics program goals, and evaluating models and other assessment tools. Because of the importance of this information, we're currently developing an approach to monitoring air toxics nationally and locally with State and local agencies. We envision a monitoring network with some monitors operated on the national level to track overall national trends. This monitoring network may include both new monitoring sites located for air toxics monitoring, as well as information leveraged from other national monitoring networks including Photochemical Assessment Monitoring Stations (PAMS) (which collect at least eight HAPs) and the PM2.5 sites (which collect most of the metals). We'll also compile data from the State toxics monitoring networks.

In order to optimize our monitoring resources, we're working with our regulatory partners to expand monitoring networks by adding new sites; merging existing Federal and States sites where appropriate (e.g., PACS, PM2.5 and Speciation Trends sites); targeting urban population-oriented sites; developing a common Acore'' list of compounds to monitor; and implementing a phased approach to expanding the number of sites and compounds to fill the data gaps.

Emissions inventories. Over the past several years we've worked to build a program for a national inventory of air toxics emissions. We now have data sets for the 1990 to 1993 period and a draft for 1996. The 1996 National Toxics Inventory (NTI) will be used as part of the NATA for modeling and data analyses. It includes information generated from MACT standards development, as well as information provided by 36 States and various industries. The 1996 NTI is currently under review by the State and local agencies. We expect the 1996 NTI to be final in the fall of 1999.

Modeling. The NATA will include modeling efforts using information from the emissions inventory and supported by the monitoring data. We're working toward a future focus on integrated multi-media/multipathway assessments. We intend to conduct assessments on the national, regional, and local scales

to support activities at all levels of the air toxics program. Initially we'll use the Assessment System for Population Exposure Nationwide (ASPEN) model (used in the Cumulative Exposure Project) to conduct national level assessments.

In the fall and winter of 1999, we'll conduct national level assessments to estimate ambient concentrations of HAP and predict the exposures that would result. This information will be released in the spring of 2000. These assessments are described in more detail in section IV.D.

In addition, we intend to use air quality and exposure models for source-specific assessments and to look at selected urban areas. In the near future, we expect to use the Total Risk Integrated Model (TRIM) to address local or neighborhood scale applications. This model will have the capability to address human health and ecological impacts. We expect this to be available late in 2000. In addition, we're working on a Models-3/Community Multi-scale Air Quality (CMAQ) Modeling System. Initially, this model will support assessments on the urban-to regional-scale. Eventually, however, it will be used for neighborhood-scale assessments. By the end of 2000, we expect to have an operational evaluation of the model using mercury and some semi-volatile compounds, with a final evaluation completed by 2001. This model includes capabilities to address ozone and PM, together with air toxics, and will be able to link with a human exposure model.

4. Education and Outreach

We believe that public participation is vitally important in the implementation of the overall air toxics program. We're committed to work with cities, communities, State, local and Tribal agencies, and other groups and organizations that can help implement our approach to reducing toxics emissions. For example, we expect to work with the cities, our regulatory partners, and other interested stakeholders in the national air toxics assessments that will be conducted. In addition, we'll continue to work with stakeholders on regulation development. We intend to involve local communities and industries in development of local risk initiatives such as the total maximum daily load (TMDL) initiatives.

B. Why Are We Concerned About Urban Air in Particular?

In urban areas, toxic air pollutants raise concerns because sources of emissions and people are concentrated in the same geographic area, leading to large numbers of people exposed to the emissions of many HAPs from many sources. Additionally, while urban exposures to some pollutants may be fairly similar across the country, studies in a number of urban areas indicate that exposures to other pollutants, and any associated risks, may vary significantly from one urban area to the next. The tools we rely on in our efforts to better characterize urban health risks from air toxics each have associated uncertainties, which may add to our concerns. We intend our NATA activities to improve our ability to describe these uncertainties and where possible, reduce them. As currently available, the various types of information (e.g., emissions, ambient air quality monitoring and modeling) that will be central to our NATA activities illustrate the importance of focusing on urban areas.

First, our baseline national emissions inventory [10] for the air toxics program indicates that the vast majority of HAP emissions (approximately 75 percent of the total HAP emissions of all 188 HAPs from all sources) are within counties with urban areas.[11] Additionally, a greater number of different HAPs may be emitted from the multiple sources present in urban areas than from the more limited number and variety of sources present in rural areas. This is particularly important because even in cases where individual pollutant levels are low enough that exposure to any one pollutant wouldn't be expected to pose harm, some pollutants may work together such that their potential for harm increases and exposure to the mixture poses harm. Thus, depending on exposure levels and characteristics of the pollutants, multiple pollutant exposures, which may be prevalent in urban populations, may pose increased public health risks.

Second, ambient air monitoring information collected by States in certain metropolitan areas during the 1990s demonstrate the simultaneous presence of many HAPs in urban air and, thus, the potential for urban population exposures to multiple HAPs. In assessing the implications of these monitored HAP concentrations for potential public health concerns, we combined the measured ambient HAP concentrations with quantitative estimates of each HAP's cancer potency. This limited evaluation of a subset of the small number of HAPs monitored indicates the presence of HAPs in some cities that when evaluated cumulatively is suggestive of upper bound estimates of additional cancer risks at or above one in ten thousand.[12] This type of limited evaluation can provide indications of potential public health concerns, but should not be considered a characterization of actual health risks.

Third, an early effort by the Agency to model ambient HAP concentrations on a national scale performed for EPA's Cumulative Exposure Project (CEP) suggests that HAP exposures are prevalent nationwide, and that for some HAPs, in some locations, concentrations are significantly higher than the concentrations that, if exposures are continuous over a lifetime, are associated with a one-in-one million lifetime excess cancer risk.[13,14] As stated above, estimated concentrations greater than risk-based concentrations should be viewed as indicators of a potential public health problem and not as characterizations of actual health risks. Illustrating the need for special attention in urban areas, the early modeling analysis found that for 75 percent of the HAPs modeled, the average estimated concentrations in urban census tracts [15] were greater, and in some cases much greater, than the overall national average concentrations.

The concentration of activities in urban areas leads to the presence of multiple emission sources and

[10] The baseline national toxics inventory (NTI) that we've compiled over the past few years is representative of the years 1990–93. We believe that this is an appropriate baseline because these years represent the ''pre-MACT'' emissions for HAP sources. This baseline inventory contains information on major, area and mobile sources for all 188 HAPs and provides information on whether the emissions are urban or rural. A subset of this baseline inventory is information collected and extensively reviewed by the public to support analyses for this Strategy and regulatory actions under section 112(c)(6).

[11] In estimating the amount of emissions from urban areas, we've totaled emissions from all U.S. counties that include a metropolitan statistical area with a population greater than 250,000 or for which more than 50 percent of the population has been designated ''urban'' by the U.S. Census Bureau. For a more detailed description of emissions allocation, see the emissions information prepared to support this Strategy (''Emissions Inventory of 40 Candidate Section 112(k) Pollutants; Supporting Data for EPA's 112(k) Regulatory Strategy''), available at www.epa.gov/ttn/uatw/112k/112kfac.html.

[12] The technical support documentation for this assessment analysis is available from the public docket and includes a presentation of ambient monitoring data in 17 cities for a variety of HAPs. Also presented are the upper bound estimates of excess cancer associated with continuous lifetime exposures at those concentrations.

[13] SAIC. 1998. Final Report, Modeling cumulative outdoor concentrations of hazardous air pollutants.

[14] Woodruff, et al. 1998. Public Health Implications of 1990 Air Toxics Concentrations across the United States. Environ. Health Persp. 106(5):245–251.

[15] Census tracts with residential population density greater than 750 persons per square kilometer.

proportionately higher emissions of multiple HAPs. Many of these emission sources are area or mobile sources, and their emissions are more likely to be released at ground level, where people are more likely to be exposed to them. Because approximately 80 percent of the U.S. population lives in metropolitan areas,[16] exposures resulting from urban air toxics emissions may pose a significant risk to public health. Additionally, the prevalence of minority and low income communities in urban industrial and commercial areas, where ambient concentrations of HAPs may be greater, increases the likelihood of elevated HAP exposures among these subgroups. The potential for air toxics in urban areas, either directly or indirectly, to contribute to elevated health risks among these and other subgroups (especially including children, the elderly and persons with existing illness or other potential vulnerability) demonstrates the need to assess risk distributions across urban populations in order to address disproportionate impacts of air toxics hazards.[17]

As described earlier in this notice, we have been and are continuing to develop various Federal standards for stationary and mobile sources as part of the air toxics program and under other Clean Air Act authorities. These standards, as well as standards developed by State and local authorities, are expected to improve air quality in urban areas. As part of the air toxics program, we will be assessing what additional actions, both at the national and local level, are needed to further improve air quality in urban areas. This is a primary focus of the Integrated Urban Air Toxics Strategy, described more fully in the rest of this notice. We will include State and local authorities, and in particular mayors, in planning activities to assess local air quality and to address concerns.

C. What is the Integrated Urban Air Toxics Strategy?

The Strategy presented in this notice has been developed in response to the requirements of sections 112(k) and 112(c)(3) of the Act, and also reflects activities to control mobile source emissions required under section 202(l). As stated previously, the Strategy represents an integration of our authorities to identify and address risks from both stationary and mobile sources. In this section of the notice, we describe the goals and major components of the Strategy, while later sections describe more fully those components. Additionally, section 112(k) of the Act also requires us to report to Congress, on two occasions, regarding actions taken under the Strategy and current information regarding public health risks posed by HAP emissions in urban areas. We're currently preparing the first of these two reports to Congress, and its release is planned for later this year.

1. Goals of the Strategy

Our goals for the Strategy reflect both statutory requirements stated in section 112(k) and the goals of our overall air toxics program. These goals consist of the following:

- *Attain a 75-percent reduction in incidence of cancer attributable to exposure to HAPs emitted by stationary sources.* This is relevant to all HAPs from both major and area stationary sources, in all urban areas nationwide. Reductions can be the result of actions by Federal, State, local and/or Tribal governments, achieved by any regulations or voluntary actions.
- *Attain a substantial reduction in public health risks posed by HAP emissions from area sources.* This includes health effects other than cancer posed by all HAPs. Reductions can be the result of actions by Federal, State, local and/or Tribal governments, achieved by any regulations or voluntary actions.
- *Address disproportionate impacts of air toxics hazards across urban areas.* This will necessarily involve consideration of both stationary and mobile source emissions of all HAPs, as well as sources of HAPs in indoor air. We intend to characterize exposure and risk distributions both geographically and demographically. This will include particular emphasis on highly exposed individuals (such as those in geographic Ahot spots'') and specific population subgroups (e.g., children, the elderly, and low-income communities).

The Act includes certain specific requirements for the Strategy. First, we're required to identify at least 30 HAPs, ''which, as the result of emissions from area sources, present the greatest threat to public health in the largest number of urban areas'' (section 112(k)(3)(B)(i) of the Act). Second, we're required to assure that sources accounting for 90 percent of the emissions of identified area source HAPs are subject to standards (section 112(k)(3)(B)(ii) and section 112(c)(3)). These steps will contribute to our progress toward the Strategy's goals.

In meeting the Strategy's goals, we'll consider reductions in HAPs resulting, not only from actions under our overall air toxics program (e.g., MACT, residual risk standards, mobile source emission controls) and measures resulting from programs to attain the national ambient air quality standards for particulate matter and ozone (as well as our other regulatory programs), but also from State, local and Tribal measures. Further, we'll consider cumulative risks presented by exposures to emissions of HAPs from sources in the aggregate. This is consistent with the language of section 112(k)(1) of the Act, quoted earlier. Further, consistent with the direction of section 112(k)(4) to encourage and support area-wide strategies developed by State or local air pollution control agencies, we'll work with State, local, and Tribal air pollution control programs for additional progress toward these goals.

Continuous advances in our knowledge and activities within the broader air toxics program, both of which are expected to contribute especially relevant information, will be integral to the implementation of the Strategy. For example, certain air toxics, such as mercury, may be deposited from the air into soil and/or water, taken up by organisms into the food chain, and bioaccumulate so that concentrations increase through each level of the food chain. The result is that humans and wildlife can be exposed to these ''air'' toxics by eating contaminated food, especially predatory fish from affected water bodies. We're concerned about individuals in urban areas that eat more than the average amount of fish from local sources, including urban subsistence fishers. Under the Great Waters program, we monitor air toxics deposition and evaluate potential adverse effects on public health and the environment including those related to contaminated ecosystems and fish. This information will assist us in assessing the potential for certain HAPs to pose multipathway health risks to urban residents of coastal areas (e.g., risks from both inhalation of HAPs and consumption of fish contaminated by deposition of HAPs to waterways).

The indoor environments program is another Agency activity with particular relevance to the Strategy because people in urban settings spend as much as 80

[16] U.S. Department of Commerce, 1997, *Population Profile of the United States.* Current population reports, special studies P23–194. Economic and Statistics Administration, Bureau of the Census, Washington, D.C.

[17] The reader should note that all of these examples illustrate that there are different ways of representing urban areas. These are all individually valid, but the result is that different definitions lead to different approximations of the affected population. In the remainder of the Strategy, we'll explain which definition we're using in each particular context.

to 90 percent of their time indoors.[18] Additionally, outdoor air is brought indoors through infiltration and mechanical ventilation and there are also many sources of air toxics indoors. As part of this Strategy, EPA will assess the current information on indoor emissions and air concentrations of air toxics, and will use the data, to the extent possible, to estimate exposures to air toxics in indoor environments. As we continue to develop and enhance our knowledge of exposures and risks from indoor air toxics through the indoor environments program, we'll seek to include information on indoor exposures in our characterization of risk associated with outdoor sources and in the development of risk management options for air toxics. We also intend to conduct additional research on indoor air exposures to HAPs and on the relative significance of outdoor and indoor concentrations of HAPs, as well as on the relationship between outdoor emission sources and indoor concentrations of HAPs.

2. Developing the Strategy

To address the problem of exposure to air toxics in urban areas, we published a draft strategy on September 14, 1998 (63 FR 49240) that addressed the urban air toxics risks from both stationary and mobile sources. We asked for, and received, extensive public comment on the draft strategy. We received over 120 letters and heard from numerous speakers at stakeholder meetings in Alexandria, VA; Durham, NC; Chicago, IL; and San Francisco, CA, as well as at other meetings including a public meeting in New York City and meetings with the National Environmental Justice Advisory Council. As discussed throughout the following sections of this notice, we considered these comments in developing the final Strategy. Comment letters, meeting summaries, and material developed to analyze and respond to comments are in the public docket (Docket No. A–97–44).

The Strategy being published today will produce a set of actions in response to the cumulative public health risks presented by exposures to emissions of multiple HAPs from multiple sources. We believe that by considering urban air toxics emissions from all sources, we'll better understand and address the relative risks posed by any one pollutant and/or source category. Thus, by integrating activities under different parts of the Act, we can more realistically address aggregate exposure in areas where the emissions and risks are most significant and controls are the most cost effective.

3. Components of the Strategy

Consistent with the broader overall air toxics program (described in section I.A.), the Strategy is made up of four interrelated parts or components for addressing the public health risk associated with urban air toxics. Information from each of the four components provides feedback to the others to inform the decisions needed to make progress toward meeting our goals.

The first component includes our regulatory tools and programmatic activities for source-specific and sector-based standard setting, as well as those of States, local agencies, and Tribes, which contribute to reductions in emissions of air toxics from major, area, and mobile sources. This component includes activities such as selecting urban HAPs, setting emission standards, conducting studies, developing policies, and conducting enforcement and compliance assistance activities. These actions result in emission reductions, as well as associated reductions in risk. Sections II and III of this document describe the regulatory activities we'll pursue to implement the Strategy.

The second component of the Strategy involves local and community-based initiatives to focus on multi-media and cumulative risks within urban areas. These may include activities such as pilot projects to identify and address risk, and may rely on some of the assessment activities and tools described below. Section III of this document describes the nature of some of these activities.

The third component is the urban component of NATA, which will provide us with meaningful information and allow us to describe progress that we've made in meeting our overall program and strategy-specific goals. We'll identify the pollutants and sources that contribute to any failures in meeting our risk reduction goals, and provide meaningful information to support regulatory and policy decisions needed to move us closer to meeting them. Section IV of this document, Assessment Activities, describes how we'll design and conduct these assessments. These activities rely on our improving base of knowledge (e.g., concerning health effects and exposure characteristics) and tools (e.g., emissions inventories, monitoring networks, and computer models), which are described in section V, along with our plans for their improvement and related research.

The fourth component, communicating about risk through education and outreach to the public, ensures that the activities we undertake are responsive to your concerns. We'll depend on stakeholder involvement at the national and local levels to implement the Strategy. Section VI explains how we'll communicate with the public on these issues.

We've formulated an integrated Strategy to characterize, prioritize, and equitably address the public health impacts of HAPs in urban areas. The Strategy relies on a strategic combination of regulatory approaches and voluntary partnerships, both of which are based on ongoing research and assessments, and include educational outreach. Sections II through VI of this document explain how the components described above work, how they'll be expanded and improved, and how we expect to meet our goals to reduce risk from HAPs.

4. Overview of the Strategy

The Integrated Urban Air Toxics Strategy, in conjunction with the overall air toxics program, will continue to lower human exposure to air toxics by reducing emissions. Progress will be achieved by:

- Completing MACT standards.
- Addressing residual risk.
- Implementing the urban air toxics strategy.
- Enhancing our ability to characterize risk and estimate exposures.
- Developing new tools for monitoring progress with the goals of the air toxics program.
- Developing a monitoring network.
- Effectively implementing and enforcing standards.

We'll achieve these objectives by following the guiding principles of the air toxics program:

- Working cooperatively and effectively with State and local communities.
- Focusing on communities, susceptible populations, and sensitive ecosystems.
- Providing cost-effective, common-sense solutions to problems, through flexible strategies.
- Developing and executing an effective education and outreach program.

[18] The indoor environments program is a non-regulatory program, working under the authority of Superfund Amendments and Reauthorization Act (SARA) Title IV to perform research and provide information to the public on the health problems associated with air pollutants in the indoor environment. Most of the guidance provided by the indoor environments program focuses on reducing pollutants throughout buildings through proper building design, operation, and maintenance, including management of indoor sources. The program works through an extensive network of partners in providing training and information on indoor air environmental issues throughout the United States.

The Strategy will bring together the four basic components (standards, initiatives, assessment, and outreach). It will be an iterative and evolving process that will use existing programs and tools to target risk reduction and to continually assess risk and measure progress.

II. Federal Activities Related to the Integrated Urban Air Toxics Strategy

A. What HAPs Pose the Greatest Threat in Urban Areas?

This section provides further discussion of what air toxics are, the concerns they present, and describes how we evaluated and selected a list of HAPs to guide our actions under the Strategy. In brief, we evaluated the health effects information available for the 188 HAPs, estimated emissions from all known sources using a variety of techniques, assessed available air quality monitoring data, reviewed existing studies, and produced a list of pollutants based on the relative hazards they pose in urban areas, considering toxicity, emissions, and related characteristics. From this effort, we established a list of urban HAPs which pose the greatest threats to public health in urban areas, considering emissions from major, area and mobile sources. Among these urban HAPs are a subset of the 30 HAPs having the greatest emissions contribution from area sources (the ''area source HAPs'').

1. Air Toxics Defined

Section 112(b) of the Act identifies 188 toxic chemicals as HAPs. Hazardous air pollutants include a wide variety of organic and inorganic substances released from industrial operations (both large and small), fossil fuel combustion, gasoline and diesel-powered vehicles, and many other sources. The major categories of toxic air pollutants include volatile organic compounds (known as VOCs), metals and inorganic chemicals, and semi-volatile organic chemicals. Volatile chemicals are usually released into the air as vapor, while semi-volatile organics and metals may be released in the form of particles. Additionally, 17 of the 188 HAPs are defined as chemical groups rather than unique chemicals. In evaluating the health effects, emissions and monitoring information for these chemical groups we made specific decisions regarding our treatment of the available information for the group or the individual chemicals represented by the group (see the technical support document in the public docket for the identification of the urban HAPs).

Of the 17 chemical groups, polycyclic organic matter (POM) posed particular complications. Polycyclic organic matter is defined in section 112(b) of the Act as organic compounds with more than one benzene ring and a boiling point greater than or equal to 100 °C, which encompasses a complex mixture of thousands of polynuclear aromatic hydrocarbons (PAH). Among the many PAH constituents of POM are seven compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-c,d]pyrene) that we've identified as probable human carcinogens. For the evaluation of POM as a potential public health threat in urban areas, and for the subsequent source category analysis, we used this group (referred to as 7-PAH) as a surrogate for the much larger, more complex and diverse mixture of POM.

The 188 HAPs have been associated with a wide variety of adverse health effects, including cancer, neurological effects, reproductive effects and developmental effects. Additionally, the specific health effects associated with the various HAPs may differ, depending on the particular circumstances of exposure (e.g., the amount of chemical, the length of time a person is exposed, the stage in life of the person exposed). We've classified many of the HAPs as ''known,'' ''probable,'' or ''possible'' human carcinogens and have included this information in our Integrated Risk Information System.[19] The HAPs can also be described with regard to the part of the human body to which they pose threats of harm. For example, neurotoxic pollutants cause harm to the nervous system. Other effects include cardiovascular, and respiratory effects, as well as effects on the immune system and reproductive system. The severity of harm can range from headaches and nausea to respiratory arrest and death. The level of severity differs both with the amount and length of exposure and the chemical itself (e.g., how it interacts with individual components of the nervous system). Some chemicals pose particular hazards to people of a certain age or stage in life or even based on their ethnic background. For example, some HAPs are developmental toxicants. That is, exposure to certain amounts of these chemicals during a woman's pregnancy or exposure of infants or children can prevent normal development into a healthy adult. Other HAPs are reproductive toxicants, meaning they may have the potential to affect the ability of adults to conceive or give birth to a healthy baby.

In addition, we're currently investigating the health risks associated with the mixture of compounds that comprise diesel exhaust which originates primarily from mobile sources. While not specifically listed as one of the 188 HAPs, diesel exhaust includes many HAPs, including chemicals that fall into the group of POM chemicals, as well as some HAP metals and volatile organic compounds. In addition, we're concerned about the potential health risks from the particulate matter component of diesel exhaust. Diesel particles are characteristically small and fall within the size range of inhalable particles addressed by the national ambient air quality standards for particulate matter.[20] Our draft health assessment of diesel emissions identifies lung cancer as well as several other adverse respiratory health effects, including respiratory tract irritation, immunological effects, and changes in lung function, as possible concerns for long-term exposures to diesel exhaust.[21] If new diesel engine models are used in an increasing share of the light duty fleet,[22] concerns regarding potential

[19] The Integrated Risk Information System (IRIS), prepared and maintained here at EPA, is an electronic data base containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences. Further information about IRIS, including the information it contains, can be found on the IRIS website at http://www.epa.gov/iris.

[20] Inhalable particles are defined as particles of aerodynamic diameter less than or equal to 10 micrometers.

[21] Health Assessment Document for Diesel Emissions, SAB Review Draft, U.S. Environmental Protection Agency, Washington, D.C. EPA/600/8–90–057C, February 1998. The evidence comes from studies involving occupational exposures and/or high exposure animal studies. The Health Assessment, when completed, will recommend how the data should be interpreted for lower environmental levels of exposure. The draft Health Assessment is currently being revised to address comments from a peer review panel of the Clean Air Science Advisory Committee (CASAC Review of the Draft Diesel Health Assessment Document, U.S. Environmental Protection Agency Science Advisory Board, Washington, D.C. EPA–SAB–CASC–99–001. The CASAC will review these revisions later this year.)

[22] Diesel engines in highway and nonroad mobile sources are numerous and widespread. Heavy-duty highway and nonroad diesel engines are the largest sources of diesel exhaust emissions. While diesel engines are used in a relatively small number of cars and light-duty trucks today, vehicle and engine manufacturers are developing new engine models that may be used in an increasing share of the light-duty fleet, particularly light-duty trucks.

health risks from diesel exhaust will become more significant.

As described above, HAPs and mixtures containing HAPs have the potential to pose a variety of health risks depending on their chemical characteristics, as well as the circumstances of human exposure. In the following two sections, we describe our identification of HAPs of particular concern in urban areas nationally.

2. The URBAN HAPs

Although information is limited regarding actual health risks posed by specific HAP emissions, the availability of various other types of information is sufficient to achieve our objective of identifying those HAPs posing the greatest potential public health concern in the largest number of urban areas. For the purpose of meeting the requirements of section 112(k) and section 112(c)(3), we've listed in Table 1 the 33 HAPs that, on a national scale, we believe pose the greatest threat to public health in the largest number of urban areas. Of these 33 HAPs, 29 appeared on the draft urban HAPs list published in our September 14, 1998 **Federal Register** document (63 FR 49240). Changes to the list resulted from changes made to the method for urban HAPs selection, the input data and the final selection criteria upon consideration of comments received on the draft list and its supporting methodology. [23]

TABLE 1.—LIST OF URBAN HAPS FOR THE INTEGRATED URBAN AIR TOXICS STRATEGY

["Urban HAPs List"]

HAP	CAS No. [+] HAP
acetaldehyde	75070
acrolein	107028
acrylonitrile	107131
arsenic compounds	.....
benzene	71432
beryllium compounds	.....
1,3-butadiene	106990
cadmium compounds	.....
carbon tetrachloride*	56235
chloroform	67663
chromium compounds	.....
coke oven emissions*	8007452
1,2-dibromoethane*	106934
1,2-dichloropropane (propylene dichloride)	78875
1,3-dichloropropene	542756
ethylene dichloride (1,2-dichloroethane)	107062
ethylene oxide	75218
formaldehyde	50000
hexachlorobenzene	118741
hydrazine	302012
lead compounds	.....
manganese compounds	.....
mercury compounds	.....
methylene chloride (dichloromethane)	75092
nickel compounds	.....
polychlorinated biphenyls (PCBs)	1336363
polycyclic organic matter (POM)	.....
quinoline	91225
2,3,7,8-tetrachlorodibenzo-p-dioxin (and congeners and TCDF congeners)	1746016
1,1,2,2-tetrachloroethane	79345
tetrachloroethylene (perchloroethylene)	127184
trichloroethylene	79016
vinyl chloride	75014

[+] Chemical Abstracts System number.
* HAPs with less significant emissions contributions from area sources.

This list of 33 urban HAPs includes not only those with emissions from area sources, but reflects the integrated nature of the Strategy by including those posing public health concerns in urban areas regardless of emissions source type. Included among the 33 urban HAPs are the 30 HAPs with greatest emissions contributions from area sources (i.e., the area source HAPs'').

In response to publication of our draft list of urban HAPs, we received comments regarding our inclusion of HAPs emitted predominantly from non-area sources. Several commenters said that it was inappropriate to include HAPs for which area source contribution was low or negligible. Although section 112(k)(3)(B)(i) only requires that we list HAPs emitted from area sources, we believe that the public is exposed to complex mixtures of pollutants, and that these pollutants are emitted by all types of sources. In other words, the risk from exposure to HAPs has public health implications regardless of the source or source type from which they are emitted. Therefore, in the interests of best protecting public health in urban areas, we've listed the 33 HAPs in Table 1 considering the aggregate exposure potential of mobile,

[23] The final list includes beryllium compounds, hexachlorobenzene, polychlorinated biphenyls and 1,1,2,2 tetrachloroethane, which hadn't appeared on the draft list, and doesn't include bis(2-ethylhexyl)phthalate (DEHP), 1,4-dichlorobenzene, methyl chloride and methylene diphenyl diisocyanate (MDI), which were on the draft list.

area, and major stationary source emissions combined. At the same time, as described below, we've also identified the 30 HAPs with the greatest area source contribution. Under section 112(k), there aren't any specific regulatory implications of listing the other three HAPs. However, we'll use all 33 HAPs in prioritizing efforts to address risk.

Section 112(k)(3)(B) of the Act requires us to identify not less than 30 HAPs that are estimated to pose the greatest threat to public health in the largest number of urban areas ''as the result of emissions from area sources.'' The Act, however, doesn't state that such threats must be exclusively the result of emissions from area sources. Therefore, from the list of 33 urban HAPs (i.e., the HAPs that pose the greatest threat to public health in urban areas because they ranked highest relative to the other HAPs in the analysis discussed above), we identified those 30 HAPs with the greatest contributions of national urban emissions from area sources, thus ensuring consistency with the specification in section 112(k)(3)(B)(i). Without these contributions from area sources, the threat from these HAPs would not be as great. Emissions of only the 30 area source HAPs were considered in the area source category listing required under section 112(c)(3) and section 112(k) and described in section II.B. of this document. The other three HAPs in Table 1 for which area sources are less significant contributors to total emissions (i.e., those HAPs noted on Table 1 with an asterisk), can be addressed, as appropriate, using our other existing authorities, as described in section II.C. of this document.

During the public comment period on the draft Strategy, we received substantial comment regarding the role of diesel engine emissions among urban air pollutants, with several commenters suggesting that we include diesel exhaust among the priority urban HAPs. As described earlier, diesel exhaust, although not specifically listed among the 188 HAPs in section 112(b) of the Act, is a particular type of emission which is composed of many HAPs. We agree with commenters that diesel exhaust plays an important role among urban air pollutants, and, as previously mentioned, we're investigating the health risks associated with diesel exhaust. Meanwhile, we plan to address diesel exhaust in our section 202(l) rulemaking for air toxics from motor vehicles and their fuels.

It's important to note that the list in Table 1 was generated based on our best estimates representing 1990 national baseline air toxics emissions and ambient concentrations for urban areas. For example, implementation of technology-based standards for coke ovens has reduced the benzene, coke oven gases, and POM from these sources by 80 percent (or 1,408 tons per year) since 1993. In addition, certain urban areas have reduced other benzene emissions by as much as 30 or 40 percent. Much of this reduction is attributable to the implementation of mobile source reformulated gasoline requirements. To insure that we appropriately target reductions of urban air toxics to support the protection of public health, it will be important to reevaluate our priorities as we develop emissions estimates and obtain more comprehensive monitoring information for more recent years.

3. Method to Identify the Urban HAPs.

This section summarizes how we identified HAPs for the urban HAPs list. Our identification methodology included three separate analyses. The results of these analyses were compared using specific criteria in order to identify the urban HAPs. The three analyses relied on a variety of information types including toxicity information, emissions estimates, ambient monitoring, and air quality modeling. The methodology is summarized here and more fully described in the technical support document (''Ranking and Selection of Hazardous Air Pollutants''), which is available through the public docket and on our website.

In 1997, we conducted an initial screening evaluation using a preliminary methodology. In addition to identifying HAPs for which we separately conducted a public review of our national emissions inventory information, this evaluation provided us with the opportunity for peer review of our preliminary methodology. Like the methodology relied on for our final list, this preliminary methodology relied on various types of information relevant to potential health risks posed by the 188 HAPs, and it integrated the results of three relative rankings using the different types of information. This initial screening run provided a starting point for focusing improvements in the national emissions inventory and for evaluating and refining our methodology for selecting the list of urban HAPs.

The preliminary methodology and screening analysis were reviewed by a panel of outside experts. In early January of 1998, the preliminary methodology was presented to the peer review panel in a written report. A full day session of the peer review panel was held on January 21, 1998 to discuss the methodology and underlying data. The reviewers evaluated all facets of the methodology and its suitability for identifying HAPs for the urban HAPs list, the relative value of various data sources, the availability of additional data sources, the scientific validity of assumptions, consistency across the methodology and appropriate presentation formats. Reviewers provided oral comments at the January 21 meeting, as well as written comments before and after the meeting. The final methodology described here has incorporated revisions made to address comments raised by the January 1998 peer review.

Comments were also received from the public in response to our publication of the draft list of urban HAPs (September 14, 1998, 63 FR 49240). Consideration of issues raised by some commenters led us to modify certain aspects of both the identification methodology and the underlying data inputs. These changes were not inconsistent with recommendations made by the 1998 peer review panel. Consistent with peer reviewer recommendations to use the available information in the most robust manner, our final identification methodology integrates the results of three separate analyses. These ranking analyses are discussed in the following sections. Because each analysis focused on different aspects of the available information, such that no one analysis fully captured all important aspects of the urban air toxics information, we and the peer reviewers agreed that all three of the analyses should be performed and their results integrated, to yield a more comprehensive methodology.

a. Analysis 1: Risk-related ranking indices. In the first of the three analyses, we ranked HAPs by combining surrogates for toxicity with surrogates for exposure into ranking indices. The surrogates for toxicity were risk-based concentrations (RBCs) for inhalation or risk-based doses (RBDs) for ingestion. The RBCs and RBDs were derived from acute and chronic (cancer and non-cancer) health-based reference values.[24]

[24] Acute RBCs were set equal to risk management exposure guideline levels (e.g., Acute Exposure Guideline Levels (62 FR 58839–51) or Emergency Response Planning Guidelines (American Industrial Hygiene Association, 1998. Emergency response planning guidelines and workplace environmental exposure guidelines.) for mild, transient or no effects from short exposure periods, when available. Additionally, two chronic RBCs and two chronic RBDs were derived for each HAP for which the requisite data were available. For carcinogenic HAPs, we compared the continuous exposure levels associated with predicted upper-bound lifetime

Types of information used as surrogates for exposure included measured ambient concentrations and yearly emission estimates from area, major and mobile sources in all urban areas nationwide. To address the potential for certain HAPs to pose significant risks of exposure through pathways other than inhalation (primarily by consuming food with accumulated HAPs), one set of indices also incorporated measures of bioaccumulation potential. As described in more detail in the technical support document, a total of seven separate indices [25] were calculated using these different types of toxicity and exposure information. Lack of the requisite data prevented all seven indices from being calculated for all of the 188 HAPs. The indices were combined into a single HAP ranking.

During the public comment period, we received comments stating that the role of monitoring information in the methodology should be strengthened. Because ambient concentrations directly influence people's exposure to HAPs and there are differences among HAPs in the many variables affecting their behavior after being emitted into the air, we agree that it is important that the monitoring information play a strong role in this analysis. Relying solely on emissions information in selection of the urban HAPs would ignore the many factors which influence ambient HAP concentrations. Since the publication of the draft list, we've expanded our monitoring database to increase both the number of pollutants for which we have monitoring information and the number of measurement values. We've also improved our treatment of non-detect measurements, first by assuming undetected HAPs are present at one half the detection limit (instead of omitting the observation), and by omitting data altogether for HAPs having fewer than ten percent of observations above the detection limit. These changes have improved the technical basis of the ambient indices.

We also received comment stating that inappropriate weight was assigned to those HAPs for which the acute index was developed. In the analysis for the draft Strategy, the requisite information for calculating this index (both an acute RBC and an estimate of short-term peak exposure) were available for only 21 of the 188 HAPs. We appreciate the issue raised by the commenter that, because of the relatively small number of HAPs for which this index could be calculated, it was not necessarily assigning HAPs the appropriate emphasis. Through our improvements to the ambient database described above, and by increasing the number of acute RBCs, we have addressed this issue and reduced bias in this index.

Commenters also recommended increased emphasis on persistent, bioaccumulative and multipathway pollutants for which non-inhalation exposure pathways may be important. It's important to recognize that persistent bioaccumulative toxics (PBTs) are also often multipathway pollutants, because the pattern of exposure is frequently other than inhalation. However, not all multipathway pollutants are PBTs.

One commenter said ''EPA should consider multi-pathway exposures under 112(k) when there is sufficient evidence demonstrating that airborne emissions of the listed HAP have both direct and indirect exposure pathways, which have been clearly identified.'' Another said, ''It is appropriate to include compounds with exposure pathways other than inhalation because these pathways are a true concern in urban areas where atmospheric deposition of particulate phase HAPs is occurring (i.e., lead, mercury, cadmium, dioxin and PCBs) and being taken up by fish, garden vegetables or hand-to mouth activity observed in infants.'' With regard to the PBTs, some commenters said PBTs should have been given more thorough consideration for listing. They said the risks from PBT exposure are high, and the concentrations of many PBTs are higher in the urban than non-urban areas. We support the use of the multipathway analysis to assess total human exposure, particularly in the case of PBTs.

Additionally, commenters said that indices should be calculated so that the size of index value differences among HAPs could be more clearly observed, and any bias related to different numbers of HAPs ranked by each index removed. Because we believe that both of these issues are important, we changed the index calculation methodology to address these recommendations. This change had its greatest impact on the food chain pathway index, in which HAPs with high bioaccumulation potential and ingestion toxicity received much higher index values. Primarily as a result of this change, Table 1 now includes two additional persistent, bioaccumulative HAPs—PCBs and hexachlorobenzene—that were absent from the September 1998 draft list. Hexachlorobenzene and PCBs, as well as mercury, cadmium, lead, POM and dioxin (also identified as urban HAPs in Table 1), are among the pollutants of concern for our Great Waters program. Additionally, PCBs, mercury and dioxin were identified as pollutants of concern in the Great Lakes by the International Joint Commission of the United States and Canada. Hexachlorobenzene, PCBs, dioxins, mercury, and alkyl-lead were targeted for virtual elimination in the Great Lakes in the 1997 Canada-United States ''Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes'', known as the ''Binational Toxics Strategy''.

Some commenters said that the identification methodology emphasized cancer as a health effect and didn't consider other health effects including asthma, birth defects and reproductive effects. The methodology does, however, consider health effects other than cancer. Reference values (RBCs and RBDs) for each HAP used in the analysis were developed for the health effects believed to occur at the lowest exposure. In the case of HAPs which, in addition to these other health effects, also pose cancer risks, we developed RBC/RBD values for one-in-one million and one-in-ten thousand predicted lifetime cancer risk levels. These risk levels have historically been used to inform environmental regulatory action. The cancer risk-based values were compared to RBC/RBD values for the most sensitive non-cancer health effect, and the lowest two RBC/RBD values for each HAP were used in the calculation of the chronic indices. This step, and the inclusion among the seven indices of an acute toxicity index based entirely on effects other than cancer, was intended specifically to recognize the importance of health effects other than cancer for some HAPs. Thus, we believe that the assessment methodology provides a balanced consideration of all health effects associated with each HAP, with index calculation and the resultant ranking depending significantly on effects other than cancer.

We also received comments regarding the toxicity information used in the analysis. More specifically, commenters

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increased cancer risks of one-in-one million and one-in-ten thousand to the continuous exposure level (e.g., EPA's reference concentration) estimated to be without adverse non-cancer effects in human populations, including sensitive subgroups. We then set the two chronic RBC or RBD values to the lower two of those three levels. For other HAPs, both of the two chronic RBC or RBD values were set to the continuous exposure level estimated to be without adverse non-cancer effects in human populations, including sensitive subgroups. A fuller discussion of these steps is included in the technical support document.

[25] Four of the indices relied on chronic RBCs and emissions or monitoring information, two other indices relied on chronic RBDs plus emissions and bioaccumulation information, and the seventh index relied on acute RBCs and monitoring information.

suggested that in the case of 1,3-butadiene and vinyl chloride, we should rely on draft assessments in progress rather than on assessments currently available on IRIS. In the case of 1,3-butadiene, we agree that the IRIS risk estimate is not an appropriate basis from which to extrapolate human risk and the updated assessment has progressed to the point where it is appropriate for use here.[26] Use of this new assessment, however, does not affect the presence of 1,3-butadiene on the urban HAPs list. In the case of vinyl chloride, we've chosen to use the Agency consensus assessment currently in IRIS rather than a draft assessment that may yet change significantly. However, we've confirmed that using the draft assessment for vinyl chloride wouldn't change its status on the final urban HAPs list.

Some commenters questioned the use of cancer-based RBC or RBD values for certain HAPs to which the Agency has assigned a ''C'' weight of evidence for carcinogenicity (''possible human carcinogens''). We evaluated the supporting data for each ''C'' carcinogen that had been proposed for listing to verify the appropriateness of the assessments for use in this analysis. Many of these substances are currently the subjects of research studies and EPA reassessment activities. In the case of 1,4-dichlorobenzene, the currently available information led us to modify our analysis so that the RBC and RBD values were based on effects other than cancer. For all other ''C'' carcinogens, we retained the RBC and RBD values. As updated information and assessments become available for these and other HAPs, we intend to use that information in analyses supporting future regulatory actions under the Strategy.

Other commenters questioned our assumptions as to the predominant species of chromium and nickel in emissions and monitoring data. Because the national monitoring and emissions data used in this analysis don't differentiate among species of metals, we had to make certain assumptions. To address the likelihood, supported by limited available data, that all nickel present in emissions or ambient air isn't in the form that is thought to have carcinogenic potential (e.g., nickel subsulfide and other insoluble forms), we applied the cancer-based RBC for nickel subsulfide to 25 percent of the total emissions and the ambient measurements for total nickel. We based this decision on the assumption that no more than 50 percent of ambient nickel is present in the insoluble form and no more than 50 percent of that is present in the crystalline form. In the case of the ingestion pathway, the non-cancer-based RBD was used. Regarding chromium, the limited emissions and monitoring information available for both hexavalent and total chromium indicated that approximately two thirds of the chromium present in ambient air or national emissions is likely to be other than the hexavalent form. Thus, we applied the cancer-based RBC for hexavalent chromium to 35 percent of the total emissions and to 35 percent of the ambient measurement.

A few commenters requested an analysis of uncertainties surrounding the calculations. To the extent that it's possible to conduct an uncertainty analysis, we believe the process already includes one. The calculation and presentation of seven different ranking indices, instituted in response to comments from the January 1998 peer review panel, is presented in graphic form in the technical support document. These graphs show the range of ranking indices for each HAP, which we regard as a measure of some of the uncertainty associated with this identification methodology.

b. Analysis 2: Review of existing risk assessments and hazard rankings. For the second analysis, we reviewed a number of air toxics risk assessments or hazard rankings conducted previously by EPA staff, State agencies or others.[27] We selected 14 of the available studies for use in this analysis, because they were sufficiently broad in the pollutants evaluated, they included area sources of HAPs, and they focused on the risks presented in urban areas. Each study provided a risk-based ranking of HAPs, with separate rankings for cancer and, when available, other health effects. The rankings within each study were converted to a scale common to all of the studies, and the values were summed across the studies, providing a total score for each HAP. Because section 112(k) places special emphasis on area sources of HAPs, scores were developed both for studies that considered combined emissions from major, area, and mobile sources, and for studies that considered emissions from area sources alone. From this analysis, we identified those HAPs that, when compared across studies, consistently ranked high.

c. Analysis 3: Cumulative Exposure Project (CEP). In the third analysis, we used information provided by the CEP.[28] In the CEP, the Assessment System for Population Exposure Nationwide (ASPEN) model was used with preliminary estimates of 1990 HAP emissions from all source types to predict long-term average concentrations at the census tract level for 148 HAPs. For some pollutants, modeled concentrations were augmented with estimates of background levels that were intended to represent contributions from natural sources, as well as historic emissions of persistent pollutants. The estimated ambient concentrations were then compared to risk-based concentrations (termed benchmarks by the authors) intended to represent either continuous exposure levels associated with a one-in-a-million upper bound estimate of excess lifetime cancer risk, or continuous lifetime exposure levels associated with no significant risks of adverse non-cancer effects (e.g., EPA's Inhalation Reference Concentration (RfC)). As stated earlier, estimated concentrations greater than risk-based concentrations should be viewed as indicators of a potential health problem, and not as a characterization of health risks. While we recognize certain limitations associated with this initial attempt at modeling HAP concentrations nationwide, and its inappropriateness for use in drawing conclusions at small geographic scales, this modeling effort is useful as a national screening tool. In this analysis, we used the information generated by the CEP for urban areas and identified those HAPs for which the modeled concentrations exceeded risk-based concentrations in the greatest number of urban census tracts.

We received comments on several aspects of our use of the CEP analysis in our method for identifying the draft urban HAPs list. Some commenters felt that the addition of background concentrations was inappropriate. Additionally, some commenters questioned the appropriateness of the reference values used for some HAPs. We recognized that the background value for one of the HAPs (bis(2-ethylhexyl)phthalate or DEHP) was wrong, and we agreed that we should focus the analysis on modeled concentrations resulting from controllable sources. Additionally, we're currently using updated risk-based concentrations which, in some cases, differ from those used in the CEP analysis. Consequently, prior to using this analysis as part of our final methodology, we repeated the analysis

[26] See April 27, 1999 internal memo, available in the public docket.

[27] These assessments and rankings, and the details of this analysis, are described in the technical support document for the identification of the urban HAPs, which is available in the public docket.

[28] See footnotes 13 and 14.

for the subset of affected HAPs using the modeled concentrations resulting only from current area, major and mobile sources (i.e., without addition of a background value) and an updated set of risk-based concentrations. We've described the details of this reanalysis in the technical support document in the public docket.

d. Integration of the three analyses. In selecting the urban HAPs for the integrated Strategy, we compared the results of these three separate ranking analyses and applied the following criteria when integrating their results. We selected those HAPs for which a publicly reviewed baseline national emissions inventory was available [29] and which had been either:

- Identified by at least two of the three analyses (regardless of area source contribution); or
- Identified by at least one of the three analyses and having an area source contribution to total emissions of at least 25 percent.

The second criterion was set in recognition of the area source emphasis of this integrated Strategy. These criteria produced an integrated list of 33 urban HAPs.

As discussed earlier, section 112(k)(3)(B) of the Act requires us to identify not less than 30 HAPs that are estimated to pose the greatest threat to public health in the largest number of urban areas as the result of emissions from area sources (''the area source HAPs''). To identify these 30 area source HAPs, we ranked the list of 33 urban HAPs by percent contribution to national urban emissions from area sources and selected the 30 urban HAPs with the greatest area source contributions. The remaining three urban HAPs (i.e., coke oven emissions, 1,2-dibromoethane, and carbon tetrachloride) have less significant emissions contributions from area sources and aren't among the 30 area source HAPs considered in the area source category listing described in section II.C.

Some commenters on the draft Strategy were concerned that the percent contribution to national urban emissions from area sources was too low for some of the HAPs on the draft area source HAPs list, thus not placing enough emphasis on risks from area sources. While we note that the percent contribution from area sources for the area source HAPs ranges down to as low as 2.9 percent, these values apply to total urban emissions nationally. In individual urban areas as well as in local communities within large areas, area sources may play a much larger role. Because the Act requires us to select not less than 30 area source HAPs and because the percentage of emissions from area sources will vary, we consider this an appropriate approach to identify the area source HAPs on which the Strategy will focus in reducing area source emissions and any associated health risks in individual urban areas nationwide.[30] Accordingly, this list of 30 area source HAPs was used in identifying the list of new area source categories for which standards will be addressed as required by section 112(c)(3) and section 112(k)(3)(B)(ii).

B. How does EPA Plan to Address Requirements for Area Sources of HAPs?

1. Area Source Category Selection Approach in Draft Strategy

The Clean Air Act includes two provisions—sections 112(c)(3) and 112(k)(3)(B)(ii)—that instruct us to identify and list source categories that contribute to the emissions of the 30 ''listed'' (or area source) HAPs, and that are, or will be, subject to standards under section 112 of the Act. The language in these two sections differs slightly. Section 112(c)(3) requires us to list, pursuant to section 112(k)(3)(B), sufficient categories of sources ''to ensure that area sources representing 90 percent of the area source emissions of the 30 [listed] hazardous air pollutants'' are subject to regulation under section 112. As explained in the draft Strategy, this would seem to allow us to regulate sources accounting for either 90 percent of the combined emissions of all of the 30 area source HAPs, or 90 percent of the emissions of each of the 30 area source HAPs. By contrast, section 112(k)(3)(B)(ii) requires us to identify sufficient categories to ''assure that sources accounting for 90 per centum or more of the aggregate emissions of each of the 30 identified hazardous air pollutants'' are subject to standards under section 112(d). This language explicitly requires us to regulate sources accounting for 90 percent of the emissions of each of the 30 area source HAPs. As a result, in the draft Strategy we adopted the interpretation that allowed us to read the two provisions consistently, and assembled a draft list of area source categories representing 90 percent of the emissions of each of the 30 area source HAPs.

We adopted a two-step process for selecting the source categories for the draft list. First we listed all of the area source categories already subject to area source standards. For each of these source categories we identified their percentage contribution to the total area source emissions for each of the 30 area source HAPs. We then listed additional area source categories as necessary, listing the largest contributors first, until the list of area sources represented 90 percent of the emissions for each of the 30 area source HAPs.

2. Improvements in Area Source Category Information

Since issuing the draft Strategy, we've significantly improved our emissions inventory data for many area source categories. (The final information on the subset of pollutants of the baseline inventory used in this analysis and a description of the changes made is in the technical support document ''Emissions Inventory of 40 Candidate Section 112(k) Pollutants; Supporting Data for EPA's Section 112(k) Regulatory Strategy'' available at www.epa.gov/ttn/uatw/112k.) The draft inventory for the subset of the HAPs of the baseline emission inventory was available twice for public review. From this extensive review, we received over 200 comments on the inventory, which were addressed where data were provided. Based on the large number of public comments, and information from internal comments, we've made many changes to the baseline emissions inventory used to identify HAP sources. In particular, better emission information for many of the sources subject to section 112(d) MACT standards made a significant difference in the inventory. The percent

[29] On June 20, 1997 we published notice of a draft listing of source categories for regulation under section 112(c)(6) of the Act (62 FR 33625). As part of this notice, we requested public review and comment on the baseline national emissions inventory for the seven pollutants identified under section 112(c)(6). In the fall of 1998, we requested and obtained public review on our baseline national emissions inventory for 40 HAPs, five of which had also been reviewed as part of the rulemaking process under section 112(c)(6). During both of these public reviews, many comments were received on various aspects of the emissions information, and we considered these comments in making improvements to the baseline national emissions inventory for those HAPs. Details concerning these two public reviews and documentation of the resultant inventory information are presented in two documents (''1990 Emissions Inventory of Section 112(c)(6) Pollutants: Final Report'' and ''1990 Emissions Inventory of 40 Candidate Section 112(k) Pollutants'') available at www.epa.gov/ttn/uatw/112c6/112c6fac.html and www.epa.gov/ttn/uatw/112k/112kfac.html, respectively. The public reviews provided us with an inventory that was appropriate for our use on a national scale, in the identification of the urban and area source HAPs. However, this baseline inventory may require certain modifications for small scale detailed analyses such as those described in section II.B.

[30] Given the uncertainties and limitations associated with the information upon which the 30 area source HAPs selection was based, we don't believe that identifying greater than the statutory minimum of 30 HAPs is warranted at this time.

contribution from major versus area sources for each source category was also refined and updated based on better information. For many MACT standards, we now have lists of regulated facilities, which allows for better designation of major facilities in the inventory.

We received several comments requesting that the area source categories designated as ''SIC combined'' be broken down into individual SIC (or Standard Industrial Classification) codes. Examples of these source categories from the draft Strategy were Electronic and other Electric Equipment Manufacturing (SICs combined), Food Products (SICs combined) and Instruments and Related Products (SICs combined). The way in which the SIC codes were combined didn't reflect a technical analysis of whether these SIC codes could in fact be combined into single source categories for regulatory purposes. In general, the combinations included large numbers of different industry types which would later have to be broken down into separate projects and separate source categories for regulation. In addition, it was difficult to discern from the list which subsets of the multiple SIC codes were actually emitting the pollutants of concern and would eventually be subject to regulation.

For the final Strategy, we listed source categories (presented in Table 3) that primarily represent single SIC codes in order to more accurately identify the sources that may ultimately be subject to regulation. The exception to this is when the source category was derived directly from information obtained during the development of a section 112(d) standard (e.g., Paint Stripping Operations), in which case the area source category described for the standard may incorporate multiple SIC codes.

Despite these improvements in the baseline, there are still uncertainties in the emissions reported in some categories and in some of the TRI reporting. Our awareness of these uncertainties is based on our improved knowledge of some source categories and emission estimation methods, and also on an improved recognition of the limits of our data for other source categories. For the development of the area source category listing, we needed to use the baseline inventory information on a more refined scale (at the source category level) than we did in development of the HAPs list where we used the baseline inventory on a national scale. For this reason, we sometimes modified the individual source category information in various ways, such as by combining source categories' emission information. In a few cases, we changed the emission information related to tonnage for some source categories. These adjustments to tonnage didn't affect the total emissions used on a national scale. As a result of these changes, the information presented in the area source category analysis (source category names and tonnage) may not always match the way source categories are presented in the final baseline inventory.

Examples of some changes made in the area source category analysis include combining all the emissions from human and animal cremation, because they will be addressed under one rulemaking (Other Solid Waste Incinerators). For the same reason, we combined all the emissions from institutional and commercial heating, as this will be addressed under one rulemaking (Institutional/Commercial Boilers). We also included the area emission estimates for the source category Paint Stripping Operations, because they were inadvertently excluded from the final baseline inventory. We changed the name of the source category listed as Chlorine Production in the baseline to Mercury Cell Chlor-Alkali Plants. This revised source category name better represents the portion of the industry which will be ''subject to standards''. Additional changes are described in the technical support document for identifying area source categories.

As discussed in section II.A.2., several of the 30 area source HAPs listed in the draft Strategy have been replaced based on updated information. The result is the addition of the following HAPs to the list of 30 area source HAPs: beryllium compounds, hexachlorobenzene, polychlorinated biphenyls (PCBs), quinoline, vinyl chloride, and 1,1,2,2,-tetrachloroethane. Quinoline was included in the draft Strategy list for major sources only, but based on updated information is now included for area sources. These changes in the area source HAPs list have also led to changes in the area source categories list.

3. Area Source Category Selection Approach in Final Strategy

We've reviewed the provisions in sections 112(c)(3) and 112(k)(3)(B)(ii), and believe the most reasonable interpretation of the Act is still the interpretation adopted in the draft Strategy. In order to comply with the requirements of both sections, we must list those source categories representing 90 percent of the emissions of each of the 30 area source HAPs.

We have, however, changed our criteria for selecting the source categories contributing to emissions of the 30 area source HAPs. Again we've adopted a two-step approach with the first step being similar to that in the draft Strategy. In the first step we've identified area sources that contribute to emissions of the 30 area source HAPs, and that are subject to existing standards, or will be subject to standards that are currently being developed. These area source categories have already been listed for regulation under the Act. As in the draft Strategy, for each of these source categories we identified the percent contribution to the total area source emissions for each of the 30 area source HAPs.

In the second step, we've decided, at this time, to add only those area source categories that contribute at least 15 percent of the total area source emissions of any of the individual area source HAPs to the list of source categories. We've adopted this criterion to account for the uncertainties in our current inventory data. While we've been able to significantly improve our baseline emissions inventory data, data gaps and uncertainty still remain. This is particularly true as we move to a more refined scale to determine emissions at a source category level. As a result, we've decided to only list new categories of area sources at this time if the inventory data demonstrate that each newly listed area source category contributes at least 15 percent to the national urban emissions of at least one of the 30 area source HAPs. Once listed, we've counted the percent contribution, even if less than 15 percent, to emissions of any other area source HAPs, because once the source is subject to regulation its emissions of any of the 30 area source HAPs can be counted toward the 90-percent goal for each of the area source HAPs. Likewise, when we subject these source categories to regulation we'll evaluate regulation of all 188 HAPs, not just the 33 urban HAPs listed under this Strategy.

The result of these new criteria for the source selection process is that the current list doesn't, at this time, contain area source categories representing 90 percent of the emissions of each individual HAP. It's important to make clear that we still intend to meet our statutory obligation to list area sources accounting for 90 percent of the emissions of each of the 30 area source HAPs. We've chosen to complete this list in stages, adding to, deleting from, or shuffling the list as we gather more and improved data. This first stage lists those area source categories that contribute at least 15 percent, and,

therefore, we're confident add real contributions to the total area source emissions of a particular area source HAP. As discussed in section IV.D., we'll be conducting an initial national risk assessment in the spring of 2000 that will be used in part to prioritize which standards to pursue first. This initial assessment will use the much better-developed 1996 NTI. We'll use this information as part of our process to reevaluate the source categories listed in the Strategy. Based on this updated information, we may decide to remove an area source category listed here if, for example, the reason for the listing was inaccurate (e.g., faulty reporting to TRI) or if no urban area sources exist. We'll also use this assessment to evaluate area source categories to be added to the list.

We believe this iterative approach is consistent with the general scheme for listing and regulating area sources under section 112 of the Act. Section 112 establishes two distinct steps for regulating emissions of HAPs—one for listing source categories under 112(c) and one for setting standards under 112(d). Section 112(k) incorporates this two-step approach. The source category listing step (see for example, sections 112(c)(1) and (9)) is intended to be an ongoing process. Under section 112(e)(4), listing of a particular source category isn't considered final agency action until EPA issues emission standards for that source category. Thus, we feel the list of area source categories is flexible both for the addition of new area source categories and/or removal of area source categories, through public notice. We believe our current approach for fulfilling the 90-percent requirements in sections 112(k)(3)(B) and 112(c)(3) is consistent with the overall structure of section 112 which authorizes us to treat the list of area source categories as a work in progress.

One alternative to this iterative approach would be to attempt to list all sources accounting for 90 percent of the emissions of each individual area source HAPs as we did in the draft Strategy, and to make changes in the future as data are collected and improved. We decided against this approach because it would involve listing many area source categories contributing very small amounts of a particular HAP based on data that we consider in many instances to still have significant uncertainty despite numerous improvements. In the end, we believe the two approaches aren't meaningfully different. Even if we officially ''listed'' these small contributors, their status on the list would be tentative at best. Under the current approach, we've identified all of these small contributors in the supporting materials for this rulemaking, but we've chosen not to list them under section 112(c)(3) at this time, if the emissions currently appear to be less than 15 percent of the total area source emissions of any individual area source HAP. Under both approaches the list will likely change with new and improved inventory data.

4. New Area Source Category List

With the two-step approach described above, we identified the area source categories listed in Tables 2 and 3. In step one, we identified those area source categories that contribute to emissions of the 30 area source HAPs, and that are subject to existing standards, or will be subject to standards that are currently being developed. These source categories are provided in Table 2. We've included Hazardous Waste Combustors on this list, despite the fact that information related to the percentage contribution from area source Hazardous Waste Combustors hasn't yet been completely defined, because the Hazardous Waste Combustor NESHAP (as proposed) would subject area sources to the same standards as major sources. Once we determine the percentage of urban area emissions from the area source categories affected by this rule, their emissions will be counted toward the 90-percent requirement for the appropriate HAPs.

Table 3 includes those new area source categories being listed under section 112(c)(3) for the first time. These area source categories were identified in step two of our selection process, which identified area source categories contributing at least 15 percent of the total area source emissions of any of the 30 area source HAPs.

TABLE 2.—AREA SOURCE CATEGORIES ALREADY SUBJECT TO STANDARDS OR WHICH WILL BE SUBJECT TO STANDARDS

Chromic acid anodizing	Industrial boilers
Commercial Sterilization Facilities	Institutional/Commercial Boilers.
Other Solid Waste Incinerators (Human/Animal Cremation)	Medical Waste Incinerators.
Decorative Chromium Electroplating	Municipal Waste Combustors.
Dry Cleaning Facilities	Open Burning Scrap Tires.
Halogenated Solvent Cleaners	Portland Cement.
Hard Chromium Electroplating	Secondary Lead Smelting.
Hazardous Waste Combustors	Stationary Internal Combustion Engines.

TABLE 3.—NEW AREA SOURCE CATEGORIES BEING LISTED

Cyclic Crude and Intermediate Production	Municipal Landfills.
Flexible Polyurethane Foam Fabrication Operations	Oil and Natural Gas Production.
Hospital Sterilizers	Paint Stripping Operations.
Industrial Inorganic Chemical Manufacturing	Plastic Materials and Resins Manufacturing.
Industrial Organic Chemical Manufacturing	Publicly Owned Treatment Works.
Mercury Cell Chlor-Alkali Plants	Synthetic Rubber Manufacturing.
Gasoline Distribution Stage I.	

5. Meeting the Requirement To List Area Sources Representing 90 Percent of Emissions

The current list of area source categories doesn't include categories representing 90 percent of the emissions of each of the 30 area source HAPs. The current list meets the 90-percent or greater requirement for 11[31] of the 30 area source HAPs. For 10[32] other HAPs, the list accounts for at least 80 percent of the emissions, and for ethylene dichloride the list accounts for approximately 78 percent of the emissions. Improved inventory data may demonstrate that the current list of area sources already meets the 90-percent requirement for some of these HAPs. The remaining HAPs on the list represent less than 75 percent of the emissions: arsenic compounds, cadmium compounds, chromium compounds, hexachlorobenzene, lead compounds, manganese compounds, nickel compounds, and polychlorinated biphenyl.

In the case of the metal compounds for arsenic, cadmium, chromium, lead, manganese and nickel, we know we haven't listed enough new area source categories to say that we've completely addressed the emissions from these area source HAPs. In the case of the metal HAPs, there tend to be numerous source categories, each contributing only a small percentage of the HAPs. In many cases, this is because the source categories have already reduced emissions due to other control programs in place. However, because these pollutants can have significant health effects, we'll be developing a separate strategy to specifically address emissions of these metals. As part of our initial evaluation of the area sources of these HAPs, we're including the following source categories for further evaluation (our current data indicate that each contributed five to twelve percent of area source emissions of one or more of these metal HAPs):

- Sewage Sludge Incineration.
- Aluminum Foundries (castings).
- Steel Foundries.
- Secondary Copper Smelting.
- Stainless and Nonstainless Steel Manufacturing—Electric Arc Furnaces (EAF).
- Iron Foundries.
- Plating and Polishing.
- Cadmium Refining and Cadmium Oxide Production.
- Autobody Refinishing Paint Shops (called Paint Applications in the baseline inventory).
- Pressed and Blown Glass and Glassware Manufacturing.

We aren't listing these categories for possible regulation at this time; however, after further evaluation of these categories, some or all may be added to our area source category list.

We haven't listed any area source categories which specifically contribute emissions of PCBs or hexachlorobenzene, although some of the source categories listed may emit one or both of these HAPs. We've decided to wait on listing any source categories contributing to area source emissions of hexachlorobenzene or PCBs, because these HAPs weren't included in the candidate list of HAPs for which we collected detailed inventory data in preparation for the Strategy; therefore the emissions inventory baseline for these HAPs didn't receive the same level of review. We've already begun efforts that may supplement our inventory data for these HAPs, and, as appropriate, we'll list new area source categories when we collect more data and make the list available through public notice. For example, we're currently researching the sources of PCBs, and whether PCBs may be the product of incomplete combustion. The findings of this research could significantly change the emissions inventory for this pollutant. Even though we're not listing source categories of these pollutants at this time, like the metals, we're concerned about the potential health effects of these pollutants, and we have a number of programs across EPA working to address them (e.g., the PBT initiative and the Binational Toxics Strategy).

We anticipate evaluating the source categories for these and the other remaining HAPs for which we haven't reached a 90-percent emission reduction, including the six metal HAPs, PCBs and hexachlorobenzene, when we conduct the initial risk assessment in the spring of 2000 (discussed in section IV.D.). We intend to adjust this list in the event that new information comes forward and will complete the list by 2003.

6. Comments on Specific Source Category Listings

Several comments on the draft Strategy addressed the need to add or delete certain source categories. Many of these comments have been addressed with the changes described above to the emissions inventory and the urban HAPs list. Many of these commenters asked that we add several source categories (such as dry cleaners, retail gas stations, print shops, autobody shops, and beauty shops). Some of these source categories are already addressed by area source MACT standards (e.g., dry cleaners). Many of the others involve organic emissions from consumer products such as surface coatings, metal cleaning, solvents, personal care products, and household cleaning products. While these products may be responsible for a significant fraction of the emissions of several of the 30 area source HAPs, we believe section 112 isn't necessarily the most appropriate regulatory mechanism for controlling them. For many of these emissions, we believe section 183(e) provides the more useful authority. For example, in September 1998, we published a VOC rule under section 183(e) for household consumer products. This rule will affect approximately 220 consumer product manufacturers and importers nationwide. At the same time we published two other national rules which address VOC emissions from consumer and commercial products: Architectural Coatings and Automobile Refinishing coatings. These combined rules should provide reductions of over 2.4 million tons of VOC per year. Automobile Refinishing is also included on our list for further evaluation due to metals emissions.

Similarly, we don't believe section 112 is the most appropriate tool to address refueling emissions at gas stations. Instead, consistent with Congress' intent, we've chosen to regulate these emissions through sections 182(b)(3) and 202(a)(6). The ''stage II'' and ''onboard requirements'' programs developed under these authorities will lead to reductions of VOCs and HAPs of 300,000 to 400,000 tons per year (63 FR 17844, April 10, 1998).

Commenters also said the list should focus on source categories emitting the deadliest HAPs. As we explained in section II.A., toxicity was one of the key criteria in all of the rankings used to develop the list of 30 area source HAPs. As a result, pollutants such as dioxins and beryllium compounds, because of their high toxicities, are included on the list of 30 area source HAPs, despite relatively small overall emissions in urban areas. Thus, toxicity is built into the list of source categories selected for regulation because toxicity is built into the list of pollutants used to select these source categories.

[31] Including 1,1,2,2-tetrachloroethane, 1,2-dichloropropane, polycyclic organic matter, acetaldehyde, acrolein, benzene, dioxin, furans, ethylene oxide, formaldehyde, quinoline, and tetrachlorethylene.

[32] Including 1,3-butadiene, 1,3-dichloropropene, acrylonitrile, beryllium compounds, chloroform, hydrazine, mercury compounds, methylene chloride, trichloroethylene, and vinyl chloride.

7. Additional Requirements for Area Source Categories Already Subject to MACT

Several of the source categories listed today (e.g., Municipal Landfills, and Publicly Owned Treatment Works) are already in source categories covered by MACT standards for major sources. As discussed in section II.C.1., we'll develop area source standards for the listed area source categories. When it's practical during our rulemaking activities, we'll attempt to combine information gathering for area and major sources. A good example is the development of the MACT standard for municipal landfills. This source category is required to be evaluated for major sources as a MACT standard, and we've expanded our data base to include area sources as well. In other instances, such as for Publicly Owned Treatment Works, the MACT standard was already proposed and is near promulgation, so it isn't possible to coordinate rulemaking for the major and area sources at the same time.

In the cases where standards already apply to listed area sources (e.g., Municipal Waste Combustors, Medical Waste Incinerators, Chromium Electroplating, and Halogenated Solvent Cleaning), we'll coordinate the need for additional regulation through assessments we'll be conducting under the section 112(f) residual risk program. Information on how we'll conduct assessments on residual risk are discussed in the residual risk report.[33] We'll also be evaluating the effectiveness of the standards that are already in place through information provided by State, local and Tribal air agencies. Also, as we continue to assess our progress in meeting our air toxics Strategy goals, we'll reevaluate the need for additional area source standards to ensure that the 90-percent requirement and our other goals are met.

C. What Regulatory Actions Will EPA Take To Implement the Strategy?

Consistent with our goals, we intend to assess cumulative risks to the public from HAP exposures resulting from stationary (area and major) and mobile sources. Based on the outcome of these assessments, we'll undertake the needed regulatory actions using the appropriate authorities. These actions include developing area source standards, which are discussed in sections II.C.1. though II.C.5. We'll also regulate motor vehicle and fuel HAPs as described in section II.C.6. Finally, we'll develop additional major source standards under section 112(d), section 112(f), and other programs under the Act, as needed to reach our goals. The role of major stationary sources in the Strategy is discussed in more detail in section II.C.7. Our approach for addressing combinations of source types (e.g., at airports) is described in section II.C.8.

1. Our Approach to Developing Area Source Standards

We plan to pursue a tiered approach that will consider three standard setting processes. The specific process selected for a particular source category will depend on the criteria outlined below. The three tiers of standard setting processes that will be considered are:

- Tier 1—MACT standard process;
- Tier 2—Source category specific GACT standard process; and
- Tier 3—Flexible GACT process.

We received a number of comments on the draft Strategy stating that our regulatory intentions for area sources were unclear. In addition, we received comments requesting flexibility for State/local/Tribal governments and for emission sources in implementing these area source standards. The following discussion attempts to provide the needed clarifications and to explain our approach to developing a flexible regulatory development process.

Tier 1—MACT standards. We'll develop MACT standards in accordance with the process outlined in section 112(d)(3) for those area sources whose emissions pose the greatest threat to human health and the environment and for which the technology to achieve maximum reductions in HAP emissions is appropriate. Section 112(d)(3) requires the standards to reduce HAP emissions as much as is achievable, considering the cost of these reductions, effects on health or the environment (other than air), and energy requirements.

Section 112(d)(3) requires us to use a minimum statutory baseline (''floor'') when setting MACT standards. For new sources, the MACT standards for a source category or subcategory must be at least as stringent as the emission control achieved in practice by the best controlled similar source. The standards for existing sources can be less stringent than standards for new sources, but they can't be less stringent than the average emission limitation achieved by the best-performing 12 percent of existing sources (excluding certain sources) for categories or subcategories with 30 or more sources, or by the best-performing 5 sources for categories or subcategories with fewer than 30 sources.

We've issued MACT standards for area sources in previous cases. For example, in the chromium electroplating national emission standards for hazardous air pollutants (NESHAP), we developed MACT standards for area sources because of the high toxicity of chromium. Similarly, in the Portland Cement NESHAP, we determined that MACT controls were appropriate because of the quantity and toxicity of the HAPs being emitted from area sources. In addition, both of these source categories have numerous, widespread sources.

Tier 2—Source category specific GACT standards. While we may develop MACT standards for some area sources, we expect most sources will be subject to GACT standards developed in accordance with section 112(d)(5). As with MACT standards, GACT standards would be developed for a specific source category, but they would be based on the use of GACT as opposed to the use of MACT. This approach will be used to address source categories that present a human health risk or environmental concern, but where GACT is a more appropriate approach for reducing HAP emissions than MACT. To make these standard-setting decisions, we'll consider economic feasibility and other factors that could lead us to GACT.

Tier 3—Flexible GACT process. Considering the large number and diversity of area sources and limitations in the data and information currently available for many of them, we expect it may be appropriate in some cases to develop flexible requirements that would apply to several area source categories where more flexibility is appropriate (e.g., where there are very few area sources, they are confined to a limited geographic area or areas, or they contribute to localized public health or environmental risks). Under this option, we might develop general requirements such as a process rule similar to section 112(g), which would be applicable to area sources in several source categories. These general requirements could outline procedures for determining what constitutes ''generally available control technology'' in this context. By following these procedures, States, local governments, and Tribal agencies could elect to develop GACT for the area sources. We'd review the resulting standards to ensure they were developed following the procedures contained within the general requirements and, if appropriate, we'd adopt the standards as GACT for these area sources.

We believe this approach presents several advantages. It could be implemented in a manner that permits State, local and Tribal agencies to

[33] U.S. EPA. Residual Risk Report to Congress. EPA–453/R–99–001. March 1999.

address cumulative risk posed by exposures to HAP emissions from many different source categories. It also permits greater flexibility in tailoring GACT to individual area sources or area source categories which may contribute to an undue public health risk in a particular area. For example, a State, local or Tribal agency could tailor GACT to a particular source by requiring potentially more stringent controls when the source contributes emissions that, when aggregated with emissions from other sources in the area, pose health risk concerns. They could also require less stringent controls when the source is in an area where exposures to aggregated emissions don't present significant concern.

To supplement our general requirements, we may choose to issue control technique guidelines or alternative control technology documents to provide information on generally available control technologies for controlling HAP emissions.

2. The Legal Basis for Using GACT for Area Source Categories

Section 112(k)(3)(B)(ii) directs us to assure that the listed area sources are subject to standards under section 112(d), which includes two levels of standards—''maximum achievable control technology'' (MACT) and ''generally available control technology'' (GACT). We read the requirement in section 112(k)(3)(B)(ii) to give us flexibility in deciding which level of control to apply to a given source category.

Unlike MACT, which is specifically described in sections 112(d)(2) and (3), the meaning of GACT, or of what is ''generally available,'' is not defined in the Act. Section 112(d)(5) authorizes the Administrator to:

> [P]romulgate standards or requirements applicable to [area] sources * * * which provide for the use of generally available control technologies or management practices by such sources to reduce emissions of hazardous air pollutants.

Section 112(d)(5) thus doesn't limit us to strict ''standard setting'' in order to provide for the use of GACT. We read section 112(d)(5) to authorize promulgation of at least two types of rules: rules that set emission levels based on specific controls or management practices (analogous to MACT standard setting), and rules that establish permitting or other regulatory processes that result in the identification and application of GACT. As long as the result of the section 112(d)(5) rulemaking is that sources use enforceable generally available control technologies or management practices, section 112(d)(5) appears to give us flexibility in choosing between the adoption of numerical emission limits and the promulgation of other requirements that result in sources applying GACT.

As discussed previously, we intend to determine which of these regulatory approaches is most appropriate when we conduct rulemaking on the individual source categories. However, it's important to bear in mind that we retain authority under section 112(d) to regulate any listed area sources more stringently, under MACT, where appropriate, to effectively address risk. In addition, we can lower the emission thresholds for defining sources as ''major'' and, therefore, subject what would have otherwise been area sources to major source requirements (MACT).

3. Issues on the National vs. Local Scope of Area Source Standards

Section 112(k) requires that listed area source categories be subject to standards under section 112(d).

Many commenters on the draft Strategy addressed the implications of selecting a national versus a local scope for the area source standards. Some said national area source standards are unfair and inefficient, because they apply to sources located outside of urban areas where they may pose less risk. However, others said failing to apply the standards nationally creates an unlevel playing field for businesses in urban areas, encourages urban sprawl, and creates a disincentive for new businesses in brownfield and urban development areas.

As indicated by our initiatives on urban development and brownfield redevelopment, we share the concern of many commenters that applying standards only in the urban areas could negatively impact economic opportunities in the urban areas and could, in some cases, encourage urban sprawl. In addition, we're also concerned about the disproportionate public health risk for people, particularly sensitive populations such as children, in smaller cities or rural areas that might be located near area sources. However, we're aware that for some area source categories it may be more practical and appropriate to limit the applicability to urban areas. Thus, our expectations are to apply area source standards under section 112(k) nationally; however, for each individual area source category, we'll determine whether it's more appropriate for area source standards to apply nationally or only in urban areas.

For those area source categories where the standards only apply in urban areas, we'll look to the consolidated metropolitan statistical area (C/MSA) boundaries as a starting point to define the urban area. Although we used the urban 1 and urban 2 definitions [34] for the development of the inventory to support the HAPs and source category analysis, we believe the C/MSAs are more appropriate for defining applicability of area source standards because the C/MSAs better reflect the nature of population density, commercial development, area growth, and air emissions that represent urban areas.

Although we generally believe that urban areas are those C/MSAs with populations of more than 50,000, we recognize that the appropriate area in which standards should apply may vary among area source categories. Consequently, we believe the determination of the area in which standards will apply should be made separately for each source category.

4. Title V Permits for Area Sources

Under section 502(a) of the Act, area sources can be exempted from Title V permitting if the Administrator determines that compliance with Title V requirements is impracticable, infeasible, or unnecessarily burdensome for the area sources in question. As specified in 40 CFR 63.1(c)(2), 70.3(b)(2) and 71.3(b)(2), individual standards promulgated under part 63 will specify whether Title V permits are required for area sources. Consequently, we'll determine in each subpart that is developed for the Strategy whether area sources affected by the subpart are subject to, or exempt from, Title V permitting.

Factors that might influence this determination were raised by commenters. For example, many commenters felt that area sources are often small businesses, and that requiring Title V permits for these sources places an unfair resource burden on them. Other commenters felt that these sources should be covered by Title V permits in order to provide resources to the States through the collection of Title V fees, and to provide an opportunity for community input on the establishment of area source requirements. Title V, which is implemented through regulations codified in 40 CFR parts 70 and 71, generally requires owners or operators of area sources subject to section 112 standards to obtain Title V permits.

[34] Urban 1 areas are those counties that have a population of more than 250,000. Urban 2 areas are counties where at least 50 percent of the population is considered to be urban.

We also received a number of comments in regard to Title V fees and the Strategy. Some commenters requested that area sources subject to the Title V program be charged an annual fee, rather than a per ton fee. How Title V fees are assessed is determined by the individual permitting authority and is subject to approval by EPA as part of the permitting authority's Title V program submittal to the Agency. Permitting authorities are free to assess fees based on criteria other than emissions, including application fees or service-based fees. Moreover, permitting authorities can assess fees differently among Title V sources. Therefore, we don't have the authority under section 112(k) of the Act to establish a new basis for assessing Title V fees.

Other commenters requested that Title V fees be used to fund state toxics reduction programs. We must emphasize that, according to 40 CFR 70.9(a), Title V fees are to be used solely to fund a permitting authority's Title V program and not non-Title V activities.

5. Schedule for Area Source Standards

We've revised the time line we presented in the draft Strategy for area source standards development. We believe the following milestones reflect a more realistic estimate of the average 4 years it takes to develop MACT/GACT standards. We intend to address the source categories newly listed here by 2004, and address additional source categories listed later in the process of implementing the Strategy in later years (i.e., 2006–2009).

- 2004—promulgate the area source standards newly listed in today's Strategy. We'll attempt to meet this demanding schedule as expeditiously as practicable.
- 2006—promulgate additional area source standards to meet the 90-percent requirement.
- 2009—promulgate all remaining area source standards necessary to meet the 90-percent requirement.
- 2012—expected compliance under all standards.

We'll prioritize the order in which we regulate source categories to address those posing the greatest risks first. This will be a part of our initial assessments, which will be done in the spring of 2000. We'll be developing standards between now and 2009. Compliance with these standards is required within 3 years of promulgation. Therefore, compliance with all standards is anticipated by no later than 2012.

6. Our Approach for Mobile Source Hazardous Air Toxic Controls

Title II of the Act provides several mechanisms to achieve reductions in hazardous air pollutants from mobile sources. The most direct of these is section 202(l) which requires us to identify the need for and consider regulations for control of HAPs from motor vehicles and their fuels.

Pursuant to section 202(l)(1) of the Act, we released the ''Motor Vehicle-Related Air Toxics Study'' in 1993.[35] This study summarized information on emissions of toxic air pollutants associated with motor vehicles and motor vehicle fuels, as well as estimated exposures, and potential risks. The study also provided cancer risk estimates for several air toxics for different years under various control scenarios. We've recently completed draft analyses to update the emissions and exposure analyses done for this study to account for new information.[36, 37] These draft analyses include base scenarios for 1990, 1996, 2007, and 2020, and control scenarios in 2007 and 2020. We modeled toxic emissions and exposure for the following urban areas: Chicago, Denver, Houston, Minneapolis, New York, Philadelphia, Phoenix, Spokane, and St. Louis. We assessed emissions and exposure from benzene, formaldehyde, acetaldehyde, 1,3-butadiene, and diesel particulate. Experts and stakeholders are currently reviewing the methodologies and assumptions used in the analyses, and work is on-going to extend and revise the analyses.

As mentioned before, diesel particulate matter (PM), which is emitted primarily by mobile sources, isn't included on the section 112(b) list of 188 HAP, and, as a result, isn't included on the urban HAP list. However, we're currently investigating the health risks associated with diesel PM and assessing its role in the urban air toxics problem. We're concerned about the potential health risks associated with exposures to the emissions of this pollutant mixture.

Diesel PM is a complex pollutant mixture that is emitted primarily by mobile sources. Heavy-duty highway and nonroad diesel engines are the largest sources of diesel PM, with the total on-road and non-road diesel PM emissions for 1997 being 516,373 thousand tons.[38] While diesel engines are used in a relatively small number of cars and light-duty trucks today, vehicle and engine manufacturers are developing new engine models that may be used in an increasing share of the light-duty fleet, particularly light-duty trucks. If sales of car and light trucks with diesel engines increase substantially over time, the potential health risks from diesel PM could also increase substantially.

Diesel PM typically consists of a solid core, composed mainly of elemental carbon, which has a coating of various organic and inorganic compounds. The characteristically small particle size increases the likelihood that the particles and the attached compounds will reach and lodge in the deepest and more sensitive areas of the human lung. Both the diesel particle and the attached compounds may be influential in contributing to a potential for human health hazard from long term exposure.

Section 202(l)(2) of the Act directs us to set standards to control HAPs from motor vehicles, their fuels, or both. Those standards are to be set based on available technology, taking existing standards, costs, noise, energy and safety factors into account. The Act also specifies that, at minimum, benzene and formaldehyde emissions must be addressed. We're currently working on a proposal in compliance with section 202(l)(2).

In developing the section 202(l)(2) proposal, we'll draw on the 1993 study, and more recent analyses when completed, to describe the magnitude of exposure and potential health risk to the public from toxic emissions from motor vehicles and their fuels. We'll examine exposure and potential risk in a number of urban areas, as well as on a nationwide basis. With regard to control strategies, several of the existing emission control programs developed under section 202(a) (motor vehicle

[35] Motor Vehicle-Related Air Toxics Study, U.S. Environmental Protection Agency, Office of Mobile Sources, Ann Arbor, MI, EPA Report No. EPA 420–R–93–005, April 1993.

[36] Estimation of Motor Vehicle Toxic Emissions and Exposure in Selected Urban Areas. Prepared by Sierra Research, Inc., Radian International Corp., and Energy & Environmental Analysis, Inc. for U.S. EPA, Office of Mobile Sources, Assessment and Modeling Division, Ann Arbor, MI, Report No. EPA420–D–99–002, March 1999.

[37] Sierra Research, Inc. ''On-Road Motor Vehicle National Toxics Exposure Estimates''. Memorandum from Philip Heirigs to Rich Cook, U.S. EPA. October 15, 1998.

[38] EPA National Air Pollutant Emissions Trends Update, 1970–1997. December 1998, EPA–454/E–98–007. This number also represents PM10 emissions, while PM–2.5 emissions are approximately 474 million tons. Non-road emissions include locomotives, and the on-road calculation excludes tire and brake wear.

[38] EPA National Air Pollutant Emissions Trends Update, 1970–1997. December 1998, EPA–454/E–98–007. This number also represents PM10 emissions, while PM–2.5 emissions are approximately 474 million tons. Non-road emissions include locomotives, and the on-road calculation excludes tire and brake wear.

controls) and section 211 (fuel controls) of the Act already limit many HAP emissions from motor vehicles and their fuels. We'll consider these programs, as well as our on-going regulatory activities (such as our recent proposal for new light-duty ''Tier 2'' emission standards and gasoline sulfur controls and our recent Advanced Notice of Proposed Rulemaking for diesel fuel control), in our assessment of whether additional controls are appropriate under section 202(l)(2).

In addition to fulfilling the requirement to examine emissions and health risks from motor vehicles and their fuels, we'll continue our efforts to ensure coordinated use of our standard-setting authorities to address priority risks from mobile sources. In particular, as we review existing regulations for a number of motor vehicle and nonroad engine categories, the goal of reducing air toxics risks will be considered. In addition, we envision that work done in the early stages of implementing the Strategy, such as improving monitoring and inventories, will help us compare options related to the various emissions sources in urban areas and control authorities to provide the best relative reduction of risk to the urban public.

7. Role Major Stationary Sources Play in the Strategy

As discussed in section I.C., section 112(k)(3)(B) requires that we ensure that area sources accounting for 90 percent of the aggregate emissions of each of the 30 area source HAPs are subject to standards. However, in achieving required reductions in cancer incidences, section 112(k)(3)(C) permits us to consider reductions in public health risks resulting from actions to reduce emissions from ''all stationary sources and resulting from measures implemented by the Administrator or by the States under this or other laws.'' Therefore, we'll consider emission reductions from a combination of major and area sources in conducting risk assessments to address this requirement.

These assessments will support regulatory efforts under the Clean Air Act and other authorities, as necessary, to address the identified risk. For example, any reductions resulting from MACT, the national ambient air quality standards, and other programs that achieve reductions in HAPs can be included in the assessment of reductions in risks. Therefore, if we determine that a source category or an individual source is presenting a significant health risk, then we'll address it using the appropriate regulatory authority. For example, if needed to provide an ample margin of safety to protect human health, section 112(f) residual risk standards will be developed for source categories currently subject to MACT. Additionally, if our analyses reveal a major source category that is currently unregulated or unlisted, but poses a public health risk, we'll list that source category under the authority of section 112(c) and develop the necessary regulations under section 112(d), or we may address it through other activities like pollution prevention or voluntary programs. Similarly, if a specific source is contributing to a local risk problem, then the State, local or Tribal program may be more appropriate for addressing that risk.

8. Our Approach for Combinations of Sources

We also intend to coordinate our authorities in addressing cumulative risks posed by exposures to aggregate emissions from multiple source types. For example, many commenters raised concerns about the risks from airports to the communities that surround them. Airports can be viewed as mini-cities, which produce numerous pollutants from multiple sources and are governed by many different authorities. We'll need to have an integrated strategy to reduce air emissions and the many other environmental impacts associated with aviation activities.

Although airports don't meet the definition of ''area'' or ''major'' source under section 112 of the Act, we're involved with numerous efforts to better understand and reduce the environmental impacts of aviation-related activities and their associated human health risks. For example, we co-chair the EPA/Federal Aviation Administration Voluntary Aircraft Emissions Reduction Initiative, a multi-stakeholder process designed to identify and evaluate technically feasible and cost-effective voluntary measures to reduce aviation emissions. We're also participating with other stakeholders in the development of the South Coast Ground Service Equipment memorandum of understanding (MOU) in California to identify ways to achieve additional emissions reductions from the commercial aviation community. Implementation of the MOU, which should be finalized in the summer of 1999, should yield emission reductions through increased use of cleaner engines, electrification, and alternative fuels. In addition, we're developing a Green Airport Initiative to demonstrate innovative strategies for reducing the environmental impacts of aviation-related activities at an airport undergoing expansion. In April 1999, we released a report that assesses the current and potential impact of aircraft emissions on local air quality at ten selected airports.[39] The regulatory and voluntary actions underway for aviation will produce data that can inform this Strategy and begin to address the environmental impacts of aviation-related activities and their associated risks to the communities that surround them.

D. How do the Various Federal Authorities Help EPA Implement the Strategy?

We've already made progress in addressing air toxics emissions using existing programs. To put the problem in perspective, we estimate that approximately 8.1 million tons of 188 HAPs were released in the United States in 1993.[40] We've already issued at least 43 MACT and GACT standards and two section 129 standards with post-1993 compliance dates, which will address these emissions. Emission controls for the nation's cars, trucks and off-road equipment, and standards for fuels add even more to these reductions. In this section, we'll discuss the utility of these programs and others to achieve additional air toxics emissions reductions.

Federal Regulatory Activities—Clean Air Act Section 112 Authorities

Section 112 of the Act provides several authorities for us to use in meeting our air toxics goals. We've promulgated section 112(d) MACT and GACT standards that are projected to reduce air toxics emissions by approximately 1 million tons per year once fully implemented. Within the next 10 years, as we complete more MACT and GACT standards, the air toxics program is estimated to reduce emissions of toxic air pollutants by well over 1.5 million tons per year.[41] These nationwide emission reductions will contribute significantly to reductions needed in urban areas.

The need for section 112(f) standards, or ''residual risk'' standards, is under consideration for some of the early source categories covered by MACT standards. Where justified, these standards will address remaining public health and environmental impacts of HAPs to ensure an ample margin of safety to protect public health and, in consideration of other factors, to prevent adverse environmental effects.

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[39] ''Evaluation of Air Pollutant Emissions from Subsonic Commercial Jet Aircraft,'' U.S. EPA, April 1999.

[40] ''Latest Finding on the National Air Quality: 1997 Status and Trends,'' December 1998.

[41] See footnote 40.

Consistent with the requirements of the Act, we'll evaluate the need for residual risk standards for those area source categories covered by MACT standards, and will consider such evaluation for those area source categories for which GACT standards have been promulgated.

The chemical accident prevention regulations (''Risk Management Program requirements'' or ''RMP rule''), were promulgated under section 112(r). These regulations require owners and operators handling more than a threshold quantity of any substance listed in 40 CFR 68.130 in a process, to develop risk management plans to prevent and address accidental releases. Eighteen of these listed substances are HAPs. By preventing accidental releases, the RMP rule will help reduce or prevent emissions of these HAPs in the future.

We've already received several requests for permits under the section 112(g) construction and reconstruction rule. This rule applies to new or reconstructed major sources and requires them to install MACT to reduce HAP emissions. In addition, the section 112(i)(5) rule (early reductions) provides incentives for sources to reduce emissions by up to 95 percent from 1990 levels prior to proposal of MACT for that source category. Approximately 27 Title V permit applications have been received, representing HAP reductions of over 6,800 tons.

Other CAA Authorities

Other programs under the Act also contribute to the reduction of HAPs in urban areas. For example, section 109 requires States to develop State implementation plans to attain compliance with the national ambient air quality standards (NAAQS). Many of the activities that are designed to address criteria pollutants (e.g., ozone, particulate matter and lead) and attain the NAAQS also achieve reductions in air toxics. For example, many of the VOCs that form ozone are also air toxics, such as benzene and 1,3-butadiene. In addition, some VOCs can react in the atmosphere to form HAPs such as formaldehyde. Thus, controlling VOCs leads to reductions in air toxics. Similarly, compliance with the PM standards will provide incidental, but potentially significant, reductions in HAPs that are either emitted in the form of particulate matter or that condense to form particles in the atmosphere. These include polycyclic organic matter (POM), chromium, mercury, and other metals. In addition, lead is a criteria pollutant and lead compounds are listed as a HAP, so reducing lead emissions through the lead NAAQS also reduces HAPs.

With regard to mobile sources, in addition to authority under section 202(1) to address hazardous air toxics, other sections of Title II that address mobile sources, including other parts of section 202 (motor vehicles), section 211 (fuel requirements), section 213 (emission standards for nonroad engines and vehicles), and section 219 (urban bus standards), are resulting in reductions in urban air toxics by limiting VOCs, oxides of nitrogen, and particulate matter.

We've established section 129 performance standards for two source categories for combustion sources. These are expected to result in over 50,000 tons per year in HAP reductions, much of which may be in urban areas. Finally, actions taken under Title IV, the acid rain program, and Title VI, stratospheric ozone layer protection, also reduce or eliminate certain urban air toxic emissions.

Other Federal Laws

There are a number of other authorities, laws, rules, and programs that will also help reduce emissions of HAPs and consequent exposures and risks. We're evaluating the appropriateness of these statutes for controlling emissions of HAPs as described under section 112(k)(3) and intend to take further actions under these statutes as appropriate. The contribution of other Federal programs to achieving the goals of the strategy is discussed in more detail in Appendix A. Following is a list of some relevant programs:

- Superfund Amendments and Reauthorization Act (SARA) Title IV.
- Toxic Substances Control Act (TSCA).
- Resource Conservation and Recovery Act (RCRA).
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
- Clean Water Act (CWA).
- Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).
- Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986, especially Toxics Release Inventory requirements.
- Pollution Prevention Act (PPA) of 1990.
- Oil Pollution Act of 1990.

III. State, Local and Tribal Activities

A. Why are State, Local and Tribal Programs Integral to the Process?

The Act requires that the Strategy achieve the risk reduction goals considering control of emissions of HAPs from all stationary sources, using measures implemented by us under the Clean Air Act or other laws or by the States. In addition, section 112(k)(4) requires us to encourage State and local programs. By providing for State reductions in achieving the goals, Congress acknowledged that there are many State programs achieving HAP emissions reductions and, therefore, reducing the chance for exposure and health risks, including cancer. For example, before the Act was amended in 1990, many State, local and Tribal governments developed their own programs for the control of air toxics from stationary sources. Some of these programs have now been in place for many years and, for some of the source categories, they may have succeeded in reducing air toxics emissions to levels at or below those required by the Federal standards. It's clear that Congress intended State and local governments to be important partners in carrying out the mandates of the Federal air toxics program, and this Strategy provides a mechanism to recognize the reductions made by them.

Because of the varied nature of the emissions sources, legislative structures, and other factors, the State, local and Tribal government programs address air toxics in a number of ways. For example, some programs have enacted technology standards for source categories that require controls for specific HAPs, much like the MACT program. Other programs apply a risk standard that prohibits emissions that result in exceedances of a certain level of risk, or they use an ambient air standard for air toxics that is based on threshold or exposure levels. Still others may rely on reductions achieved through volatile organic compound, particulate matter, or lead regulations developed under section 110 or subpart D of the Act to meet national ambient air quality standards. Regardless of the approaches used to address air toxics, State, local and Tribal governments have accomplished and continue to accomplish reductions in HAPs. As we proceed to implement the Strategy, we'll work with these governments to better characterize these reductions in emissions and the resulting reductions of public health risks, including risk of cancer.

Developing the Strategy is a challenge at the national level because urban air toxics problems vary significantly across the country. Because of this variability, the Strategy works best if approached as a partnership between EPA and State, local and Tribal governments. These governments (including municipal

offices other than pollution control departments) have the most experience with local air pollution issues, and can lend their expertise and knowledge to address and resolve air toxics concerns that are unique to cities. Many of these governments also have existing air pollution control programs that currently address, and can effectively continue to address, some or all of these issues. In addition, these governments are often able to act much more quickly than we can to address local concerns, which leads to less overall pollution, particularly in the areas where pollution is of greatest concern.

At the Federal level, we can contribute Federal standards and requirements using our authorities to develop and implement a national regulatory program. We also have the resources and expertise to evaluate, or to help other agencies evaluate, toxic pollution problems. By integrating our relative strengths, we can provide a stronger, more efficient, and more effective program to address toxic air pollution in urban areas.

B. What Are the Objectives of State, Local and Tribal Activities?

The Strategy will be a partnership between EPA and State, local and Tribal governments to address the risks from air toxics in urban areas. Section I.C. of this document describes the goals of the Strategy. Listed below are the objectives that we've identified to guide the actions taken by us and our governmental partners, so that those actions will be effective and efficient in achieving the goals of the Strategy:

- *Establish appropriate Federal measures, through guidance, policies, and rulemaking, which enable State, local and Tribal agencies to be full partners.* Many of the State, local and Tribal agencies may be unable to do more than the Federal laws and rules require. These agencies could benefit from Federal rulemaking guidance in addressing local issues. At the same time, we recognize the need for flexibility for these agencies to identify and address the local issues. We need State, local and Tribal agencies' help to reach the Act's goals for healthy air, and they'll benefit by being able to tailor the Strategy to their specific needs.
- *Provide flexibility for strong State, local and Tribal programs.* Many of these governments have developed their own air programs. In fact, we received many comments requesting that the Strategy acknowledge programs that are already in place. Those governments that have been pro-active in controlling air toxics can benefit by tailoring the Strategy to their own needs, or by being able to implement a program earlier than we can.
- *Provide incentives for State, local and Tribal action.* Since enabling through standards, policies and guidance and providing flexibility can result in more effective and earlier controls of urban HAPs, it will be beneficial to State, local, and Tribal governments, to us, and to the public to facilitate State, local and Tribal actions.
- *Set priorities among urban areas and source categories.* Given the broad scope of the Strategy and the time it may take to implement, it may be most effective to first identify and address those areas and sources with the highest air toxic emissions or exposure levels (including consideration of multipathway exposure where appropriate).
- *Provide information to the public on HAPs and potential risk in urban areas.* The public benefits by having a sound basis to use in setting their pollution control priorities and communicating their priorities to us. Providing information to the public is also our responsibility, and an informed public will be better equipped to help us set priorities for appropriate State, local and Tribal HAP control actions. This public outreach will include not only information on exposure to air toxics, but also information on the link between water quality and the deposition of air toxics.
- *Facilitate a focus on areas with disproportionate impacts and greatest risks.* The Strategy is intended to recognize the potential for disproportionate impacts of air toxics hazards across urban areas. State, local and Tribal governments can be particularly effective in identifying and addressing disproportionate impacts of HAPs. We'll work with our regulatory partners to provide technical and policy guidance to help identify and address disproportionate impacts from HAPs, including consideration of multipathway exposure as appropriate.

C. What Were Comments on the State/Local/Tribal Programs and How Are They Being Addressed in the Strategy Development?

Commenters expressed a general desire for more information on the State/local/Tribal agencies' roles and responsibilities in the development and implementation of the Strategy. The nature of the discussion in this part of the Strategy is general because our efforts to develop urban air toxics strategies with State, local, and Tribal governments are in an early stage of development. As described in a later section, we plan to conduct assessments to better understand our status with regard to the goals of the Strategy. We intend to use this information and also gather more input from relevant parties in the development of those programs through stakeholder meetings.

Commenters had a wide variety of opinions beyond a general desire for more information. Some State, local or Tribal governments have well-developed programs and ample resources for both the scientific and regulatory aspects of an air program, while many others have less experience and/or inadequate resources and don't do more than the Federal government requires. As a result, some States believe that their programs are mature enough to be given the flexibility to identify HAPs and source categories to address the section 112(k) requirements for themselves, and they and large industries located in these States requested local flexibility. Other regulatory agencies, small businesses and public health/environmental advocacy groups recommended against such flexibility and requested national Federally-mandated programs with Federal enforceability. We believe there are valid points from all sides. Those wanting flexibility note that risk reductions tailored to the local situation can be more effective than national solutions and that this approach takes advantage of work they already have in progress. Those wanting Federally-imposed programs note that without such Federal mandates, the playing field wouldn't be level for small businesses across different areas. In addition, some State, local or Tribal programs wouldn't be able to address urban air toxics without a Federal requirement. We will convene stakeholder meetings early in the next fiscal year to resolve these issues on State, local and Tribal programs. This time frame will allow for consideration of information from our national assessment. We plan to bring stakeholders together regularly for approximately six months and then take their input, along with comments already received on the Strategy, to develop a plan for implementing the State program. We intend to release this plan no later than six months after the end of the stakeholder meetings.

D. How Can State, Local or Tribal Agencies Participate in the Strategy?

The Strategy needs to be a partnership between EPA and State, local and Tribal agencies in order to focus on local urban air toxics concerns. But our relative roles may vary according to the needs of particular urban areas and any limitations faced by State, local and Tribal governments. With our regulatory

partners, we'll discuss and explore options for how the State, local and Tribal agencies should participate in developing and implementing the Strategy to address public and other environmental issues related to air toxics.

We see a broad range of possibilities for State, local and Tribal agency participation. For example, as indicated above, many regulatory agency programs are designed to implement delegated Federal requirements. However to provide additional flexibility, we may be able to provide a Federal program that allows the agencies to either develop and substitute their own requirements for an existing Federal program, or, if they wish, to simply adopt and implement a risk reduction program designed by us. For example, we could promulgate a Federal rule describing how we'd develop and implement a local risk reduction program. State, local or Tribal agencies could then either develop and implement a program modeled on ours, or submit an alternative program for our approval.

Alternatively, instead of promulgating a Federal rule setting out the details of an acceptable risk reduction program, we could promulgate a set of minimum elements that any local risk reduction program—whether implemented by us or a State, local or Tribal agency—must contain. This would provide agencies with more flexibility to design and implement their own risk reduction programs that we could approve.

The Federal role in developing additional risk reduction strategies for urban areas could be smaller still. It may not be necessary for us to directly guide development of State, local and Tribal programs. It may be enough for us to encourage them to meet the goals of the Strategy, and to provide necessary guidance. In the end, we (or the State, local or Tribal agency) would still need to measure progress against the mandatory goals of the Act. We might then need to determine whether additional Federal action is warranted to meet the goals.

In evaluating and comparing the options we develop together, we and our regulatory partners and other stakeholders will need to consider how well each option addresses the objectives described in section III.B. We'll also need to consider such other issues as practicality of implementation, resource burden at each governmental level, and possible adverse impacts on other Federal, State, local or Tribal programs.

E. What Elements Should a State, Local or Tribal Program Contain?

No matter who develops and implements State, local or Tribal programs, they should contain certain basic elements to allow them to meet the risk reduction goals of the Strategy. For example, the following list of elements should be considered:

- Locally-focused assessment using existing information and sufficiently refined tools to identify significant contributors to urban risk, problem chemicals and sources, geographic ''hot spots'' within an urban area, and characteristics of at-risk populations.
- A process, regulatory or otherwise, to develop strategies aimed at reducing risk from those sources.
- Opportunity for public review of both the baseline assessment and the proposed risk reduction strategies.
- A process and schedule for implementing the risk reduction strategies.
- Evaluation of whether the goals of the Strategy have been met.
- Provisions to implement additional risk reduction strategies if the goals have not been met.
- A process to encourage public participation.

At this point, this list is fairly general, because we don't have enough information to more fully develop this program structure. However, over the next couple of years, we'll be working to further develop this aspect of the Strategy, to develop and use information from assessments and other tools to guide our thinking, and to get input from our stakeholders. For example, once we've completed the initial assessment in the spring of 2000 (as described in section IV), we'll know better our status with regard to risk reduction goals of the Strategy. This will inform us about additional Federal activities needed to meet those goals, and what additional State, local and Tribal activities are needed to complement these activities. As described in section IV, periodic assessments will continue to inform us about needed programs over time. In the interim, while we're waiting for completion of the initial assessment, we plan to meet with our State, local and Tribal partners. We'll be reviewing the goals and the various components of the Strategy and how they interrelate. In particular, we'll focus on the assessment tools and their role in defining Federal, State and local activities, and we'll exchange information to help better refine the tools.

IV. Assessment Activities

This discussion of our assessment activities first focuses on how we generally intend to assess progress in meeting the goals of the Strategy. We then discuss our methods and tools for estimating health risks and describe more specifically how we intend to apply these risk assessment methods and tools in assessing progress and in supporting implementation of the Strategy. However, it is important to remember that the NATA assessments are designed to address all of the goals and activities of our overall air toxics program.

Historically, Agency risk assessment and decision-making have focused on the likelihood of health effects associated with exposure to individual environmental contaminants. In recent years, as we move from a focus on emissions reductions toward a focus on estimated risk reduction, our risk assessment emphasis has shifted increasingly to a greater consideration of multiple endpoints, pathways and routes of exposure and holistic reduction of risk. This more complex assessment is often called ''cumulative risk assessment,'' defined according to who or what is at risk of adverse effects—from identifiable sources and stressors—through several routes of exposure over varied time frames. While various integrated approaches are now being used within the Agency, we realize that there are significant gaps in methods, models and data that limit our ability to assess cancer and non-cancer risks associated with cumulative exposure to mixtures of pollutants having different endpoints. We've identified both short-term and long-term research needs to fill these gaps, highlighted in section V.D. of this notice. Progress toward more refined assessments of cumulative risks will depend upon the pace and evolution of our policy and guidance on cumulative risk and the underlying research.

A. How Will We Assess Progress Toward Goals?

Assessing progress in reducing cumulative risk from HAPs will require us to move away from a focus on assessing reductions in tons per year emitted, toward a focus on estimating reductions in cancer and non-cancer risks associated with lower emissions.

''Cancer'' describes a group of related diseases that affect a variety of organs and tissues. Cancer results from a combination of genetic damage and non-genetic factors that favor the growth of damaged cells. At current cancer incidence rates, approximately one third

of U.S. residents may be expected eventually to contract some form of cancer. Cancer is associated with a wide range of factors, of which exposure to HAPs is only one. Other causes of cancer, including genetic susceptibility, diet, smoking, background radiation, and lifestyle, are thought to be the dominant factors determining total cancer incidence. Given these complexities, the rate of cancers associated with HAPs alone cannot be observed directly. Attributing cancer to specific factors is also complicated by the fact that many cancers do not appear for years, or decades, after exposure and, therefore, may have been caused by exposures long past and in different locations. As a result, we'll need to rely on modeled estimates of cancer risk rather than on direct measurements for assessing the Strategy's progress toward the goal of 75-percent reduction in cancer incidence associated with HAPs.

Adverse health effects other than cancer (''non-cancer risks'') include a wide range of health endpoints in all organ systems (for example, cardiovascular, immune, liver, kidney).[42] As with cancer, other factors such as diet, lifestyle, and other exposures (for example, smoking) may exert a dominant influence over incidence of adverse non-cancer health effects. Therefore, as with carcinogens, we expect to rely primarily on risk estimates to assess progress, rather than on direct measurements of changes in the incidence of adverse non-cancer health impacts due to reductions in emissions.

The Act sets a clear numerical goal for reduction in cancer incidence, but specifies only a ''substantial'' reduction in public health risks for effects other than cancer. We see a need to define and clarify this goal more fully as we work to implement this Strategy, but we haven't yet developed a specific numerical goal for risk reduction for various non-cancer effects. One major purpose of our non-cancer risk assessments will be to provide a sound technical basis for developing and defining non-cancer goals that are quantifiable, attainable, and consistent with the Act.

Since cancer and non-cancer health impacts can't be directly isolated and measured, we and others have spent more than two decades developing an extensive set of risk assessment methods, tools and data that serve the purpose of estimating health risks for many of our programs. Our risk assessment science has been extensively peer-reviewed, is widely used and understood by the scientific community, and continues to expand and evolve as scientific knowledge advances. We intend to use the most current and appropriate risk estimation methods in tracking progress under the Strategy.

Our risk assessments, reflecting the risk paradigm set forth by the National Academy of Sciences in 1983,[43] are based in general on a combination of two types of analyses. The first type of analysis examines what adverse effects a substance causes (the ''hazard identification''), and the specific exposures at which these effects occur (the ''dose-response assessment''), and is usually based on human or animal studies of high quality published in peer-reviewed scientific journals. This type of analysis allows us to evaluate a chemical's potential to cause cancer and other adverse health effects.

The second type of analysis estimates the levels of exposure that people receive within the environment. We develop this ''exposure assessment'' in stepwise fashion for air pollutants, with the first step being the compilation of emissions data. Second, these data are input to a dispersion model, which estimates ambient air concentrations. These modeled ambient concentrations may be compared to monitoring data in order to test and validate the models. Third, we estimate exposures to ambient concentrations by applying models of human behavior patterns, and incorporate measured personal exposure information when available.

These two types of analyses—the exposure that causes harm and the exposure people actually receive—are combined in a ''risk characterization'' that describes the potential for real-world exposures to cause harm, and the uncertainties surrounding the characterization.

B. What Methods, Tools, and Data Will We Use To Estimate risk?

1. Evaluating a Chemical's Potential To Cause Cancer

Our dose-response assessments for carcinogens are based on mathematical models and assumptions that support extrapolation from high to low doses and from non-human test species to humans. As a matter of science policy, many of these assumptions are protective, to avoid underestimating cancer risks where data are incomplete. The most important of these assumptions for most carcinogenic chemicals is that risk is proportional to dose, with no threshold dose below which there is no risk. Our dose-response assessments for inhalation of carcinogens are expressed as a ''unit risk,'' that is, risk per microgram per cubic meter of daily exposure during a lifetime. The unit risk is defined as a conservative estimate of an individual's excess probability of contracting cancer at the end of 70 years exposure to a continuous level of one microgram per cubic meter. Risks from exposures to concentrations other than one microgram per cubic meter are modeled as proportional, with half the concentration producing half the estimated risk, and so on.

Each word in the above definition of unit risk carries significant meaning. First, the unit risk is a conservative rather than a ''best'' estimate. This means that the actual unit risk is unknown, and is very likely to be lower than estimated and very unlikely to be higher. Second, as already described, risks are estimated rather than measured. Third, the unit risk applies to an individual, although cancer incidence in a population can be estimated across a group by aggregating the risk of each person. Fourth, unit risk estimates focus only on the route of exposure being analyzed. Fifth, unit risks are expressed in terms of probability. For example, we may determine the unit risk of a particular HAP to be one in ten thousand per microgram per cubic meter. This means that, of ten thousand people who continuously inhale an average of one microgram per cubic meter of this particular HAP for 70 years, no more than one would be expected to contract cancer from the exposure. Sixth, risks are generally expressed in terms of contracting cancer, not dying from it. Finally, exposures are averaged over a 70-year lifetime, to account for long-term exposures to low levels of carcinogens.

We intend to use unit risk estimates as the dose-response component in estimating plausible reductions in cancer incidence achieved by this Strategy.

2. Evaluating a Chemical's Potential To Cause Adverse Effects Other Than Cancer

Adverse health effects other than cancer (''non-cancer risks'') cover a wide range of health endpoints in all organ systems (for example, cardiovascular, immune, liver, kidney).

[42] Some HAPs that cause cancer may also cause adverse non-cancer health effects at environmentally relevant doses. Thus, when we discuss ''non-carcinogens,'' we mean substances that may potentially cause non-cancer effects in humans. Some of the same substances may also be evaluated as carcinogens.

[43] National Research Council (NRC). 1983. Risk assessment in the federal government: Managing the process. National Academy Press, Washington, D.C.

For this reason, we've developed our non-cancer dose-response assessment methods to address several additional sources of complexity beyond those found in cancer assessments. First, organisms possess varying abilities to eliminate, detoxify, and sequester many toxic substances, and to repair some amount of damage that those toxic substances may cause to tissues and organs. For this reason, most chemicals don't cause observable adverse non-cancer health effects until some threshold dose has been exceeded. Second, the appearance of a toxic response when the threshold dose is exceeded is seldom proportional to dose. The shape of ''dose-response curves'' (for example, a graph of the number of individuals affected at varying dose levels) varies substantially among chemicals, so there is no single model that can be applied to all non-carcinogens. Third, available information for most HAPs comes from animal studies, and significant uncertainty is associated with extrapolating these results to humans to support predictions of human dose-response curves.

For these reasons, non-cancer dose-response assessments for inhalation are usually expressed in terms of a ''reference concentration,'' defined as an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious non-cancer effects during a lifetime. We intend to use reference concentrations as the dose-response component for estimating reductions in non-cancer risk achieved by this Strategy.[44]

3. Assessing Exposures and Characterizing Risks

In general, the choice of appropriate risk characterization approaches will be influenced by both the availability of data to support exposure assessment, and the level of detail and resolution needed to support the purpose of the assessment. Possible approaches span a wide range, from simple weighting adjustments of emissions data or ambient concentrations, to detailed multipathway risk assessments. We've identified four basic approaches that we plan to use for various assessments to evaluate the progress of the Strategy in reducing estimated risk. Each of these approaches uses the same dose-response information described above, but relies on different types of data to represent exposures. The four basic approaches we intend to use are: (1) Emissions or ambient concentration weighting;(2) comparisons between ambient concentrations and risk-based concentrations (RBCs) [45]; (3) comparisons between estimated exposures and RBCs, that may yield quantitative estimates of risk; and (4) quantitative estimates of carcinogenic risk for individuals and populations.

Approaches (1) and (2) are considered hazard-based approaches, in that they lack the dispersion and/or human exposure modeling steps of an exposure assessment and therefore cannot provide quantitative estimates of risk. However, they can provide valuable information, subject to substantial uncertainty, that may be useful in evaluating progress toward risk reduction goals. In contrast, approaches (3) and (4) are considered risk-based approaches, in that they do incorporate exposure assessments and thereby can provide quantitative risk estimates.

(1) Weighted emissions or ambient concentrations. Weighting of emissions or ambient concentrations is the least resource-intensive approach of the four in terms of data needs and computational requirements.[46] This hazard-based approach combines HAP emissions or monitored HAP concentrations (acting as surrogates for exposure) with weighting factors (developed from unit risks and reference concentrations) that account for differences in relative toxicity among HAPs. Other weighting factors could also potentially be developed to account for differences in dispersion characteristics or variations in population density or behavior.

The toxicity adjustment is intended to account for differences in toxic potency among substances, placing all emissions data on the same scale of hazard potential. For example, acrylamide is approximately 160 times more potent a carcinogen than benzene, such that weighting by toxicity would consider one ton of acrylamide emissions equivalent to 160 tons of benzene. In a cumulative analysis, emissions or concentrations of each HAP would be weighted by its relative toxicity to allow for direct comparison and aggregation across HAPs (with carcinogenic and non-carcinogenic estimates aggregated separately). This type of analysis permits comparisons of relative hazard between pollutants with large mass emissions and low toxicity (for example, many non-chlorinated volatile compounds) against pollutants with small mass emissions but high toxicity (for example, dioxin).

As discussed above, the weighted emissions-or concentration-based approach lacks the last two steps of an exposure assessment, and therefore doesn't provide a quantitative estimate of risk. Also, because of the absence of these important exposure assessment steps, it isn't possible to say how closely changes in weighted emissions or concentrations will be related to changes in health risk. Nevertheless, emissions and ambient concentrations clearly have a strong influence over exposure and risk, and we anticipate that the toxicity-weighting approach will provide useful information to estimate progress where appropriate data for more refined assessment approaches aren't available.

(2) Ratios of ambient concentrations to RBCs. A second type of hazard-based approach is the comparison of ambient HAP concentrations with RBCs.[47] Ambient concentrations may be measured (as discussed in section V.A.) or modeled (section V.C.). Appropriate modeling approaches for estimating ambient concentrations at different spatial scales using emissions data include national-scale and urban-to neighborhood-scale air quality models, as well as multi-media models for urban-to neighborhood-scale analyses.

The RBCs used for comparison are derived from unit risks or reference concentrations. Specifically, cancer RBCs can be defined in terms of a fixed risk level (for example, HAP concentrations conservatively estimated to result in a one-in-ten-thousand or a

[44] The uncertainty surrounding reference concentrations (RfCs) varies substantially among HAPs, depending on the strength of the supporting data. As a result, RfCs vary in their level of protectiveness, with RfCs supported by strong toxicological data tending to be less protective. We recognize this important limitation to the use of RfCs, and may use more advanced dose-response models for specific HAPs where they can be applied.

[45] Risk-based concentrations for cancer are ambient concentrations associated with specific levels of cancer risk, assuming 70 years of continuous exposure. RBCs for non-cancer effects are ambient concentrations that pose no appreciable risk to humans, assuming continuous exposure. The use of RBCs does not imply a judgement that the concentrations are either acceptable or unacceptable, only that they have been derived in the same way for all HAPs.

[46] Peer-reviewed examples of this approach include the EPA/OPPT Risk-Screening Environmental Indicators, the EPA/OSW Waste Prioritization Management Tool, and the EPA/OAQPS ranking analysis for urban HAPs. See the public docket for a detailed list of risk assessment references.

[47] Peer-reviewed examples of the use of this approach include the concentration-toxicity screen used by EPA's Superfund program to select contaminants and exposures for detailed risk assessment, and EPA's Cumulative Exposure Project, which compared modeled ambient air concentration estimates with RBCs (termed Ahealth benchmarks'' by the authors) for 148 HAPs nationwide. See the public docket for a detailed list of risk assessment references.

one-in-one-million upper-bound risk of contracting cancer from a lifetime exposure at the RBC). Non-cancer RBCs can be defined in terms of estimates of continuous exposure levels at which even sensitive subgroups are likely to be without any appreciable risk of adverse effects during a lifetime.

Because it is more complex than emissions-weighting, this type of analysis brings two significant advantages. First, it supports a more complete treatment of ambient HAP concentrations that are already below non-cancer RBCs, for which further reductions may not carry significant health benefits. Second, the use of dispersion models to predict ambient concentrations can potentially account for variations in factors such as location of exposed populations relative to sources of HAPs, differences in meteorological conditions, and differences in fate and transport characteristics among HAPs.

Nevertheless, this approach still lacks the third, human behavior-related, step in an exposure assessment. Therefore, it doesn't provide a quantitative estimate of risk, and its use in estimating progress is subject to greater uncertainty than approaches (3) and (4), below. Changes in health risk may not precisely track changes in concentration/RBC ratios. However, because ambient concentrations are important determiners of exposure and risk, we anticipate that the concentration/RBC approach will provide useful information to estimate progress where exposure assessment is not possible.

(3) Ratios of exposures to RBCs. A third type of approach begins with measured or modeled ambient HAP concentrations, and adds further refinement by overlaying estimates or measurements of population exposures. Thus, this risk-based approach is qualitatively different from the first two hazard-based approaches because it incorporates all three steps of an exposure assessment.

While human exposures are directly affected by ambient concentrations, they're also influenced by behavioral factors such as time spent outdoors, periodic movements (such as commuting) within an urban area, and activity levels. Exposures may be estimated with exposure models, as discussed in section V.C., that simulate the behavioral factors that determine exposure. Human exposure may also be directly measured by personal monitoring, in which subjects wear small air samplers and record their daily activities.

These estimated or measured exposures are then compared to RBCs [48] (as described above for approach (2)). Analogous to the comparisons in approach (2), hazard potential would typically be presented in terms of ratios of the exposure concentrations divided by RBCs. The additional complexity of estimating exposure provides three significant advantages over considering ambient concentrations alone. First, it provides a more realistic comparison with RBCs, which are based on unit risks and reference concentrations usually derived from doses actually received by test organisms. Second, exposure estimates can take into account behavioral differences between populations in different cities, or between different demographic groups. Third, exposure estimates support combining effects of multiple HAPs, considering non-additivity and similarities or differences in toxic mechanisms. Comparison of exposures with reference concentrations for non-cancer effects (acting as RBCs) is currently the most advanced approach available for assessing non-carcinogenic HAPs, although this may change in the future for some substances.

(4) Risk estimation. A fourth type of approach that can be used to estimate cancer incidence is comprehensive risk estimation, focusing on the most exposed individual or on entire populations or subgroups.[49] We'll derive risk estimates by combining exposure estimates with dose-response assessment results in terms of unit cancer risk estimates. Risk estimates will also consider non-standard dose-response models and complex interactions among different HAPs, if information is available. Such risk estimates represent the most refined analysis of the four approaches considered. Comprehensive assessments may contain modeling to account for environmental fate and transport of released pollutants, estimation of exposures to different subpopulations, detailed dose-response assessments for each HAP, and information on complex, non-additive interactions among HAPs. Results are expressed in terms of probabilities of developing cancer during a lifetime. Cancer risks are usually aggregated across HAPs by addition, but non-additive interactions are included if data permit.

In its most complete form, risk estimation produces results in probabilistic form (that is, with calculations considering a range of cancer risks and the likelihood of each), expressed in terms of a frequency distribution rather than as a single deterministic estimate. Of currently available approaches, risk estimation, presented probabilistically, provides the most complete, best-supported, and most accurate presentation of both risk and the variability and uncertainty surrounding it. However, this risk-based approach is much more resource- and calculation-intensive than are simpler approaches.

4. Summary

We anticipate tracking progress in reducing estimated cumulative risks from air toxics in urban areas by relying on estimates of health risk rather than by directly observing reductions in adverse health impacts in human populations. We consider these health risk estimates to be reasonable and appropriate indicators of progress toward meeting the goals of the Strategy. Their use is made necessary by the long latency period for cancer, the high background rate of human cancer from all sources, and complexities involved in attributing various non-cancer health effects to specific environmental causes. Our assessments will use a variety of approaches, including some that do not include all exposure assessment steps. In some cases the information may be too uncertain to support conclusions. We intend to evaluate these approaches against each other, in terms of their ability to estimate risk and their resource and data requirements, when supporting data become available in early 2000. These results will assist us in determining the scope, refinement, and precision of future assessments developed to reflect different purposes under the Strategy.

C. What Is Our Overall Risk Assessment Approach for the Strategy?

In section I, we discussed the key role that assessing air quality, exposure, and estimated risks will play in assessing progress toward meeting the goals of this Strategy. In addition, these assessment activities will, over time, also serve the following broader purposes:

- Improve the definition of the goal for ''substantial'' reduction in non-cancer risk.

[48] Peer-reviewed analyses of this type of analysis include many single-substance risk assessments. Several examples concern the fuel additives methylcyclopentadienyl manganese tricarbonyl (MMT) and methyl tertiary butyl ether (MTBE). See the public docket for a detailed list of risk assessment references.

[49] Examples of such multi-chemical, multipathway risk assessments include many performed by EPA's Superfund program under the Risk Assessment Guidelines for Superfund. See the public docket for a detailed list of risk assessment references.

• Support development of Federal area (as described earlier) and mobile (as appropriate under section 202(l)) source standards.
• Support decisions on how to conduct future risk assessments.
• Evaluate the effectiveness of each of the four approaches to characterizing risk reductions, described above.
• Provide guidance for State, local and Tribal agency efforts in conducting local assessments and developing risk reduction programs at the state and local levels.

Our assessment approach will be basically iterative in nature, so as to take advantage of emerging science, new data, and improved tools that become available at the time future assessments are performed. Consistent with this approach, beginning in early 2000, we'll conduct an initial set of assessments that will be based on final, updated emissions data, as discussed in section IV.D. Subsequent assessments will reflect the best available data, methods, and tools available at the time the assessments are performed.

Our national database of air toxics emissions from major, area, and mobile sources (including diesel exhaust), the NTI, will be a fundamental component of our risk assessments. We are now completing a baseline NTI representing the 1990–1993 period, and obtaining State review of a draft 1996 NTI suitable for use as input data for dispersion and exposure models (scheduled for completion in the fall of 1999). We plan to update the NTI every three years, and to conduct subsequent risk assessments to coincide with these revisions. Monitored air toxics concentrations will also be an important component of our assessment activities, in part to help us evaluate and refine our air quality models. We are now working with the States to design and implement a national air toxics monitoring network that will provide important information for future assessment activities. Our plans for the ambient monitoring network are described in more detail in section V.A.

1. How We Will Design Our Assessments

We'll tailor each assessment to the purpose(s) it is to serve (e.g., measuring progress against the 75-percent estimated cancer incidence reduction goal). Accordingly, assessments will vary in scope, level of refinement, and, thus, data and resource requirements. The scope of each assessment will generally be defined by the following characteristics:

• The number of HAPs to be evaluated (all 188 or some subset);
• Types of source included (area, major, mobile);
• Spatial resolution (for example, aggregation of results on the national, state, urban, or neighborhood scale); and
• Pathways/media to be evaluated (inhalation/air only or multipathway/multimedia).

Further, for each assessment, we need to specify an appropriate approach to use in estimating progress toward our risk reduction goals, since, as discussed above, it will not be possible to directly measure reduction in cancer incidence or non-cancer risks attributable to hazardous air pollutant emissions. Alternative approaches, discussed in section IV.B., range from rough approximations to more precise risk estimates, with data and resource requirements increasing for more precise assessments that require greater refinement.

2. How Our Assessments Will Address Disproportionate Risks

Disparities in risks from air toxics in the urban environment may exist between different cities, between neighborhoods or demographic groups within a city, or within a similarly-exposed population that includes sensitive groups. In our assessments, we intend to pay particular attention to areas, populations, and sensitive groups with substantially higher-than-average risks.

While differences in risk between different urban areas may be discernible from national screening-level modeling, more refined modeling will generally be needed to evaluate localized disparities within any one urban area. This is because highly localized disparities may be obscured by the simplifying assumptions that are necessarily inherent in national screening-level assessments. For this reason, the ability of EPA or State and local authorities to assess localized risk disparities will depend on the availability of detailed data on emissions and population distribution, local-scale models, and sufficient resources.

D. How Will We Design Future Assessments?

We'll conduct a series of assessments starting in early 2000 and periodically thereafter at appropriate times during the implementation of the Strategy. The assessments will include both national-scale and urban-scale analyses. All assessments will incorporate the most current data, information, and assessment tools available at the time they are performed. As the Strategy progresses, we may eventually use risk assessment tools that are now only in early development, or perhaps have not yet been envisioned. For this reason, we can't describe in detail assessments that will be conducted several years from now.

1. Initial Assessments—National

We'll conduct an initial national assessment in early 2000. This assessment will define an appropriate hazard-or risk-based approach consistent with the limited available information on HAP emissions and ambient concentrations. The principal limitation of the baseline emissions information is that, although the baseline NTI will be a comprehensive county-level inventory, it will lack the source-specific information necessary to support air quality modeling.[50] Thus, any assessment of progress relative to the base year will be limited to using either a weighted emissions or a weighted ambient concentration analysis, since the other approaches include an air quality modeling step. Future assessments, however, will not be limited in this way because emission inventory data, beginning in 1996, will include information needed for modeling.

The initial assessment will serve several purposes. First, we'll develop an estimate of progress that has already been made toward the goals of the Air Toxics Program and the Strategy. Consistent with section 112(k) of the Act as amended in 1990, which focuses on reductions ''below those currently experienced,'' we've established 1990 as the base year for assessing progress. To estimate progress since the base year, we'll compare the base year emissions inventory to the inventory for 1996, due to be completed in fall of 1999, using a weighted emissions analysis. This assessment will be limited to the weighted-emissions approach because the base year inventory (although a comprehensive county-level inventory) will lack the source-specific information

[50] We note here, as discussed in sections I.B. and II.A., that as part of the Agency's Cumulative Exposure Project, the ASPEN model to estimate HAP ambient concentrations nationwide was developed and tested using a 1990 emissions inventory that was based on the limited HAP information available in the mid-1990s prior to the substantial improvements that are now reflected in the baseline NTI. While that first national-scale modeling exercise provided screening-level information that we've used in conjunction with other information in selecting the urban HAP list, we believe that the uncertainties in the CEP's 1990 emission inventory are too large to support a meaningful comparison with modeled concentrations for future years that will result from the application of the ASPEN model using updated emissions inventories. These updated inventories, starting with the 1996 NTI, are specifically designed to include sufficient source-specific information to support air quality modeling.

necessary to support air quality modeling. Subsequent assessments, however, will not be limited in this way because emission inventory data, beginning in 1996, will include information needed for modeling.[51]

Second, the initial national assessment will provide basic information to assist us in prioritizing HAPs and area, mobile, and major source categories for regulations to be developed consistent with section 112(k), section 202(l) and other authorities (e.g., residual risk), respectively, based on their relative importance as contributors of risk. Third, the assessment will provide the clearest and most current picture of inter-urban and demographic disparities in risk, and will provide insight on more refined analyses that may be appropriate to identify types of sources associated with particularly high risk levels. Fourth, we intend to use information from the initial assessment to develop a more complete and quantitative goal for a ''substantial'' reduction in non-cancer risk. Finally, we'll use the initial assessment to compare different hazard- and risk-based approaches. In particular, we intend to correlate results of assessment approaches (1) and (2) (which lack exposure assessments) with exposure assessment-based approaches, to determine their relative accuracy and to quantify uncertainties. These comparisons, in combination with data and resource availability, will help us to scope the details of future assessments and finalize our estimates of progress from 1990 to 1996.

We'll use all four types of approaches (emissions weighting, comparisons between ambient concentrations and exposure estimates and RBCs, and modeled estimates of risk) in the initial national assessments, to the extent possible. As discussed in section V.C., we plan to use the ASPEN model to estimate national air quality concentrations in conjunction with the use of the Hazardous Air Pollutant Exposure Model (HAPEM) to estimate national exposures. We'll conduct screening level analyses before progressing to more refined analyses, to ensure that we're allocating appropriate amounts of resources to each assessment, given our information needs. The assessment will focus on inhalation exposures, with the expectation of including multipathway exposures, as appropriate, in subsequent assessments. The initial assessment will include all urban areas in the United States, and we anticipate presenting results with county- and/or urban-scale resolution. The assessment will address as many HAPs as the data support, but will include at least the 33 urban HAPs and diesel PM.

2. Initial Assessments—Urban

We plan to conduct urban-scale assessments for a number of selected cities to serve as case studies that may be particularly useful as guidance for State, local and Tribal program assessments. We'll also provide technical support and risk assessment tools for authorities that wish to conduct their own local assessments to analyze area-specific progress and intra-urban disparities. The experience we gain through these analyses will also help us refine future assessments.

We'll develop these initial urban assessments using the specific approaches that are appropriate for the quality of data available. Each assessment will describe a single urban area, and we anticipate presenting the results with high spatial resolution (for example, a 1-kilometer grid). The scope of each assessment will address a subset of HAPs that we identify as being priority HAPs for the particular urban area being assessed. We plan to consider both inhalation and multipathway exposures as appropriate and as available data permit.

3. Periodic Assessments

In the years following the initial national assessment, we'll conduct new analyses at appropriate intervals as new data become available. These periodic assessments will serve two principal purposes. First, they'll measure progress toward the goals of the Strategy, considering all actions taken that reduce HAP emissions (including Federal, State, local and Tribal actions, as well as voluntary initiatives by local communities and industry) for any purpose. Second, they'll assist us in prioritizing which future regulatory actions would be most effective in making needed further progress. We'll develop the periodic assessments using the specific approaches that have proved most efficient (that is, the least resource-intensive approach that accomplishes the purpose of the assessment). Assessments will include all urban areas in the United States, with results presented on county- and urban-scale level resolution. Assessments will address the full list of 188 HAPs, to the extent to which emissions, monitoring, and health data are available. If appropriate tools become available, periodic assessments for bioaccumulative HAPs will include multipathway exposures.

By measuring ongoing progress, periodic assessments will also inform us when we have met our goals, and will help us to measure the degree to which we have reduced disparities in risk. The approaches used for such goal-specific comparisons will be determined by the results of earlier assessments, and developed to fit the Strategy's purpose.

V. Knowledge and Tools

This section describes the activities we'll undertake to improve our base of knowledge (e.g., concerning health effects and exposure characteristics) and tools (e.g., emissions inventories, monitoring networks, and computer models), along with our plans for their improvement and related research.

A. How Will We Review and Expand Ambient Monitoring Networks?

1. Need for Ambient Data

As described in section IV, our iterative approach to risk characterization looks at emissions as a rough surrogate for risks in the near-term, while providing for a plan to periodically conduct more refined analyses as risk tools and data are developed. In order to base the air toxics program on risk assessments backed by sound science, we'll need emissions and monitoring data to conduct good assessments. Emissions data are one way we can attribute HAP exposures to specific sources. On the other hand, ambient monitoring data allow us to continually evaluate and improve our models and inventories, to deal credibly with the difficult issue of background HAP concentrations, and to measure progress more directly. Furthermore, each type of data (source emissions data and ambient monitoring data) can be used to improve our understanding of the other. For example, ambient data can warn us when our inventory or models are seriously flawed, and modeled exposures can be used in siting monitors and directing analyses for both short- and long-term measurements.

2. Ambient Monitoring Network Program Design

Currently, we have limited data on ambient concentrations of air toxics, because existing networks are limited, were developed for other purposes, or weren't specifically designed to develop the data needed to meet our current air toxic program goals. In fact, many commenters raised concerns that the current monitoring network was

[51] Peer-reviewed examples of this approach include the EPA/OPPT Risk-Screening Environmental Indicators, the EPA/OSW Waste Prioritization Management Tool, and the EPA/OAQPS ranking analysis for urban HAPs. See the public docket for a detailed list of risk assessment references.

inadequate and that the draft Strategy didn't adequately address this concern. Another problem is that ambient data can be both difficult and expensive to obtain. Our long-term plan is to build an air toxics monitoring network consistent with the goals of the air toxics program and the Strategy.

Since it's not possible to monitor everywhere, we must develop a monitoring network that is representative of air toxics problems on a national scale, but that still provides a means of obtaining data on a more localized basis as appropriate and necessary. The appropriateness of a candidate monitoring site with respect to the projected uses of its data is a key consideration in identifying sites for the national network. For example, in selecting monitor locations we must evaluate how well the location allows us to directly evaluate public exposure and environmental impacts in the vicinity of the monitors. We'll also need to site monitors to allow us to obtain data that can help us establish an ambient baseline for toxics risk characterization, track trends in ambient levels to assess progress in meeting our emission and risk reduction goals, and assess the effectiveness of specific emission reduction activities.

We'll design the monitoring network to address all of the needs of the air toxics program and the Strategy, which should satisfy the following objectives:

- Measure pollutants of concern to the overall air toxics program and the Strategy.
- Use scientifically sound monitoring protocols to ensure nationally consistent data of high quality.
- Collect a sufficient amount of data to estimate annual average concentrations at each monitoring site.
- Complement existing national and State/local monitoring programs.
- Reflect Acommunity-oriented'' (i.e., neighborhood-scale) population exposure, including inhalation and non-inhalation exposure.
- Represent geographic variability in average ambient concentrations.

3. Network Implementation Schedule

For the first 2 years of monitoring, we'll maximize our use of existing State/local air toxics monitoring sites, Photochemical Assessment Monitoring Stations (PAMS) sites, or planned particulate matter chemical speciation sites. These sites should provide coverage of both the largest metropolitan areas and neighborhood-scale sites, which fits with our focus on population-oriented urban sites. If existing platforms aren't suitable for characterization of population exposure to air toxics, we'll strive to establish new community-oriented monitoring stations or upgrade existing ones to include urban HAP analyses. We'll also work to establish appropriate quality assurance, data management, data analysis, and data submission procedures, and will use established monitoring protocols in the next few years.

After 2000, we expect the air toxics monitoring network to continue to grow to cover more urban areas and to include monitors in rural areas to permit estimates of background concentrations. We also expect to place other fixed-site monitors in areas that may be subject to localized high concentrations of air toxics. In some cases, temporary or mobile monitors may be used to evaluate these areas. The long term goal for a national network includes monitoring of sensitive ecosystems and other environmental concerns. To this end, the national network should incorporate the separately funded deposition monitoring activities associated with the Great Waters Program. Our tentative projection of the national network is 200 sites, but this will be revised as additional information becomes available and as the network itself expands.

B. How Will We Update and Maintain the Emission Inventory?

We plan to update the NTI every 3 years using the same principles that we used when developing the 1996 NTI. The next version will be known as the 1999 NTI. The 1996 and subsequent NTIs will be compiled from State and local air toxics inventories. The State and local emission inventory data are supplemented with data gathered to support the development of MACT standards and Toxic Release Inventory (TRI) as well as calculated emission estimates for the majority of area and mobile sources. Unlike the baseline inventory developed for the Strategy, the 1996 and subsequent NTIs will contain location- and facility-specific data making the inventory suitable for input to dispersion and exposure modeling. These additional data are used to determine the exact types and location of facilities in urban and rural areas. We also expect that the quality of information available to use in developing future inventories will improve as data quality does and as we learn more about the locations and sources we are studying.

As discussed in the rest of section V, we plan to obtain improved monitoring data that will influence our inventory efforts, as well as to undertake research projects to address our data needs. One tool we're in the process of developing is the consolidated emissions reporting rule, whose purpose is to simplify reporting, offer options for data exchange, and unify reporting dates for various categories of inventories.

C. What Air Quality and Exposure Models Will We Use To Implement the Strategy?

A variety of mathematical models are often employed to assist in risk assessment activities. While not designed specifically to address urban areas, several models are currently available or under development to help describe the fate and transport of toxic air pollutant emissions. Although there is much associated uncertainty, the output of such models is then used as input to models that estimate human exposure and risk. This section discusses the model development activities and models that will be used in the air toxic assessments discussed in section IV.

We'll rely on a variety of fate and transport modeling tools that vary in their complexity and the scale of the geographic area that they're capable of handling. For example, we plan to use the Assessment System for Population Exposure Nationwide (ASPEN) model to conduct national screening modeling for ambient (i.e., outdoor) air toxic concentrations. This model estimates annual average ambient air toxic concentrations by modeling the dispersion of a nationwide inventory of HAP emissions from major, area, and mobile sources. It can also address simple chemical transformations of air toxics in the atmosphere. Current developmental efforts are underway to add increased model functionality to allow for testing of various ''what-if'' emission reduction scenarios using the ASPEN model. We'll use the Industrial Source Complex Short-Term (ISCST3) model to estimate both short-term (one-hour) and long-term (annual) average concentrations at locations from the urban to neighborhood scales. The ISCST3 model can predict not only ambient air toxic concentrations, but the amount of air toxic pollutants that will settle to the soil and/or into bodies of water. These settling rates are sometimes used to track the fate of air toxic pollutants where multimedia (air, water and/or soil) exposure and risk are of concern (e.g., with mercury). When multimedia considerations are of concern, we'll use the environmental fate and transport module of the Total Risk Integrated Methodology (TRIM) to determine urban and neighborhood scale impacts. Likewise, when a HAP

associated with complex chemical reactions in the atmosphere is being considered, we'll use the Community Multiscale Air Quality (CMAQ) Model. This model is currently being developed in the EPA's Models-3 Framework, and it can be used to predict regional and urban wide concentrations values. The Models-3 Framework also employs a state-of-the-art meteorological pre-processor for accurate and detailed simulation of the meteorological data for input into the CMAQ model.

Model estimates of HAPs in the ambient air (and water and soil, when appropriate) will provide input necessary for modeling exposures. An exposure assessment takes into account the fact that most people don't spend the majority of their lives in an outdoor environment. An exposure model can track day-to-day activity patterns, simulating the movement of population subgroups (e.g, children under 5 years of age) through different ''micro-environments'' (e.g., in homes, vehicles, school, work, or while bathing). These activity pattern relationships are then used to estimate levels of exposures of population subgroups to the HAPs. One such model that we've developed for determining inhalation exposures is the Hazardous Air Pollutant Exposure Model (HAPEM4). This model can work in tandem with the ASPEN model to predict long-term nationwide-scale inhalation exposures to HAPs. Applications requiring exposure estimates through multipathway routes (e.g., through inhalation, ingestion and dermal contact) can use the TRIM module, TRIM.Expo, which is currently under development. We're currently developing several other exposure models for specific applications that we may also consider in our air toxic assessments.

As is the case with any mathematical simulation, the more detailed and accurate the simulation required, the more complex the input data requirements become. The availability, type, and quality of input data will directly influence the choice of the model or models selected for specific assessment purposes. Where gaps between input data and the required level of detail and accuracy are identified, we're making efforts to supplement and improve our data sets (e.g., improvements in the NTI, establishment of national monitoring networks) to make use of the most state-of-the-art models available.

D. What are the Research Needs and What is EPA Doing to Address Them?

The Strategy describes the process we'll use for identifying the various risks that may be present in an urban environment. Part of that process is to determine gaps in our scientific information and to identify the tools we'll need to assess urban risks and to implement the risk reduction elements of the Strategy. To address this concern, we plan to include a ''research needs'' chapter in our forthcoming ''Integrated Urban Air Toxics Report to Congress'' (Urban Report), which will describe the activities and research that will be needed to assist in our assessment and management of risks in urban environments.[52] The Urban Report will describe the research activities we'll undertake with the support of our Office of Research and Development, the research activities to be done by organizations outside of EPA and funded through our Grants program, and the research activities described in various other EPA reports that have relevance to the Strategy. We're also developing an ''Air Toxics Research Strategy'' (Research Strategy) which will expand on the planned urban ''research needs'' chapter, to include information that would assist in assessing risks on a national or regional basis.[53] This Research Strategy would reflect the needs of other elements of the air toxics program, such as the residual risk and Great Waters elements.

In our Urban Report, we plan to present research needs using the risk assessment/risk management paradigm developed by the National Academy of Sciences as the basis for the requested research. This paradigm includes activities related to health and dose-response, emissions and exposure characterization, a risk assessment, and risk management. Briefly, the following identifies the research areas and describes some of our current activities:

Urban HAP health effects and dose response needs.

- Additional knowledge of both cancer and non-cancer health effects will be accumulated. This will include determinations of specific toxicities (determined from animal and human studies) as well as the development of models to extrapolate across HAPs, species, time, and routes of exposure. Any such determinations should address the effects of HAPs or other factors which make sensitive subpopulations (e.g., children, the elderly, persons with existing illnesses) more vulnerable to exposure and effects.
- Development and updating of HAP health reference values, such as inhalation reference concentrations, acute reference exposure values, and cancer unit risk factors.
- Statistical methods for quantifying and reducing uncertainty in risk assessments using acute and chronic data.

Emission characterization needs.

- Development of methods for measuring HAPs in emissions and for monitoring the ambient and indoor air, and the environment (e.g., deposition to water). The resulting measurements will be used to improve the spatial characterization of potential exposures and to establish a baseline against which modeling concentrations may be compared.
- Improved procedures to estimate and assess HAP emissions in a representative number of cities, and to extrapolate results to other locations.
- Improved models that include multiscale air dispersion models (neighborhood, urban, and regional) which consider atmospheric transport, fate, and their potential transformation products and which can simulate microenvironments when estimating inhalation exposures to urban HAPs.

Exposure characterization needs.

- Improved data to better understand the potential for disproportionate impacts on those who are more susceptible to HAP exposures including minority and low-income communities.
- Improved understanding of human indoor and outdoor activity patterns in urban environments, especially for children.
- Improved understanding of the relationship between outdoor and indoor air and HAP concentrations.
- Improved monitoring to assess multipathway exposures to foods, such as fish, vegetables and beef, contaminated by deposition of urban HAPs.

Risk assessment needs.

- Improved risk assessment methods for chemical mixtures.

Risk management needs.

- Cost-effective control technologies for all HAPs and more effective controls for those HAPs posing residual risks even after applying currently available controls.

Some of the major air toxic research activities currently planned or being undertaken by EPA include:

Health effects and dose-response assessment research highlights.

- A proposed test rule under Toxics Substance Control Act (TSCA) that would require testing of 21 HAPs.
- Dose-response assessment efforts for mobile source pollutants (such as benzene, 1,3-butadiene, and various fuel additives, including

[52] We hope to release the ''Integrated Urban Air Toxics Report to Congress'' this summer.

[53] The ''Air Toxics Research Strategy'' will be finalized in fall 1999.

methylcyclopentadienyl manganese tricarbonyl (MMT)) and urban HAPs shown in Table 1.

- Reducing uncertainty in acute and chronic dose-response assessments through the use of statistical (and other) methods.
- Improved methods for identifying and quantifying the health effects associated with exposures to mixtures of pollutants.
- Development of a mixtures database to facilitate assessments involving more than one chemical.

Emissions and exposure characterization research highlights.

- A national air toxics monitoring network.
- An updated, comprehensive emissions inventory of air toxics (the National Toxics Inventory).
- Various toxic emission characterization studies that include addressing emissions speciation for HAPs such as mercury.
- Improved nonroad and highway emission prediction models.
- Improved air quality models, including long-range transport models, a new model of acid deposition, and a modeling system, the Total Risk Integrated Methodology (TRIM), which will provide a framework for better assessing health and ecological risks from multipathway exposure to air toxic (as well as criteria) pollutants.
- Various exposure assessment studies and methodologies.

Risk management research highlights.

- Identification of processes contributing to the HAP emissions from area source categories, and listing of control options and Pollution Prevention alternatives for these processes.

In addition to those research needs and activities that will be identified in the Urban Report, research designed to improve quantitative risk assessment and management which may have relevance to urban HAPs, can be found in various other EPA documents. For example, we're developing a ''Mercury Research Strategy,'' which describes the key research questions for mercury that we plan to address over the coming 5 years. We expect that the mercury strategy will be finalized during 1999 (following consideration of peer review comments). A summary description of this and other research activities and the documents in which they are found will be included in a separate chapter of the Urban Report. As discussed earlier, we're also developing an ''Air Toxics Research Strategy'' that, building on the summary research descriptions in the Urban Report, will identify key research questions and the additional research that will be conducted to address those questions.

VI. Public Participation and Communication

A. How Will we Encourage Stakeholder Involvement?

Because of the scope of the Strategy, we realize that various interests may perceive it differently. As a result, we'll make every effort to address the unique perspectives of the key stakeholders to this process, and we'll welcome their input to support an equitable approach to meeting our risk reduction goals. As described earlier, we intend to hold stakeholder meetings starting early in the next fiscal year to discuss State, local, and Tribal authority and implementation of the Strategy. With comments already received on the Strategy and through input from various stakeholders in these meetings, we will develop a plan for implementing the State, local and tribal programs. Below we have also provided more information on different groups that we plan to involve in implementing various aspects of the Strategy.

State, Local, and Tribal Governments

National standards for mobile and major sources may not adequately address the human health risks in urban areas because of the combined emissions from these sources and the many different types of sources. For this reason, we expect State, local, and Tribal agencies to play an active role in tailoring local approaches to reduce risks in urban areas, and we'll ask for their help in developing practical programs to implement the Strategy. More information on their role is presented in section III.

In a parallel effort to address the issue of roles and responsibilities, we'll be holding a series of meetings with State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) to develop a plan for the most efficient and effective interaction among regulators. Additionally, over the next year, we plan to meet with other regulatory partners including Tribal leaders and city mayors to help shape the coordination process. In conducting urban scale assessments as discussed in section IV, we'll work with local communities as appropriate to characterize the air toxics emissions within a community (through monitoring and emission inventories), estimate the risks associated with these emissions, and identify actions which could be taken to reduce air toxics. We'll also explore to what extent and how to address air toxics indoors.

Environmental Justice Communities

The cumulative impact of multiple emission sources on minority populations and low income populations in urban areas is of special concern. The Strategy will help identify and plan actions to decrease emissions that affect these communities. We're already coordinating with the National Environmental Justice Advisory Council (NEJAC) to establish mechanisms to work with communities to help solve urban air toxics problems. We'll work with NEJAC to explore the formation of groups such as round tables and panels as a means to involve communities, and other stakeholders, including representatives from universities and hospitals. These round tables/panels would explore issues related to rulemaking coordination, risk assessments, and the process of defining roles and responsibilities for Federal and State, local and Tribal agencies in implementing the Strategy.

Public Health Groups and Environmental Groups

Public health concerns are a priority in this Strategy, especially the impact of air toxics on susceptible groups like children. We plan to identify and address health risks to children and seniors and welcome input on these key issues. We'll also encourage these groups to work with us on various aspects of the Strategy, such as defining the roles and responsibilities of State, local, and Tribal agencies.

Small Business and Industry

Because the Strategy focuses on reducing emissions from area sources, impacts of the ultimate standards may be felt by small businesses. We'll strive, however, to ensure that regulations don't unfairly impact them. We also plan to involve small businesses in pilot projects to assess and design solutions to local air toxics risks.

An example of how we'll provide concrete support to small businesses is our EPA Small Business Innovative Research (SBIR) Program. Under this program, we can award Phase I contracts of up to $70,000 over 6 months to small businesses with fewer than 500 employees to develop and commercialize new environmental technologies. The awards are based on the scientific merit and technical feasibility of the proposed technology. The results of Phase I determine whether the research idea is technically feasible, whether the firm can do high-quality research, and whether sufficient

progress has been made to justify a larger Phase II effort. We can award Phase II contracts for up to $295,000 over 2 years to commercialize the technology or product. The FY2000 Phase I Solicitation will open on August 11, 1999 and close on October 13, 1999. Copies of the solicitation will be posted on August 11, 1999 on our website at: http://www.epa.gov/ncerqa. The solicitation will also be available by fax at the EPA SBIR Helpline: 800–490–9194.

In addition, large businesses could be affected by programs and regulations developed to implement the Strategy. As always, we'll work with industry representatives to try to develop technically sound, effective regulations that minimize the burden to affected sources.

Urban Developers

In designing the Strategy, we've tried to avoid unfairly limiting the efforts of developers interested in creating business opportunities in urban industrial sites or areas needing revitalization. We plan to work with these interests to ensure that public health protection is achieved and economic development is encouraged.

As with our previous air toxics regulatory development efforts, our efforts under the Strategy will involve stakeholders as early as possible in the process. We recognize that opportunities for public participation beyond the required notice and comment process help ensure we develop the most workable requirements that still achieve our environmental goals. We'll use the established urban air toxics Strategy website on the Internet (www.epa.gov/ttn/uatw/urban/urban.pg.html) to update the public on ongoing activities and opportunities to participate in implementation of the Strategy. This will include updates on rule development, assessment activities, and progress toward meeting all of the Strategy goals. You can find information on all of our air toxics regulations at the following website on the Internet: www.epa.gov/ttn/uatw.

B. What is our Overall Timeline for Action?

Many of the activities identified in the Strategy will require further public notice and comment, and we'll provide further opportunities for stakeholder input as they are developed. The public will also be able to measure the progress of the Strategy by tracking the following milestones projected in the coming five years:

- 1999
  - —Publish the Integrated Urban Air Toxics Strategy, including the urban HAPs list and the area source category list.
  - —Issue the first Integrated Urban Air Toxics Strategy report to Congress under section 112(k)(5).
  - —Complete 1996 NTI update.
  - —Begin State/local/Tribal stakeholder communication and information exchange on implementing the Strategy.
  - —Propose motor vehicle and fuel standards under section 202(l).
- 2000
  - —Complete initial national and urban scale assessment.
  - —Complete motor vehicle and fuels standards development under section 202(l).
  - —Start development of additional area source standards.
- 2002
  - —Complete 1999 NTI update.
- 2003
  - —Complete 1999 assessment.
  - —Finalize source category list.
- 2004
  - —Promulgate standards for the area source categories newly listed in today's strategy.

We'll attempt to meet this demanding schedule as expeditiously as practicable. We're currently engaged in significant efforts to develop standards for stationary sources that were previously listed under section 112(c). In addition, realistic schedule and resource constraints suggest that our efforts to develop additional standards should be phased in over time.

C. What Reports Will we Prepare To Communicate With the Public?

We're required under section 112 of the Act to provide two reports to Congress on actions taken to reduce the risks to public health posed by the release of HAPs from area sources. The Act also requires that the reports identify specific metropolitan areas that continue to experience high risks to public health as the result of emissions from area sources.

We'll submit our first report in late 1999. This report will provide more specific information about our Strategy, including further details on the methodologies we used to develop the final urban HAPs list and the list of source categories. The report will also provide an overview of previous studies conducted in various cities to characterize their respective urban air toxics problems and contain a detailed discussion of the research needed to achieve the goals of the Strategy. We also expect to report to the public about air toxics emissions trends and air quality in urban and other areas in our annual Air Quality and Emissions Trends Reports.

Dated: July 6, 1999.

Robert Perciasepe,

Assistant Administrator for Air and Radiation.

Appendix A—Summary of Other Authorities, Laws, Rules, and Programs to Help Reduce HAP Emissions

There are a number of other authorities, laws, rules, and programs that will help reduce emissions of HAPs and consequent exposures and risks. Some of these are discussed below. We're currently evaluating the appropriateness of these statutes for controlling emissions of HAPs as described under section 112(k)(3) and intend to take further actions under these statutes as appropriate.

As discussed in section I., the Strategy involves collaboration between offices within the air program to assess the risks from exposures to air toxics indoors and will assimilate non-regulatory, voluntary programs developed to address those risks. Title IV of the Superfund Amendments and Reauthorization Act (SARA) provides EPA with the authority to perform research and provide information to the public on the health problems associated with air pollutants in the indoor environment.

Under the Toxic Substances Control Act (TSCA), chemicals produced or imported into the United States are evaluated as to toxicity to human health and the environment. To prevent adverse consequences of the many chemicals developed each year, TSCA requires that any chemical that will reach the consumer marketplace be tested for possible toxic effects prior to commercial manufacture. Any existing chemical that is determined to pose health and environmental hazards is tracked and reported under TSCA. Procedures also are authorized for corrective action under TSCA in cases of cleanup of toxic materials contamination. The TSCA is a complementary authority to the Clean Air Act and has contributed to decreased emissions of several HAPs. For example, concern over the toxicity and persistence in the environment of polychlorinated biphenyl (PCB) compounds led Congress to include in TSCA prohibitions on the manufacture, processing, and distribution in commerce of PCBs (TSCA section 6(e), 15 U.S.C. 2605(e)). In 1990, TSCA authority was relied upon to eliminate chromium use in, and emissions from, comfort cooling towers (i.e., industrial process cooling towers used exclusively for cooling, heating, ventilation, and air conditioning systems).

There are several provisions of the Resource Conservation and Recovery Act (RCRA) and its amendments which may yield reductions of urban air toxics. One impact evidenced in the 1990's is increased recycling and recovery of hazardous waste, including solvents which through volatilization contribute to HAP emissions. Section 3004(n) of RCRA has been the basis of a three-phased regulatory program to control air emissions from hazardous waste

treatment, storage and disposal facilities. The third phase would address any risks remaining after implementation of the control regulations issued in 1990 and 1994, which were estimated to reduce organic emissions by more than one million tons per year. Any resulting emissions and risk reductions can be considered in assessing progress toward the 75-percent reduction in cancer incidence from the baseline.

Under the Comprehensive Environmental Response, Compensation and Liability Act, commonly known as Superfund, the clean-up of abandoned hazardous waste sites may also reduce emissions of HAPs. Where significant health risks from chemical releases to the air have been identified at Superfund sites in urban areas, clean-up will reduce risks from urban air toxics.

Under the Clean Water Act (CWA), controls on the discharge of pollutants to surface water can also reduce the amount of HAPs entering the environment. These controls may take the form of national technology-based standards under the effluent guidelines program or site-specific water quality-based controls to achieve State water quality standards. In addition to providing control by establishing discharge limitations on pollutants (including HAPs) in the wastewater, process changes made in order to comply with these limitations may also reduce fugitive emission sources.

As part of the effluent guidelines program under the CWA, we've issued effluent limitations for the pharmaceuticals industry. Human health benefits from these guidelines include reductions in excess cancer risk through inhalation. The regulatory impact assessment prepared for these guidelines estimates that the number of excess cancer cases avoided per year nationwide ranges from 0.02 to 0.35. These reductions are due to reductions in VOC emissions, including 10 carcinogens (principally chloroform and methylene chloride). We can also point to air toxics benefits from the effluent guidelines for the pulp, paper, and particleboard industry. These regulations, coupled with the associated NESHAP, are expected to decrease background emission of HAPs by 121,200 megagrams annually.

If a waterbody isn't meeting water quality standards even after all technology-based controls under the effluent guidelines program are in place, the State, local agency, or Tribe must list the water as ''water quality limited'' and prepare a ''total maximum daily load'' (TMDL) calculation that allocates the maximum amount of pollution, with a margin of safety, that the waterbody can absorb from point and nonpoint (including air deposited) sources. A plan must then be developed to implement the TMDL, which might include provisions to address air sources under Federal or State (or local or Tribal) programs. We're conducting a pilot project in two waterbodies to develop TMDLs identifying the relative contributions of mercury from various air sources. This project will also examine how Federal and State water programs can work together to reduce mercury contamination of water.

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) provides Federal control of pesticide distribution, sale, and use. Several HAPs listed in Clean Air Act section 112(b) have been used as pesticides. An EPA registration is required of all pesticides sold in the United States and is intended to ensure that pesticide use, when in accordance with label specifications, doesn't cause unreasonable harm to people or the environment. It's a violation of FIFRA to use a pesticide in a manner inconsistent with its label. Registered pesticides classified as ''restricted use'' may only be used by registered applicators who have passed a certification exam. This restricted use requirement minimizes the number of persons having access to certain pesticides. The FIFRA regulations may also reduce emissions and exposures by banning (canceling or denying registration) or severely restricting pesticide use. Seven individual HAPs and members of three HAP compound groups have been banned or severely restricted in their use as pesticides.

Two other Federal laws, the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and the Pollution Prevention Act (PPA) of 1990, while not directly regulating air emissions of HAPs, may influence decisions regarding chemical usage and storage, and yield significant reductions in air toxics risks in urban areas. The goal of EPCRA is to reduce risks to communities through informing communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require certain facilities to report the locations and quantities of chemicals stored at their facilities to State and local governments. This information is used by State and local agencies in preparing for, and responding to, chemical spills and similar emergencies.

Through EPCRA, Congress mandated that a Toxics Release Inventory be made public. The TRI provides citizens with information about potentially hazardous chemicals stored, manufactured and used in their community. Section 313 of EPCRA specifically requires certain manufacturers and all Federal facilities to report to EPA and State governments, all releases of any of more than 600 designated toxic chemicals to the environment (including most of the 188 HAPs). Each year, more than 20,000 manufacturing facilities and 200 Federal facilities submit information to us on the releases of chemicals to the environment. We compile these data in an on-line, publicly accessible national database, which is a significant source of information regarding HAP emissions. Reporting requirements for TRI became more comprehensive in 1991, highlighting the importance of pollution prevention. In 1997 we added seven industry groups (metal mining, coal mining, RCRA subtitle C TSD and solvent recovery, petroleum distribution, electricity generating, and chemical distribution). We believe that for the manufacturing sector this public spotlight on releases and other waste management of toxic chemicals has led to reductions in their environmental release. We're also planning to lower the reporting thresholds under the TRI for several persistent, bioaccumulative toxic chemicals, including mercury and dioxin, that can cause human health and environmental damage at very low levels, so that additional information on releases will be available to the public.

The passage of the Pollution Prevention Act (PPA) established an environmental hierarchy that establishes pollution prevention as the first choice among waste management practices. Traditionally, much environmental protection has involved controlling, treating or cleaning up pollution. Pollution prevention, which eliminates or minimizes pollution at the source, is most effective in reducing health and environmental risks because it (1) eliminates any pollutant associated risks, (2) avoids shifts of pollutants from one medium (air, water or land) to another, which can result from certain waste treatments, and (3) reduces waste of natural resources. For waste that cannot be avoided at the source, recycling is considered the next best option. A waste generator should turn to treatment or disposal only after source reduction and recycling have been considered. Pollution prevention strategies include redesigning products, changing processes, substituting raw materials for less toxic substances, increasing efficiency in the use of raw materials, energy, water, land and other techniques. The EPA implements the PPA by promoting voluntary pollution reduction programs, engaging in partnerships, providing technical assistance, funding demonstration projects and incorporating cost-effective pollution prevention alternatives into regulations and other initiatives.

In addition, we've developed the ''Waste Minimization National Plan,'' a voluntary, long-term effort to reduce the quantity and toxicity of hazardous waste through waste minimization. The plan was built on extensive stakeholder involvement and was released in 1994. The plan focused on the following key objectives:

- Prioritize pollution prevention efforts based on risk.
- Promote source reduction over recycling.
- Adopt a multi-media approach and prevent cross media transfers.
- Provide flexibility in implementing pollution prevention activities.
- Provide accountability and measure progress.
- Involve the public.

The plan calls for a 50-percent reduction in the presence of the most persistent, bioaccumulative and toxic (PBT) chemicals in hazardous waste by 2005.

The starting point for selecting chemicals for the national waste minimization list is EPA's ''Waste Minimization Prioritization Tool,'' which is a software program that provides a screening-level assessment of the potential chronic risks that chemicals pose to human health and the environment, based on their persistence, bioaccumulative potential, and human and ecological toxicity. This software program contains full or partial PBT data for approximately 4,200 chemicals. The draft ''Waste Minimization Prioritization Tool'' was released for public comment on June 23, 1997 (62 FR 33868). We made significant changes in response to public comment and published a revised version on November 9, 1998 (63 FR 60332). The revised software, in conjunction with a publicly

reviewed methodology, was used to generate a draft list of 53 PBT chemicals, which is now in the process of being finalized.

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