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Air

Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations

Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations

Issued By:

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Research Triangle Park, NC 27711

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ACRONYMS AND ABBREVIATIONS

AFS	AIRS/Facility Subsystem
AIRS	Aerometric Information Retrieval System
ALAPCO	Association of Local Air Pollution Control Officials
AMS	Area and Mobile Subsystem
ANSI	American National Standards Institute
BEIS-2	Biogenic Emissions Inventory System-2
BIOME	Biogenic Model for Emissions
BSFC	brake specific fuel consumption
CAA	Clean Air Act
CARB	California Air Resources Board
CASAC	Clean Air Act Scientific Advisory Committee
CB-IV	Carbon Bond IV
CEMS	Continuous emission monitoring system
CERR	Consolidated Emissions Reporting Rule
CG	cloud-to-ground
CHIEF	Clearing House for Inventories and Emission Factors
CNG	compressed natural gas
CO	carbon monoxide
EC	elemental carbon
EDI	Electronic Data Interchange
EDR	electronic data reporting
EFIG	Emission Factor and Inventory Group
EIIP	Emission Inventory Improvement Program
EKMA	Empirical Kinetic Modeling Approach
EMS	Emission Modeling System
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTP	file transfer protocol
GTM	gross ton miles
GCVTC	Grand Canyon Visibility Transport Commission
HAP	hazardous air pollutant
HCs	hydrocarbons
HDDV	heavy-duty diesel vehicle
HDGV	heavy-duty gasoline vehicle
HONO	gaseous nitrous acid
HPMS	Highway Performance Monitoring System
IC	intra-cloud
I/M	inspection and maintenance
IPP	Inventory Preparation Plan
LDDT	light-duty diesel truck
LDDV	light-duty diesel vehicle
LDGT	light-duty gasoline truck
LDGV	light-duty gasoline vehicle
LPG	liquid petroleum gas
LTOs	landing and takeoffs

ACRONYMS AND ABBREVIATIONS (continued)

MoVEM	Motor Vehicle Emissions Estimates Model
NAAQS	national ambient air quality standard
NAICS	North American Industry Classification System
NAPAP	National Acid Precipitation Assessment Program
NET	National Emission Trends
NH_3	ammonia
NMHC	nonmethane hydrocarbons
NMOG	nonmethane organic gases
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NTTAA	National Technology Transfer and Advancement Act
OAQPS	Office of Air Quality Planning and Standards
OC	organic carbon
OMB	Office of Management and Budget
OMS	Office of Mobile Sources
OTAG	Ozone Transport Assessment Group
OTC	Ozone Transport Commission
PCBEIS-2.2	Personal Computer version of the Biogenic Emission Inventory System-2.2
PCC	process category code
PM	particulate matter
PM_{10}	particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers
$PM_{2.5}$	particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
QA	quality assurance
QC	quality control
RADM	Regional Acid Deposition Model
RE	rule effectiveness
ROG	reactive organic gas
ROM	Regional Oxidant Model
RP	rule penetration
RVP	Reid vapor pressure
SAEWG	Standing Air Emissions Work Group
SAPRC	California Statewide Air Pollution Research Center
SAQM	SARMAP Air Quality Model
SARMAP	San Joaquin Valley Air Quality Study/Atmospheric Utilities Signatures, Predictions and Experiments Regional Modeling Adaption Project
SCC	source classification code
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_4	sulfate
SO_x	oxides of sulfur

ACRONYMS AND ABBREVIATIONS (continued)

STAPPA	State and Territorial Air Pollution Program Administrators
TAFF	Temporal Allocation Factor File
TCA	1,1,1-trichloroethane
TDM	travel demand model
TEA-21	Transportation Equity Act for the 21st Century
THC	total hydrocarbons
TOG	total organic gases
TTN	Technology Transfer Network
UAM	Urban Airshed Model
UMRA	Unfunded Mandates Reform Act
U.S.	United States
UTM	universal transverse mercator
VMT	vehicle miles traveled
VOC	volatile organic compound(s)

SECTION 1.0
OVERVIEW

1.1 PURPOSE

The purpose of this guidance document is to define required elements of emission inventories necessary to meet State Implementation Plan (SIP) requirements for complying with the 8-hour ozone national ambient air quality standard (NAAQS), the revised particulate matter NAAQS and the regional haze regulations. For the particulate matter NAAQS, the emphasis in this guidance is on particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$). However, the earlier PM_{10} (particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers) NAAQS is still in effect and, therefore, States should continue to inventory PM_{10} as well. The required elements include those for compiling and reporting the emission inventories to the United States (U.S.) Environmental Protection Agency (EPA).

For the 8-hour ozone NAAQS, this guidance applies to all nonattainment area classifications except "transitional." Transitional ozone areas are nonattainment areas that may be able to demonstrate attainment of the 8-hour NAAQS through actions intended to meet the 1-hour NAAQS. An example would be areas in the East that can demonstrate attainment of the 8-hour NAAQS as a result of actions taken in response to the oxides of nitrogen (NO_x) SIP call. Emission inventory guidance for these transitional areas is included in *Implementation Guidance for the Revised Ozone and Particulate Matter (PM) National Ambient Air Quality Standards (NAAQS) and the Regional Haze Program*,[1] Section 3 "SIP Requirements for Transitional Areas," Subsection b "Emission Inventory, Modeling and Attainment Demonstration."

Ozone, regional haze, and a significant portion of $PM_{2.5}$ are produced in the air by the combination of pollutants ("precursor pollutants") from many of the same local emission sources. In addition, studies have identified the long-range transport of pollutants as contributing to ambient air violations and visibility impairment. Therefore, this guidance document emphasizes the importance of preparing a single, statewide inventory for all pollutant emissions that contribute to the formation of ozone, $PM_{2.5}$, and regional haze.

1.2 RELATIONSHIP TO EMISSION INVENTORY IMPROVEMENT PROGRAM (EIIP) GUIDANCE

This document is a guide for State and local agencies for the requirements for submitting their emission inventories for the 8-hour ozone and $PM_{2.5}$ NAAQS, and for the regional haze program. It is not a procedures document covering the methods for compiling and documenting emissions inventories. The Emission Inventory Improvement Program (EIIP) has been and will continue to develop the procedures for compiling and documenting emission inventories for point, area, nonroad mobile, onroad mobile, biogenic, and geogenic source categories. Thus, the EIIP guidance compliments this requirements document.

The goal of EIIP is to provide cost-effective, reliable inventories by (1) improving the quality of emissions information; and (2) developing systems for collecting, calculating, and reporting emissions data. The goal is achieved by developing a set of "preferred and alternative methods" for all inventory associated tasks. This standardization improves the consistency of collected data and results in increased usefulness of emissions information. The EIIP will reach its goal through development of:

- Preferred methods for collecting data and calculating emissions;
- Improved reporting systems;
- Procedures for quality control; and
- More consistent guidance.

The EIIP is a jointly sponsored effort of the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) and EPA, and is an outgrowth of the Standing Air Emissions Work Group (SAEWG). Funding is provided by State/local agencies through the federal 105 grant programs. The EIIP Steering Committee and technical committees are composed of State, local, industry, and EPA representatives. The EIIP maintains a web site which provides the documents prepared by EIIP as well as periodic updates on EIIP activities and products. The web site address is: http://www.epa.gov/oar/oaqps/eiip/. The documents prepared by the EIIP should, where appropriate, be used instead of existing emission inventory procedures guidance.

1.3 RELATIONSHIP TO THE CONSOLIDATED EMISSIONS REPORTING RULE (CERR)

The EPA is preparing the Consolidated Emissions Reporting Rule (CERR) to improve and simplify the reporting of emission inventory information. A draft of the CERR is provided in Appendix A of this document. The preparation of the CERR will assist State and local agencies to:

- Determine and integrate the various emissions reporting requirements;
- Improve reporting efficiency; and
- Provide flexibility for data gathering and reporting.

Numerous State and local agencies requested that EPA consolidate its various air emissions reporting requirements. This should increase the efficiency of the emission inventory program and provide more consistent and uniform data. Consolidating reporting requirements will enable agencies to better explain to program managers and the public the necessity for a consistent inventory program. This action, while including new data collection requirements for $PM_{2.5}$, its precursors, and hazardous air pollutants (HAPs), reduces the reporting requirements for other criteria pollutants.

This document incorporates the 8-hour ozone, $PM_{2.5}$, and regional haze emission inventory requirements of the draft rule presented in Appendix A. This guidance document and the CERR were developed in parallel, and this guidance document is being released before the CERR is published in its final form. While the CERR is undergoing the rulemaking process, EPA believes that there is sufficient existing statutory authority to implement the provisions contained in this guidance document. If there are conflicts between this guidance document and the final rule, the final rule will take precedence.

1.4 IMPLEMENTATION

Section 2.3 of this document provides details of SIP inventory implementation schedules. Implementation of the 8-hour ozone NAAQS began after it was finalized in July 1997. Similarly, implementation of the regional haze regulations will begin after they are finalized in the spring of 1999.

The implementation of the $PM_{2.5}$ NAAQS will not occur until after the Clean Air Act Scientific Advisory Committee (CASAC) completes its review of the standard in 2002. However, because many of the same sources produce emissions that contribute to ozone and $PM_{2.5}$ formation and visibility impairment, EPA encourages States to coordinate emission inventory planning and development efforts for ozone, regional haze, and $PM_{2.5}$ as they develop their required inventories for ozone. EPA believes that the States should take advantage of the opportunity to produce a PM emission inventory while they are collecting data and preparing their ozone precursor inventory. Coordination of emission inventory planning and development efforts will help to reduce the burden associated with preparing separate inventories, improve the accuracy of emission inventories through the application of consistent methods, improve regional modeling studies, and improve coordination of control strategy development.

1.5 SUMMARY OF DOCUMENT CONTENTS

Section 2 of this document summarizes the regulatory requirements for emission inventories for the 8-hour ozone and $PM_{2.5}$ NAAQS, and the regional haze regulations. This section also provides a brief overview of the types of inventories that States will need to prepare for their SIPs, specifies the year for which the base year inventories are to be prepared, and provides a time line illustrating the relationship between the schedules for submittal of emission inventories and other SIP milestones. Section 2.0 also discusses the emission inventory planning and approval process.

Section 3 identifies and explains the key requirements for ozone, PM, and regional haze SIP emission inventories. The topics covered include requirements for the inventory base year and periodic inventories; uses of the inventories; defining the pollutants and pollutant precursors, and sources and source categories, to be inventoried; geographic coverage of inventories; temporal basis of emissions; application of rule effectiveness (RE) and rule penetration (RP); and modeling inventories. For modeling inventories, this section explains the procedures by which emissions in a completed base year or projection year inventory are temporally allocated, spatially allocated, and speciated for use in a photochemical grid model. By explaining these procedures, it is anticipated that State and local agencies will be able to provide more complete and accurate data to increase the accuracy of the procedures.

Section 4 provides brief definitions and data element reporting requirements for stationary point and area, nonroad mobile, onroad mobile, biogenic, and geogenic emission sources. This section also specifies data reporting and electronic data transfer requirements, and discusses how the emission inventories submitted by State and local agencies are compiled into a comprehensive emission data base at EPA.

Section 5 addresses emission inventory development requirements for the base year and periodic emission inventories. This section provides an overview of the types of emission sources and pollutants expected to be considered for inclusion in an inventory, and cross-references existing emission inventory development procedures by source category and pollutant where available. Section 5 also emphasizes the importance for State and local agencies to collect the best activity data available for their inventories. The EPA recognizes that emission factors are either currently not available or have higher uncertainty for some pollutants [e.g., $PM_{2.5}$ and ammonia (NH_3)], and is conducting ongoing research to develop new and improved emission factors. Therefore, because it is difficult to collect high-quality activity data retrospectively, emphasis should be placed on collecting good activity data for the base year inventory. As emission factors are developed or improved, the factors can be applied to the activity data to improve emission estimates.

The final section of this document, Section 6, discusses the importance of including quality assurance (QA) and quality control (QC) procedures in the inventory planning and development process, and the importance of preparing sound documentation for the inventories.

SECTION 2.0
REGULATORY REQUIREMENTS, DEFINITIONS, AND SUBMITTAL DATES

This section reviews the Clean Air Act (CAA) provisions and associated regulations that require States to compile and submit air pollution emission estimates to EPA. It also reviews inventory types, emission inventory submittal dates, Inventory Preparation Plans (IPPs), and the EPA approval process.

2.1 STATUTORY AND REGULATORY REQUIREMENTS

EPA interprets Section 110(a)(2)(F) of the CAA (codified in 40 CFR 51 Subpart Q) as requiring SIPs to provide for the reporting of criteria air pollutants for all areas under the general SIP requirements of section 110. In addition, EPA interprets section 172(c)(3) as providing the Administrator with discretionary authority to require other emissions data as deemed necessary for SIP development in nonattainment areas to attain the NAAQS. This statutory authority provides a basis for requiring SIPs to provide for a periodic inventory of PM_{10} emissions for PM_{10} nonattainment areas, $PM_{2.5}$ emissions and emissions of the $PM_{2.5}$ precursors NH_3, NO_x, and oxides of sulfur (SO_x). Section 169(A) provides authority for emission inventories to be required in SIPs developed to protect visibility in Federal Class I areas.

2.2 TYPES OF INVENTORIES

For the purpose of developing SIPs to demonstrate compliance with the 8-hour ozone NAAQS, $PM_{2.5}$ NAAQS, and regional haze rule, there are three basic kinds of inventories that are necessary. These three are the base year, periodic, and modeling inventories. Because of the increasingly regional nature of air quality analysis and planning, all three types of inventories should be prepared on a statewide basis. The **base year inventory** is the primary inventory from which the other two inventories are derived. Thus, all inventories should be consistent with data provided in the base year inventory. The CAA calls for States to ensure that the base year inventory is comprehensive, accurate, and current for all actual emissions. The inventory should include emissions estimates from stationary point and area sources (from both anthropogenic and biogenic origin), onroad mobile sources, and nonroad mobile sources.

Every 3 years after the base year inventory is developed, States are required to develop **periodic inventories** (in the future to be called the 3-year cycle inventory) based on actual emissions. This inventory is used to measure overall emission reduction trends and meet information requests from the general public. These inventories will be important to future modeling studies and emissions trading programs.

Modeling inventories are required for developing the attainment demonstration. A modeling inventory, defined as an inventory that will be processed through an "emissions preprocessor," is only prepared for a specific modeling application. The inventory requirements specified in this guidance will support modeling, but do not require a modeling inventory *per se*. Modeling inventories are based on either allowable or actual emissions depending on the purpose of the modeling. For example, modeling

inventories are based on the actual emissions for model performance evaluation. For control measure evaluations and the attainment demonstration, the modeling inventory is based on actual emissions for the base year and projected allowable emissions for the attainment year.

As an alternative to using allowable emissions for projections for the 8-hour ozone standard, current EPA policy allows the use of actual emissions in certain circumstances. For sources or source categories that are currently subject to a regulation, and where the State does not anticipate subjecting the source(s) to additional regulation, the projected emissions may be based on actual emissions. In addition, for sources or source categories that are currently unregulated and are not expected to be subject to future regulations, the projected emissions may be based on actual emissions. For all other sources (i.e., sources that are expected to be subject to additional regulation), the projections should be based on the new allowable emissions (including RE). Where a State chooses to project emissions using a different approach than described above, the State should get the approval of the appropriate EPA Regional Office before proceeding. In addition, the State should provide complete documentation of the approach and documentation and technical justification of any assumptions. For PM_{10} and $PM_{2.5}$, current EPA policy only permits the use of allowable emissions in projections to future years. EPA is reviewing the policy for all pollutants to determine if more realistic projected emission estimates can be obtained.

Previously, modeling inventories were only specifically required for areas performing photochemical grid-based modeling to demonstrate attainment of the 1-hour ozone NAAQS; however, recent events have shown that most States also need access to emissions data outside their borders. Regional approaches such as the Ozone Transport Assessment Group (OTAG), the Ozone Transport Commission's (OTC) NO_x baseline study, and the Grand Canyon Visibility Transport Commission's (GCVTC) study have emphasized the need for regional (multi-State) emission inventories. Regional modeling is expected to become even more prevalent as areas develop attainment plans for the 8-hour average ozone and the $PM_{2.5}$ NAAQS, and to develop plans and demonstrate progress toward meeting regional haze visibility goals. Thus, needs for multi-State inventories to support grid-based modeling are increasing.

Countywide emission estimates are needed for all counties. Where a State is unable to provide this information, EPA's National Emission Trends (NET) inventory can be used for regional analyses. States that are performing modeling analyses generally have to make emission estimates for more than just a nonattainment area. In the absence of State-prepared emissions data, the NET inventory may be used. Without additional State scrutiny, however, the risk of incorrect air quality estimates is increased.

2.3 SPECIFICATION OF BASE YEAR

This section specifies the base year for the emission inventory that States should use in the development of their SIPs for ozone, PM, and regional haze. In each case, the base year was determined by considering when the SIP was due, and the time needed to prepare the SIP, perform the modeling studies, and prepare the emission inventory. In selection of the base year, consideration was also given to the 3-year frequency of emission inventory preparation in the CERR, as well as, conserving State resources by using a single inventory year for multiple applications.

2.3.1 Ozone

States are strongly encouraged to select 1999 as the base year for the emission inventory for the 8-hour ozone NAAQS. That is, EPA suggests that the base year inventory for the ozone NAAQS should be representative of calendar year 1999. However, this guidance permits a State to select any year from 1996 to 1999 as its base year. If this inventory will be used as a part of a regionwide modeling domain,

then all of the States in that domain should agree to use the same base year. The appropriate EPA Regional Office(s) should be involved in selection of the base year. The State should detail in its IPP (see section 2.4 for more information on IPPs) the base year selected, or specify the process for selecting a base year if a regionwide domain is necessary.

2.3.2 Particulate Matter

A base year for the $PM_{2.5}$ NAAQS inventory and a submittal date for the inventory cannot be specified until the NAAQS review is complete in 2002. However, it is important that States should begin in 1999 to identify and characterize their sources of PM and PM precursors. Some of the PM precursors will already be inventoried as part of the ozone inventory (VOC and NO_x) and the acid rain reporting provisions (SO_x). The only additional requirement for the States is that they include $PM_{2.5}$ and PM_{10} and the precursor NH_3 as they characterize their sources. To ensure progress toward developing a PM inventory, States, for example, should estimate the $PM_{2.5}$ and PM_{10} emissions from all of their point sources at the same time they estimate ozone precursor emissions. If the NAAQS review upholds the current $PM_{2.5}$ standard, States with monitoring data available for designations in 2002 to 2005 will need to have a base year of 2002 for their emission inventory.

2.3.3 Regional Haze

The base year for the emission inventory for developing regional haze control strategy SIPs will be contingent on the final regional haze rule, but is likely to be the same as the base year for developing nonattainment area SIPs under the $PM_{2.5}$ NAAQS. Therefore, as with $PM_{2.5}$, States should begin in 1999 to identify and characterize their sources. Again, to ensure progress toward developing a regional haze inventory, the States may want to do this as they estimate ozone precursor emissions.

The Transportation Equity Act for the 21st Century (TEA-21), passed in June 1997, includes revised time lines for regional haze and $PM_{2.5}$ SIP submittals. $PM_{2.5}$ nonattainment areas are to be designated in the 2002 to 2005 time frame, and $PM_{2.5}$ SIPs would be due 3 years later, in the 2005 to 2008 period. For these same geographic areas, regional haze SIPs would be due at the same time. The TEA-21 also requires regional haze SIPs to be submitted within 1 year for the geographic areas designated attainment or unclassifiable for $PM_{2.5}$. These regional haze SIPs would be due in the 2003 to 2006 time frame.

EPA is considering the possibility of an optional approach whereby States could commit to participation in future regional planning efforts and have coordinated deadlines for regional haze control strategy SIPs covering the geographic areas designated nonattainment, attainment, and unclassifiable for $PM_{2.5}$. States committing to regional planning efforts may need to conduct preliminary technical analyses characterizing interstate pollutant transport. To perform such analyses, which would precede more detailed analyses for the development of control strategies, the States may need to use the 1999 base year inventory.

2.4 INVENTORY PREPARATION PLAN

IPPs are used as a planning tool to guide inventory preparation and ensure that emission estimates are of high quality and are consistent with CAA requirements. IPPs provide States with the opportunity to tell their EPA Regional Office how they plan to compile their required inventories and allow EPA to provide feedback to avoid having States use approaches that are inconsistent. Because EPA has attempted to be as flexible as possible on how it allows States to meet the CAA inventory requirements, EPA is now requiring States to submit detailed IPPs which describe how the inventory is developed, what it includes, and what assumptions are being made. States should prepare and submit these IPPs for the

8-hour ozone and PM NAAQS and the regional haze program statewide emission inventories. States that prepared earlier IPPs for the 1-hour ozone or the PM_{10} NAAQS can use these IPPs as the starting point for the 8-hour ozone, $PM_{2.5}$, and regional haze IPPs. IPPs can also serve as standard operating procedures for the States for future inventory preparation and as documentation of inventory procedures to other neighboring States in regional planning efforts.

The IPPs should include descriptions of inventory objectives and general procedures. One of the first steps in developing the IPP is to define the purpose and scope of the inventory. This includes identifying items such as base year for the inventory, the pollutants to be inventoried, the emissions sources and source categories, the geographical boundaries of the inventory, the spatial and temporal scales of the emissions, and the application of controls and regulations, including RE and RP. The IPPs for inventories that report VOC emissions should include the State's definition of VOC and what species are included. The IPPs should also contain a schedule or time line for when the States plan to submit their inventories or inventory components to EPA. This schedule/time line should also show how the inventory preparation or review process will mesh with the application of these inventories in atmospheric modeling. If the State plans to submit an inventory in components (e.g., point sources, area sources, etc.), the IPP should so indicate, along with their submittal dates by component. Final submittal dates should be consistent with the ultimate inventory dates required by EPA (see section 2.3).

The IPP should contain the following sections, including separate sections to address the point, area, nonroad mobile, onroad mobile, and biogenic portions of the inventory:

- **Introduction**

This section includes items such as: a description of the inventory objectives, including how this IPP is structured, what it contains, who is responsible for the inventory, and who is compiling it; the geographic area covered by the inventory; the base year of the inventory (see section 2.3); the pollutants included in the inventory (see section 3.2.1); and the temporal resolution of the inventory.

- **Point Source Inventory**

Topics to be discussed in this section include: how sources are identified and located; what data collection methods are used; the basis for activity data and emissions estimates; how control efficiencies are identified and applied; whether RE and RP are applied and their values (see section 3.2.5); and how temporally resolved emissions are prepared and supplied (see section 3.2.4).

- **Area Source Inventory**

This section identifies what source categories are included in the inventory (see section 3.2.2), how emissions are estimated, how data are identified and collected, whether RE and RP are applied and their values (see section 3.2.5), how emissions are temporally and spatially resolved and supplied (see sections 3.2.4 and 3.3), and how double-counting of emissions is avoided.

- **Nonroad Mobile Source Inventory**

This section includes details on what source categories are included in the inventory (see section 3.2.2), how emissions are estimated, how data are identified and collected, and how emissions are temporally and spatially resolved and supplied (see sections 3.2.4 and 3.3).

- **Mobile Source Inventory**

This section includes the State's approach for determining vehicle miles traveled (VMT) (see section 5.5.1), specification of the mobile source emissions model used, specification of key assumptions for the model, including parameters such as temperature, speeds, existing inspection and maintenance (I/M) programs, etc., and how emissions are temporally and spatially resolved (see sections 3.2.4 and 3.3).

- **Biogenic Source Inventory**

This section identifies what source categories are included in the inventory (see section 3.2.2), how emission are estimated, how data are identified and collected, and how emissions are temporally and spatially resolved and supplied.

- **Documentation Approach**

This section describes how the inventory and its procedures are documented and how the data are stored and managed (see section 6.2). In addition, this section includes information on how the data are transmitted to EPA (see section 4.7).

- **Quality Assurance Plan**

This section includes a description of the inventory QA program and QA/QC procedures, as well as specification of the inventory data quality objectives (DQOs) (see section 6.1).

Each State should negotiate its IPP submittal schedules with its EPA Regional Office. The State and its Regional Office should agree in advance on the time table for submitting the IPP and the approval process that will be used by the EPA Regional Office. EPA Headquarters and Regional Offices will work together to promote consistency of IPP review and approval, while allowing maximum flexibility to the States in their inventory preparation process.

During the preparation of their IPPs, States are referred to Volume I of the EIIP guidance which discusses emission inventory planning and development.[2] Chapter 2 of Volume IV, *Quality Assurance/Quality Control*, of the EIIP guidance provides additional information on planning and documentation of inventory development and QA activities.[3]

2.5 INVENTORY APPROVAL

States should negotiate the emission inventory approval process with their respective EPA Regional Office. Of the emission inventories that States submit to EPA, those that are deemed to be of "regulatory significance" will require EPA approval. In general, this means that the approval process will include the emission inventory as a component of a SIP submittal, or other significant action by the State, that requires EPA review and approval. This represents a change from the policy with the 1990 inventories, which required States and EPA to subject the 1990 inventory to a public hearing and regulatory approval. This modification recognizes, and thus eliminates, the additional burden to States to have a separate inventory approval process. This modification also allows inventory revisions to continue to occur after initial compilation as application of the inventory in control strategy evaluation and urban or regional scale modeling reveals where improvements/adjustments are needed.

SECTION 3.0
EMISSION INVENTORY REQUIREMENTS

The purpose of this section is to identify and explain the key elements to be included in statewide SIP emission inventories that should be prepared by State and local agencies to comply with the 8-hour ozone NAAQS, $PM_{2.5}$ NAAQS, and regional haze rule. If a State or local agency is unclear on how this guidance applies to its specific situation, it should consult with its EPA Regional Office for clarification. This section identifies the uses and required components of the base year and modeling inventories discussed in this guidance document. This section also discusses the temporal allocation, spatial allocation, and speciation methodologies used to process the inventories for input to photochemical air quality models to enable State and local agencies the opportunity for supplying data to improve the methodologies.

3.1 IDENTIFICATION OF INVENTORY USES

The uses of inventories determine the information that should be included in the inventories. The emission inventories covered by this guidance document will be used by State and local agencies to develop their SIPs to demonstrate attainment of the 8-hour ozone NAAQS, $PM_{2.5}$ NAAQS, and regional haze rule. As discussed in section 2.2, these inventories include the base year and modeling inventories. These inventories will also be used by regional planning bodies and EPA to support regional and national analyses, which in turn will be given to State and local agencies to support development of their SIPs.

The base year inventory is the starting point from which the other SIP inventories are derived. One of its key purposes is to support air quality modeling and control measure analyses to determine the types and amounts of emission reductions needed to demonstrate attainment. Emissions trading programs could also be based on the inventory if emissions trading programs are adopted as a measure of implementing controls. The results of these studies are then used by State and local agencies to identify the emission sources for control, and to develop and adopt the control measures that should be included in the overall control strategy for a SIP. The draft CERR presented in Appendix A specifies the data elements that State and local agencies should include in their inventories.

Recent studies have indicated that the long-range transport of precursor emissions contribute to elevated ozone and $PM_{2.5}$ levels and visibility impacts in down-wind areas. Thus, EPA will support State and local agencies in conducting regional scale photochemical modeling for all three of these programs to provide State and local agencies with a number of critical data bases for use in developing their attainment demonstration and maintenance SIPs. Since EPA has recently published a regional NO_x control strategy for reducing ozone levels for 22 eastern United States and the District of Columbia, this support in the near term is expected to focus on $PM_{2.5}$ and regional haze SIP development. To support this effort, EPA will compile inventories that will include a blend of inventory data submitted by State and local agencies with inventory data developed by EPA. EPA developed data will be used to fill gaps in State data and for certain source types where EPA has developed accurate and comprehensive emission estimates (e.g., electric utility sources). EPA is developing a Data Incorporation Plan which will document in detail how EPA plans to use State and EPA developed data. These inventories will be stored in a central repository termed the NET data base. The EPA will also improve the NET data base for other regional studies as the needs arise. The NET data base will be updated annually with the

emphasis on incorporating State data using the 3-year cycle inventories submitted by State and local agencies.

3.2 COMPONENTS OF THE BASE YEAR AND 3-YEAR CYCLE INVENTORIES

3.2.1 Pollutants and Pollutant Precursors to Be Inventoried

This section identifies the pollutants that must be included in the base year and a 3-year cycle inventory for the 8-hour ozone NAAQS, $PM_{2.5}$ NAAQS, and regional haze rule. Because many sources emit more than one of the precursor pollutants, and because the precursor pollutants have the potential to be transported across State boundaries, it is important that State and local agencies develop a single statewide inventory of pollutants to support integrated, regional scale modeling, and control strategy development for ozone, $PM_{2.5}$, and regional haze.

For the 8-hour ozone NAAQS, the pollutants to be inventoried are volatile organic compounds (VOC), NO_x, and carbon monoxide (CO).

For the $PM_{2.5}$ NAAQS, the pollutants to be inventoried are primary emissions (including condensibles) of PM_{10} and $PM_{2.5}$, and the precursor emissions SO_x, NH_3, VOC, and NO_x. The EPA is requiring PM_{10} emissions to be reported because PM_{10} is a criteria pollutant and PM_{10} emissions are needed as an input to air quality simulation models when modeling $PM_{2.5}$.

For regional haze, the pollutants to be inventoried include all of the pollutants and precursor pollutants identified for ozone and PM, except for CO. While elemental carbon (EC) and organic carbon (OC) will be identified in default speciation profiles, more locally-specific data should be collected where available as an input to model preprocessing. Where such data are available, they should be provided to EPA to help in improving EPA's speciation profiles. State/local agencies can contact EPA's Emission Factor and Inventory Group (EFIG) for more information.

EPA's current regulatory definition of VOC (40 CFR § 51.100) excludes constituents considered to be negligibly photochemically reactive. These include methane, ethane, methylene chloride, 1,1,1-trichloroethane (TCA), several Freon compounds, acetone, perchloroethylene, and others. It is anticipated that additional compounds may be exempted from this VOC definition. The exempt compounds are considered negligibly reactive, although some can influence the formation of ozone when present in sufficient amounts. In preparing the base year inventory, States should consider how the VOC data are to be used in air quality modeling studies and the techniques available to the State in estimating VOC emissions. Therefore, should a State or local agency encounter a situation where its emission estimation methodology includes emissions exempted from EPA's definition of VOC, it should consult with its modeling staff and EPA Regional Office for guidance and include its plan for addressing the situation in its IPP. States should specify in their documentation what they are reporting as VOC.

Generally, the emission factors used to estimate organic emissions represent nonmethane hydrocarbons (NMHCs). Because of this, it is generally assumed that inventories do not have methane, and part of the modeling procedure "automatically" adds back that missing VOC component. Therefore, inventory preparers should not have to do anything further specific to methane. State and local agencies should confirm this with their air quality modeling staff.

At a minimum, it is of utmost importance to document what the inventory contains (e.g., specify what VOC species are included and any negligibly reactive VOC that are segregated/excluded). If the

State is reporting VOC as defined by EPA (40 CFR § 51.100), the State should simply state this in both the IPP and the inventory documentation.

The $PM_{2.5}$ and PM_{10} emission values that should be reported in the inventory should be primary PM. For the purpose of this guidance document, the following definitions apply:

- **PRIMARY PM:** Particles that enter the atmosphere as a direct emission from a stack or an open source. It is comprised of two components: Filterable PM and Condensible PM.

- **FILTERABLE PM:** Particles that are directly emitted by a source as a solid or liquid at stack or release conditions and captured on the filter of a stack test train.

- **CONDENSIBLE PM:** Material that is vapor phase at stack conditions, but which condenses and/or reacts upon cooling and dilution in the ambient air to form solid or liquid PM immediately after discharge from the stack.

- **SECONDARY PM:** Particles that form through chemical reactions in the ambient air well after dilution and condensation have occurred. Secondary PM is usually formed at some distance downwind from the source. Secondary PM is **NOT** reported in the emission inventory.

In reporting their PM emissions to the EPA, States should report the following:

- Primary $PM_{2.5}$ (or Filterable $PM_{2.5}$ and Condensible PM individually. Note that all Condensible PM is assumed to be in the $PM_{2.5}$ size fraction)
- Primary PM_{10} (or Filterable PM_{10} and Condensible PM individually)

It is preferred that the States report the two separate components rather than the single combined Primary PM values, if known. This information is important to assist in the development of new emission factors for condensible PM. If only the filterable component is known, report it as "filterable."

In addition, States may also choose to report the following:

- Total Primary PM Measured (or Filterable Total Primary PM Measured and Condensible PM individually)

These two PM components are the components measured by a stack sampling train such as EPA Method 5 and have no upper particle size limit.

States should be careful to identify the PM components that they are reporting using the above terms. If a State does not identify what PM components are being reported, the EPA will assume that the emissions represent only the Filterable PM component.

3.2.2 Identification of Sources and Source Categories to Be Inventoried

The base year inventory should include all stationary point and area, nonroad mobile, onroad mobile, biogenic, and geogenic emission sources present within each county within a State. Even if there are areas within a State that do not have significant emissions, the State should still prepare a statewide inventory (the State may, however, elect to use the NET inventory data for those areas). EPA's EFIG maintains the Clearing House for Inventories and Emission Factors (CHIEF) web site

(http://www.epa.gov/ttn/chief/) to provide access to the latest information and tools for identifying emission sources and estimating emissions of air pollutants and preparing air emission inventories. The CHIEF web site provides access to the list of point, area, and mobile source classification codes (SCCs).

Note that EPA plans to revise the current SCC reporting system. The new reporting codes, likely to be termed process category codes (PCCs), will be accommodated by the NET input format. Once the new reporting system is established, EPA will accept an emission inventory based on either SCCs or PCCs (i.e., EPA will not set a deadline by which time States are required to use the new system). EPA expects to develop a crosswalk for converting codes from the existing reporting system to the new system. In addition, for point source reporting under the CERR, a State is required to specify the Standard Industrial Classification (SIC) code. The U.S. Department of Commerce, Bureau of the Census has developed the North American Industry Classification System (NAICS) to replace the SIC system. The NAICS was developed jointly by the United States, Canada, and Mexico to provide new comparability in statistics about business activity across North America. Correspondence tables to map NAICS codes to SIC codes (or SIC codes to NAICS codes) have also been developed by the Bureau of the Census.

Section 5.0 of this document provides tables which list in detail the source categories that EPA believes are significant sources for the pollutants in the tables. This section also lists the source categories for which EIIP procedures guidance has been developed. As new EIIP guidance is issued for source categories discussed in section 5.0, the EIIP guidance should be used in lieu of the section 5.0 information, and can be accessed through the EIIP web site at http://www.epa.gov/oar/oaqps/eiip/.

3.2.3 Geographic Coverage

The base year inventory must be prepared for all sources for the entire State regardless of the attainment status of counties within the State. Even if there are areas within a State that do not have significant emissions, the State must still prepare a statewide inventory. The State may elect to use the EPA supplied NET inventory for those areas. Emissions for area, nonroad mobile, onroad mobile, biogenic, and geogenic emissions should be provided at the county level. The geographic location of emissions for point sources should be defined by their coordinates [i.e., latitude and longitude (decimal degrees) or universal transverse mercator (UTM)].

Because of the regional nature of the pollutants, statewide inventories are necessary to support air quality modeling to identify the scale of the pollutant problem (i.e., local versus regional), which in turn will support evaluation and development of cost-effective control strategies. The draft CERR in Appendix A specifies the criteria for defining point sources in attainment and nonattainment areas and the frequency for reporting point source data. The draft CERR also specifies the criteria for defining area, nonroad mobile, onroad mobile, and biogenic sources, and the reporting frequencies for these sources. The draft CERR includes reporting requirements for all NAAQS criteria pollutants and precursors, the Section 110 NO_x SIP Call, and HAPs. Although this guidance document is only concerned with the 8-hour ozone and $PM_{2.5}$ NAAQS, and the regional haze rule, State and local agencies are encouraged to coordinate their emission inventory development efforts for these other programs to minimize duplication of effort while compiling their inventories for the 8-hour ozone and $PM_{2.5}$ NAAQS, and the regional haze rule.

3.2.4 Temporal Basis of Emissions

This section addresses the temporal resolution of the emissions data that should be provided in the base year and 3-year cycle inventories. Discussion of how emissions are temporally allocated for air quality modeling purposes is provided in section 3.3.1. Temporal adjustments to annual emissions included in the inventory are made because of seasonal differences in the rate of emissions or activity, or to apportion emissions to a particular season or day. State and local agencies should consult EIIP guidance for temporal adjustment procedures. It is important that State and local agencies develop a single integrated annual statewide inventory.

For the 8-hour ozone NAAQS emission inventory, VOC, NO_x, and CO emissions should be reported as actual annual and actual summer weekday. Summer weekday emissions are defined as an average day's emissions for a typical summer day during the ozone season. These temperature data are provided to the air quality model by meteorological inputs developed for the specific days which are modeled. This information, in turn, is used by emissions models to "adjust" initial information provided by the State. It is only necessary to choose a summer weekday and make note of the diurnal temperature pattern used on a selected day. The emissions model will make adjustments for temperatures observed on the actual days which are modeled. For modeling purposes, EPA also urges providing estimates for a weekend day, which may reflect different activity levels and patterns. Note that in certain situations, weekend emissions may dominate some episodes, and, therefore, the inventory will be needed to support those analyses.

For the $PM_{2.5}$ NAAQS and regional haze rule emission inventories, direct emissions (including condensibles) of PM_{10} and $PM_{2.5}$, and the precursor emissions VOC, NO_x, SO_x, and NH_3 should be reported as actual annual. Temporal allocation of the inventories to other time scales (e.g., daily) will be made during preprocessing of the inventories for modeling, based on temporal allocation profiles. Alternatively, the State or local agency may choose to include actual temporally resolved emissions data in its inventory (see section 3.3).

The State or local agency should discuss in its IPP its approach for preparing and supplying temporally resolved emissions.

3.2.5 Rule Effectiveness and Rule Penetration

For ozone inventories, RE is still required as it has been in the past (i.e., each State or local agency should negotiate the application of RE and RP with its EPA Regional Office and include the decisions in its IPP). The inventory documentation should note when RE or RP are applied and what the factors are.

RE reflects the ability of a regulatory program to achieve all the emission reductions that could have been achieved by full compliance with the applicable regulations at all sources at all times. The concept of applying RE in a SIP emission inventory has evolved from the observation that regulatory programs may be less than 100 percent effective for some source categories. Should a State include RE, it should be applied to all sources that are affected by a regulation and for which emissions are determined by means of emission factors and control efficiency estimates. Thus, the RE factor is only applied to controlled emission sources (point) or source categories (area). No RE is needed in cases where no control is applied or there is no applicable regulation. Several factors should be taken into account when estimating the effectiveness of a regulatory program. These include: (1) the nature of the regulation (e.g., whether any ambiguities or deficiencies exist, whether test methods and/or recordkeeping requirements are prescribed); (2) the nature of the compliance procedures (e.g., taking into account the long-term performance capabilities of the control); (3) the performance of the source in maintaining

compliance over time (e.g., training programs, maintenance schedule, recordkeeping practices); and (4) the performance of the implementing agency in assuring compliance (e.g., training programs, inspection schedules, follow-up procedures). For further information on RE, the reader is referred to EPA guidelines for estimating and applying RE for ozone and CO SIP base year inventories.[4]

Rule penetration is an estimate of the extent to which a regulation covers emissions from an area source category for a specified control area (e.g., county, group of counties making up a nonattainment area, or statewide). Thus, RP is applied to the control efficiency for a regulation to account for less than 100 percent coverage of the emissions for an area source category. For example, if a control measure is applied to an area source fuel combustion category to control emissions from the largest emission sources within the category, then RP could be applied to the control efficiency for the control measure to account for the percentage of emissions for the source category that are affected by the control measure. For area sources, RP and RE should be applied at the SCC level.

For information on applying RE, State/local agencies can consult the EIIP draft document *Emission Inventories and the Proper Use of Rule Effectiveness*, available at the following web site: http://www.epa.gov/ttnchie1/eiip/pointsrc.htm.

For $PM_{2.5}$ and regional haze inventories, large contributions to overall emissions are of an uncontrolled area source nature, and there is insufficient evidence to draw broad conclusions on the application of RE/RP. Therefore, RE/RP will not be applied to $PM_{2.5}$ and regional haze inventories.

EPA is currently reviewing its policy on RE and RP. If changes to the existing policy are made, EPA will announce these changes through a policy memorandum.

3.3 MODELING INVENTORIES

This section explains the procedures by which emissions in a completed base year or projection year inventory are temporally allocated, spatially allocated, and speciated for use in a photochemical grid model. By explaining these procedures, it is anticipated that State and local agencies will be able to provide more complete and accurate data to increase the accuracy of the procedures. Note, however, that the information on preparing gridded inventories is presented for informational purposes and is not required for States. The procedures discussed are those applied in the emission inventory preprocessor currently being used by EPA, which, for this purpose, is based on the Emissions Modeling System, version 1995 (EMS-95). The procedures more than likely will be revised to incorporate improvements to the emission inventory/modeling interface, therefore, State and local agencies should consult with their modeling staff and EPA Regional Office to verify the procedures that will be used to process their inventory data for modeling, and make adjustments as needed. Once these decisions have been made, State and local agencies should document their approach in the IPP. As such, the following discussion of EMS-95 is presented as an example of a method to process data for photochemical grid modeling, and States are not required to use EMS-95.

It is possible that States will need to develop microscale, day-specific inventories to support air quality modeling efforts. These detailed emission inventories may be developed for any number of state-specific purposes, including model performance evaluation. However, if States develop a more detailed modeling inventory, the emissions do not need to be reported to EPA.

3.3.1 Temporal Allocation Procedures

Because of the different data elements reported for point, area, and mobile sources, the preprocessor contains separate procedures for temporally allocating their emissions. The following sections describe the procedures used for point, area and mobile sources, respectively.

3.3.1.1 Point Sources

EMS-95 temporally allocates emissions estimates based on source-specific operating schedule data that are input to the preprocessor. EMS-95 recognizes the following forms of operating schedule data:

- monthly throughput fractions (January through December)
- seasonal throughput fractions (where winter = December, January, and February; spring = March, April, and May; summer = June, July, and August; and fall = September, October, and November)
- hours per year in operation
- days per year in operation
- weeks per year in operation
- days per week in operation
- hours per day in operation

Any, none, or all of the operating schedule data can be supplied. If no operating schedule data are supplied, EMS-95 uses a default operating schedule based on SCC-specific profiles for point sources. However, custom profiles were not available and were not incorporated into EMS-95 for all SCCs. Therefore, in many cases the SCC-specific profiles simply reflect 24 hours per day, 7 days per week, and 12 months per year of operation.

If some or all of the operating data are provided, EMS-95 uses a hierarchy of the operating schedule data to determine how to compute the temporal factors. In this hierarchy, the monthly temporal factor is computed first, followed by the weekly temporal factor, then the daily temporal factor, and finally, the 24 hourly temporal factors.

To determine the monthly temporal factor, EMS-95 employs the following steps:

- **Step 1.** If valid monthly throughput values are available, the monthly temporal factor is set to the monthly throughput value of the month being modeled.

- **Step 2.** If a value is not obtained in Step 1 and valid seasonal throughput values are available, the monthly temporal factor is set to one-third of the seasonal throughput value of the season being modeled.

- **Step 3.** If monthly and seasonal throughput values are not available, the monthly temporal factor is set to 0.083 or 1/12 for equal monthly throughput values.

To determine the weekly temporal factor, EMS-95 determines the number of days in the month being modeled and divides that value by 7 days per week.

To determine the daily temporal factor, EMS-95 examines the values for days per week in operation. If it is a valid value (i.e., from 0 to 7), no additional action is needed to determine days per week for that source. If it does not have a valid value, EMS-95 assigns a value by examining the hours per year in

operation, days per year in operation, and weeks per year in operation fields, and using the following assumptions:

- **hours per year in operation** (*houryear*)
  - if $0 < houryear \leq 850$, then days per week = 2
  - if $850 < houryear \leq 1250$, then days per week = 3
  - if $1250 < houryear \leq 1670$, then days per week = 4
  - if $1670 < houryear \leq 2100$, then days per week = 5
  - if $2100 < houryear \leq 2500$, then days per week = 6
  - if $2500 < houryear$, then days per week = 7

- **days per year in operation** (*dayyear*)
  - if $0 < dayyear \leq 110$, then days per week = 2
  - if $110 < dayyear \leq 160$, then days per week = 3
  - if $160 < dayyear \leq 210$, then days per week = 4
  - if $210 < dayyear \leq 260$, then days per week = 5
  - if $260 < dayyear \leq 315$, then days per week = 6
  - if $315 < dayyear$, then days per week = 7

- **weeks per year in operation** (*weeks*)
  - if $0 < weeks \leq 7$, then days per week = 1
  - if $7 < weeks \leq 13$, then days per week = 2
  - if $13 < weeks \leq 19$, then days per week = 3
  - if $19 < weeks \leq 26$, then days per week = 4
  - if $26 < weeks \leq 33$, then days per week = 5
  - if $33 < weeks \leq 39$, then days per week = 6
  - if $39 < weeks$, then days per week = 7

To determine the hourly temporal factor, EMS-95 checks the hours per day in operation field for the source, and if there is a valid value, EMS-95 takes no other actions to determine the hours per day in operation value for the sources. If there is not a valid value, EMS-95 assigns a value by examining the hours per year in operation, days per year in operation, and weeks per year in operation fields. If any of these fields have a valid value, hours per day in operation is assumed to be 8. If hours per day in operation or days per week in operation cannot be assigned through the methods described here, hours are assumed to be 24 and days are assumed to be 7.

EMS-95 uses the temporal factors to allocate emissions to hourly values. The temporal factors are applied based on how the emissions estimates were reported to the preprocessor (as annual average, day-specific, or average day emissions).

- If the emissions data are **annual average** emissions, reported emissions are multiplied by (1) the product of monthly temporal factor divided by the weekly temporal factor, then by (2) the day of week temporal factor, and then by (3) the hourly temporal factor, to get the hourly emissions estimate.

- If the emissions data are **average day** emissions and the monthly factor, weekly factor, or day of week factor is zero, then emissions are assumed to be zero for each hour.

- If the emissions data are **average day** emissions and none of the factors (the monthly temporal factor, weekly temporal factor, or day of week factor) is zero, then emissions are multiplied by the hourly factor.

- If the emissions data are reported as **day-specific** emissions, then the emissions are multiplied by day-specific hourly temporal factors.

The States are encouraged to provide the modelers with as much operating data as possible for each point source. Use of actual data results in more accurate temporal allocation, and less data manipulation and fewer assumptions from the preprocessor.

3.3.1.2 Area and Mobile Sources

EMS-95 uses the Temporal Allocation Factor File (TAFF) developed for the 1985 National Acid Precipitation Assessment Program (NAPAP) to temporally allocate area source emissions. The temporal allocation factors take the form of three sets of fractional multipliers, as follows:

(1) Four seasonal factors divide the annual total into four subtotals representing emissions for each season.

(2) Three daily factors per season divide each seasonal total into three subtotals representing emissions for a typical weekday, Saturday, and Sunday in each season.

(3) Twenty-four hourly factors per day divide each daily total into 24 subtotals representing emissions for each hour of the day.

The seasonal multipliers for each record sum to one, as do the hourly multipliers for each season/day combination. Since daily emissions totals represent emissions for one typical weekday, Saturday, or Sunday in each season, the overall equation for daily allocation factors is:

$$(65 \text{ x weekday factor}) + (13 \text{ x Saturday factor}) + (13 \text{ x Sunday factor}) = 1$$

where a season is defined as 91 days (13 weeks).

Temporal allocation factors were developed for the area source categories in the 1985 NAPAP area source file. Depending on the magnitude of emissions within the category and the availability of data, some factors were resolved to the regional, State, or county level (i.e., different sets of factors for each region, State, and county for a given source category). Table 2-1 of *The 1985 NAPAP Emissions Inventory: Development of Temporal Allocation Factors*[5] (herein referred to as the TAF document) lists the NAPAP area source categories, including the level of resolution for each temporal pattern. Appendix D of the TAF document contains the listing of all 212 unique temporal profiles used to allocate area source emissions, including a key to the temporal profile usage. Section 2 of the TAF document describes how the temporal allocation factors were developed for each area source category.

The following example profile listing was excerpted from Appendix D of the TAF document.

PROFILE	DAY NBR	SEA	DAY	HR 01	HR 02	HR 03	HR 04	HR 05	HR 06	HR 07	HR 08	HR 09	HR 10	HR 11	HR 12	HR 13	HR 14	HR 15	HR 16	HR 17	HR 18	HR 19	HR 20	HR 21	HR 22	HR 23	HR 24
A001	1	621	0110	051	051	051	057	057	057	048	048	048	047	047	047	028	028	028	016	017	016	038	037	038	047	048	047
	2	621	0110	051	051	051	057	057	057	048	048	048	047	047	047	028	028	028	016	017	016	038	037	038	047	048	047
	3	621	0110	051	051	051	057	057	057	048	048	048	047	047	047	028	028	028	016	017	016	038	037	038	047	048	047
	4	201	0110	083	083	083	110	110	110	127	127	127	013	013	013	000	000	000	000	000	000	000	000	000	000	000	000
	5	201	0110	083	083	083	110	110	110	127	127	127	013	013	013	000	000	000	000	000	000	000	000	000	000	000	000
	6	201	0110	083	083	083	110	110	110	127	127	127	013	013	013	000	000	000	000	000	000	000	000	000	000	000	000
	7	000	0000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
	8	000	0000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
	9	000	0000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
	10	178	0110	067	067	067	106	106	106	120	120	120	000	000	000	000	000	000	000	000	000	000	000	000	040	040	040
	11	178	0110	067	067	067	106	106	106	120	120	120	000	000	000	000	000	000	000	000	000	000	000	000	040	040	040
	12	178	0110	067	067	067	106	106	106	120	120	120	000	000	000	000	000	000	000	000	000	000	000	000	040	040	040

Using the key in Appendix D, profile A001 corresponds to NAPAP area source categories 001 through 006 (residential fuel - anthracite coal, bituminous coal, distillate oil, residual oil, natural gas, and wood, respectively) for the State of Alabama. Under the DAY NBR column:

1 = winter weekday
2 = winter Saturday
3 = winter Sunday
4 = spring weekday
5 = spring Saturday
6 = spring Sunday
7 = summer weekday
8 = summer Saturday
9 = summer Sunday
10 = fall weekday
11 = fall Saturday
12 = fall Sunday

The numbers in the SEA column represent the seasonal factors used to divide the annual emissions into seasonal totals. For profile A001, the winter seasonal factor is 621, which means that 62.1 percent of the total annual activity occurs in the winter.

The numbers in the DAY column represent the daily factors used to divide the seasonal emissions into typical weekday, Saturday, and Sunday emissions. For profile A001, the winter weekday factor is 0110, which means that 1.10 percent of the seasonal activity occurs during each weekday.

The numbers in each HR column represent the hourly factors. For profile A001 on a winter weekday, the fraction for HR 1 is 051, which means that 5.1 percent of the total daily activity for this source category occurs during hour 1 of the day.

States and local agencies can review the area source temporal allocation factors used by EMS-95, and, if they feel that the these factors are not representative of actual activity for a specific area source category in their area, they may submit alternative profiles to be used with their area source emissions inventory. If an agency elects to submit alternative temporal allocation factors, it should clearly indicate which categories the alternative factors should be applied to, as required in the CERR.

The Motor Vehicle Emissions Estimates Model (MoVEM) is used to compute emissions estimates from onroad mobile sources in EMS-95. MoVEM is a true model because it computes gridded, hourly

emissions estimates from fundamental traffic and emissions data (e.g., VMT, vehicle mix, emission factors). VMT estimates are temporally allocated by MoVEM in the following manner. Prior to computing the motor vehicle emissions estimates, MoVEM adds gridded, hourly temperatures and adjusts the VMT to the specific modeling day. The temperature data are used to obtain the correct emissions factor from the MOBILE emissions factors lookup tables. Through the application of the following equations, MoVEM computes the day-specific, diurnal and nondiurnal, hourly VMT.

$$dvmt_{i,j,l,h,m,n} = ddayvmt_{i,j,l,m,n} * adjday * adjmonth * dvmt_prof_{i,j,l,h}$$

$$ovmt_{i,j,l,h,m,n} = odayvmt_{i,j,l,m,n} * adjday * adjmonth * ovmt_prof_{i,j,l,h}$$

$$dvmt_{i,j,a,f,m,n} = ddayvmt_{i,j,a,f,n} * adjday * adjmonth * dvmt_prof_{i,j,a,f,h}$$

$$ovmt_{i,j,a,f,m,n} = odayvmt_{i,j,a,f,n} * adjday * adjmonth * ovmt_prof_{i,j,a,f,h}$$

where: *dvmt* is the diurnal VMT;

ddayvmt is the total day diurnal VMT;

adjday is the day-specific VMT adjustment factor supplied through the ASCII input file *adjstvmt.mv*;

adjmonth is the month-specific VMT adjustment factor supplied through the ASCII input file *adjstvmt.mv*;

dvmt_prof is the hour-specific, diurnal VMT fractional profile factor;

ovmt is the nondiurnal VMT;

odayvmt is the total day nondiurnal VMT;

ovmt_prof is the hour-specific, nondiurnal VMT fractional profile factor;

i is the State index;

j is the county index;

h is the hour index;

l is the link identifier index;

a is the area type index;

f is the facility type index;

m is the east-west grid cell index; and

n is the north-south grid cell index.

If the user supplies limited data to MoVEM, MoVEM can apply a variety of default values to compute motor vehicle emissions estimates. For temporally allocating VMT, MoVEM applies the following default fractional profile for estimating hourly VMT from day-specific and month-specific VMT supplied by the user (Table 3.3-1).

Table 3.3-1. Default Hourly VMT Fractional Profile

Emission	Hour											
	1	2	3	4	5	6	7	8	9	10	11	12
Diurnal	0.000	0.000	0.000	0.000	0.000	0.129	0.021	0.100	0.095	0.095	0.166	0.199
Other	0.016	0.010	0.003	0.006	0.010	0.026	0.053	0.064	0.055	0.048	0.050	0.052
	13	14	15	16	17	18	19	20	21	22	23	24
Diurnal	0.079	0.116	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.054	0.055	0.059	0.070	0.074	0.070	0.058	0.046	0.037	0.033	0.028	0.022

3.3.2 Spatial Allocation Procedures

To prepare emissions for photochemical modeling, these emissions should be spatially allocated both horizontally and vertically. Horizontal spatial allocation refers to placing the emissions in the proper grid cell on the emissions modeling grid to be used in the modeling exercise. Vertical spatial allocation refers to placing the emissions in the proper layer, that is, distance into the atmosphere, in which emissions are deposited. Spatial allocation procedures used for point sources are different than those used for area and mobile sources. Procedures used for spatial allocation of point source and area/mobile source emissions are described below.

3.3.2.1 Point Sources

Horizontal Spatial Allocation

Point sources are spatially allocated to an emissions modeling grid by the UTM coordinates of a stack or by the UTM coordinates of the facility. These geographic coordinates should be supplied as part of the point source inventory. If they are supplied as latitude/longitude coordinates rather than UTM coordinates, they must be converted to UTM prior to input to EMS-95.

The EMS-95 Point Source Location Processor prepares an ASCII file of point source identifiers and point source UTM locations. The Point Source Grid Processing Module reads the ASCII file that was generated by the Point Source Location Processor, generates the appropriate ARC/INFO® coverages, and prepares two ASCII files:

- a file which contains point source identifiers and grid cell location
- a file which contains point source identifiers and latitude/longitude coordinates

Point sources that have neither stack coordinates nor facility coordinates are placed in the center of the county, and EMS-95 reports on the point sources so placed. The process of assigning grid coordinates to point sources is an ARC/INFO® function; therefore, the technical formulation is embedded within the ARC/INFO® software. Please refer to the ARC/INFO® documentation for a discussion on coverage manipulation.[6]

Vertical Spatial Allocation

The vertical layer that point source emissions are deposited in is based on the plume rise of the emissions. The plume rise of emissions is calculated based on the stack parameters supplied in the point source inventory. Therefore, it is important that State/local agencies provide accurate stack parameters (height, diameter, gas exit temperature, velocity, and flow rate) as part of their point source inventory submissions.

An important feature of the EMS-95 Point Source module is its ability to provide an initial screening of the stack parameters (i.e., height, diameter, flow rate, gas exit temperature) for validity. Table 3.3-2 identifies the range of each stack parameter that is used in the initial screening. Stack parameters that fall outside of this range are flagged by EMS-95 as suspect parameters.

Table 3.3-2. Stack Parameter Ranges Used in the Initial Screening

Range	Height (feet)	Diameter (feet)	Flowrate (cubic feet/minute)	Velocity (feet/second)	Temperature (°F)
minimum	0.01	0.01	0.01	0.01	0.01
maximum	1,500.00	100.00	100,000.00	98.40	2,000.00

Since the stack parameters are used to compute plume rise, that is, the distance into the atmosphere that the stack emissions rise, they are critical in the air quality modeling process. Based on the OTAG experience and previous modeling experience, approximately 20 to 30 percent of the stacks will have one or more incorrect stack parameters. In some cases, the incorrect stack parameters will result in emissions that are released above the top of the modeling domain; hence, the impact on air quality from elevated point source emissions will be underestimated. In many past efforts, the errant parameters have gone uncorrected; hence, the resulting air quality modeling results may be suspect.

3.3.2.2 Area and Mobile Sources

Horizontal Spatial Allocation

Most area and mobile source inventories contain countywide emissions. Emissions modeling grids are not based on political boundaries and in almost all cases they represent smaller areas than counties. Therefore, countywide area and mobile source emissions must be allocated to grid cells prior to photochemical modeling.

One of the most important functions of the EMS-95 Area Source Model is the allocation of countywide area source emissions estimates to individual grid cells. In general, spatial surrogates approximate the location and magnitude of the emissions for the area source. For example, residential natural gas combustion is well approximated by single family housing, and population can be used to estimate the number of gasoline service stations. The user is required to define the spatial surrogates (e.g., population, housing, urban area, etc.). For each spatial surrogate, the user must define what data (categories of land use/land cover, population counts, housing counts, etc.) contribute to the surrogate. The user also assigns each area source category (e.g., residential natural gas combustion, dry-cleaning operations) to a unique spatial surrogate (e.g., housing, population).

After the user has populated the appropriate files, EMS-95 grids the necessary data sets per the requirements of the user-defined spatial surrogates. Spatial surrogates, and their data source, that have been used in prior modeling exercises are shown in Table 3.3-3.[7] In some cases a surrogate (e.g., agriculture) will not exist in a county though an emissions estimates for an area source category (e.g., farm harvesting equipment) may be assigned to the surrogate. In such a case, the area source category is assigned a secondary surrogate (e.g., rural). If the secondary surrogate also does not exist in the county, the population surrogate acts as the default since population covers the entire domain. Note that it is possible to recombine the data in Table 3.3-3 to develop other area source spatial surrogates, if so desired. EPA encourages the use of the best available, most representative, data for use as the spatial surrogates.

The surrogate is computed as the sum of the values that comprise the surrogate in a grid cell divided by the sum of the values that comprise the surrogate in a county, as shown in the following equation:

$$srg^{k}_{c,i,j} = \frac{\sum_{x,c,i,j} val^{x}_{c,i,j}}{\sum_{x,c} val^{x}_{c}}$$

where:
- srg is the spatial surrogate value ($0 < srg < 1$)
- k is the surrogate index (e.g., index to urban, population)
- i, j is the grid cell identifier
- val is value of the component that comprises the spatial surrogate (length, area, count)
- x is the spatial surrogate component index (e.g., index to dryland, cropland)
- c is the county identifier (e.g., 17,031 Cook County, Illinois)

Spatial allocation of the area source emissions estimates is accomplished using the following equation:

$$acee^{a}_{i,j} = acee^{a} * srg^{k,a}_{i,j}$$

where:
- $acee$ is the county-specific area source emissions estimate
- a is the county-specific area source category index
- i, j is the grid cell identifier
- srg is the spatial surrogate value ($0 < srg < 1$)
- k is the surrogate index assigned to area source category a

Because there are over 340,000 State/county/area source category combinations, it is not possible to list all spatial surrogate assignments here. However, Table 3.3-4 identifies the 4-digit area source category code (note that area source category codes are ten digits long), a brief description of the area source category, and the predominant area source spatial surrogate to which the area source category has been assigned.

For mobile sources, VMT is spatially allocated to grids, prior to calculation of emissions by EMS-95. The Motor Vehicle Emissions Estimates Model (MoVEM) is used to compute emissions estimates from onroad mobile sources in EMS-95. After VMT input data (i.e., monthly and daily VMT adjustments; speed adjustments; vehicle mix profiles; countywide VMT; and network speeds) files have been read and checked, MoVEM prepares the necessary network coverages. The off-network system is derived from the U.S. Department of Transportation Federal Highway Administration (FHWA) version 2.1 nationwide planning network.[8] The off-network coverage is gridded by overlaying the emissions

Table 3.3-3. Area Source Spatial Surrogates[7]

Surrogate	Description
Agriculture	Derived from the LCC25 data base.[9] Comprised of the categories: dryland, cropland, and pasture; irrigated cropland and pasture; mixed dryland/irrigated cropland and pasture; grassland/cropland mosaic; and woodland/cropland mosaic. Resolution of data is 1.1 kilometers. Surrogate exists for both U.S. and Canada.
Airports	Derived from the post-1990 TIGER/Line data base.[10] Comprised of major national and international commercial airports and large private airstrips. Point value; no resolution. Surrogate exists only for U.S.
Area	Derived from grid coverage developed by EMS-95 Grid Definition Model. Resolution of data is 1,000 meters. Surrogate exists for both U.S. and Canada.
Housing	Derived from the post-1990 census data base.[11] Comprised of all single and multiple family housing units. Resolution of data is census tract (about 2,000 meters). Surrogate exists only for U.S.
Inverse housing	Derived from the post-1990 census data base.[11] Resolution of data is census tract (about 2,000 meters). Surrogate exists only for U.S.
Inverse population	U.S. data derived from the post-1990 census data base.[11] Resolution of data is census tract (about 2000 meters). Canadian data are derived from gridded world population data[12] with resolution of about 5'. Surrogate exists for both U.S. and Canada.
Major highways	Derived from the Federal Highway Authority v.2.0 national planning network.[8] Resolution of data is 3000 meters. Surrogate exists only for U.S.
Population	Derived from the post-1990 census data base.[12] Resolution of data is census tract (about 200 meters). Canadian data are derived from gridded world population data[12] with resolution of about 5'. Surrogate exists for both U.S. and Canada.
Ports	Derived from the post-1990 TIGER/Line data base.[10] Comprised of major national and international commercial shipping ports. Point value; no resolution. Surrogate exists only for U.S.
Railroads	Derived from the National Railway Network.[13] Resolution of data is 3,000 meters. Surrogate exists only for U.S.
Water	Derived from LCC25 data base[9] and post-1990 census data base.[11] Comprised of the water category plus ocean. Resolution of LCC25 data base is 1.1 kilometer and resolution of census data base is census tract (about 2,000 meters). Surrogate exists for both U.S. and Canada.
Rural	All areas not Urban. Resolution of data is census tract (about 2,000 meters). Surrogate exists for both U.S. and Canada.
Urban	Derived from the post-1990 census data base.[11] Determined to be all areas with populations of 25,000 or more. Resolution of data is census tract (about 2,000 meters). Canadian data are derived from the LCC25 Canada data base.[9] Surrogate exists for both U.S. and Canada.

Table 3.3-4. Four-digit Area Source Category Codes and the Predominant Area Source Spatial Surrogate

4-digit Area Source Category	Major Category Description (2-digit Area Source Category)	Minor Category Description (4-digit Area Source Category)	Predominant Area Source Spatial Surrogate
2101	Stationary Source Fuel Combustion	Electric Utility	Population
2102	Stationary Source Fuel Combustion	Industrial	Population
2103	Stationary Source Fuel Combustion	Commercial/Institutional	Population
2104	Stationary Source Fuel Combustion	Residential	Housing
2199	Stationary Source Fuel Combustion	Total Area Source Fuel Combustion	Population
2260	Mobile Sources	Off-highway Vehicle Gasoline 2-Stroke	Population
2265	Mobile Sources	Off-highway Vehicle Gasoline 4-Stroke	Population
2270	Mobile Sources	Off-highway Vehicle Diesel	Population
2275	Mobile Sources	Aircraft	Airports
2280	Mobile Sources	Marine Vessels Commercial	Ports
2282	Mobile Sources	Marine Vessels Recreational	Water
2283	Mobile Sources	Military	Population
2285	Mobile Sources	Railroads	Railroads
2294	Mobile Sources	Paved Roads	Population
2296	Mobile Sources	Unpaved Roads	Population
2301	Industrial Processes	Chemical Manufacturing SIC 28	Population
2302	Industrial Processes	Food and Kindred Products SIC 20	Population
2303	Industrial Processes	Primary Metal Production SIC 33	Population
2304	Industrial Processes	Secondary Metal Production SIC 33	Population
2305	Industrial Processes	Mineral Processes SIC 32	Population
2306	Industrial Processes	Petroleum Refining SIC 29	Population
2307	Industrial Processes	Wood Products SIC 24	Population
2308	Industrial Processes	Rubber/Plastics SIC 30	Population
2309	Industrial Processes	Fabricated Metals SIC 34	Population
2310	Industrial Processes	Oil and Gas Production SIC 13	Inverse population
2311	Industrial Processes	Construction. SIC 15 - 17	Population
2312	Industrial Processes	Machinery SIC 35	Population
2325	Industrial Processes	Mining and Quarrying SIC 14	Population
2390	Industrial Processes	In-process Fuel Use	Population
2399	Industrial Processes	Industrial Processes NEC	Population
2401	Solvent Utilization	Surface Coating	Population
2415	Solvent Utilization	Degreasing	Population
2420	Solvent Utilization	Dry Cleaning	Population
2425	Solvent Utilization	Graphic Arts	Population
2430	Solvent Utilization	Rubber/Plastics	Population
2440	Solvent Utilization	Miscellaneous Industrial	Population
2460	Solvent Utilization	Miscellaneous Nonindustrial All Classes	Population
2461	Solvent Utilization	Miscellaneous Nonindustrial Commercial	Population
2465	Solvent Utilization	Miscellaneous Nonindustrial Consumer	Population
2500	Storage and Transport	***UNKNOWN***	Inverse housing
2501	Storage and Transport	Petroleum and Petroleum Product Storage	Inverse housing
2505	Storage and Transport	Petroleum and Petroleum Product Transport	Population
2510	Storage and Transport	Organic Chemical Storage	Inverse housing
2601	Waste Disposal, Treatment, and Recovery	On-site Incineration	Inverse housing
2610	Waste Disposal, Treatment, and Recovery	Open Burning	Inverse housing
2620	Waste Disposal, Treatment, and Recovery	Landfills	Inverse housing
2630	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Population
2640	Waste Disposal, Treatment, and Recovery	TSDFs	Population
2660	Waste Disposal, Treatment, and Recovery	Leaking Underground Storage Tanks	Population
2801	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture
2805	Miscellaneous Area Sources	Agriculture Production - Livestock	Agriculture
2810	Miscellaneous Area Sources	Other Combustion	Inverse population
2830	Miscellaneous Area Sources	Catastrophic/Accidental Releases	Inverse population
2850	Miscellaneous Area Sources	Health Services	Population

modeling grid over the off-network coverage, and in the same manner that the area source spatial surrogates are computed, an off-network VMT surrogate is computed for each area type/facility type combination. That is, each area type/facility type segment is apportioned to a grid cell in the emissions modeling domain. Once the networks have been gridded, the corresponding countywide VMT, which is identified by area type and facility type, is gridded. Though it is extensive, consisting of over 400,000 miles of roadways, the FHWA network does not adequately define all area type/facility type combinations for which countywide VMT are defined. In such cases, the VMT is apportioned via the area source population surrogate.

States may use an emissions preprocessor that spatially allocates mobile source emission estimates instead of VMT, as is done for MoVEM. In these cases, the following horizontal spatial allocation surrogates are provided as suggestions for spatially allocating non-exhaust emissions from non-commercial vehicles: for diurnal and evening hot soak emissions, single family housing locations may be an appropriate surrogate; employment data may be a suitable surrogate for allocating morning hot soak evaporative emissions.

Vertical Spatial Allocation

Both area and mobile source emissions are assumed to be ground-level sources, that is, deposited into the surface layer. Therefore, no vertical spatial allocation is needed for these sources.

3.3.3 Speciation Procedures

Prior to describing the methods employed by EMS-95 to speciate emissions supplied by the emissions submodels, it is necessary to describe the difference between discrete and lumped-model speciation:[14]

- ***discrete speciation*** - refers to splitting emissions for a pollutant into individual chemical compounds. For example, total organic gases (TOG) emissions from automobile exhaust may consist of 50 or more identified organic compounds (e.g., benzene, hexane, formaldehyde, etc.). Discrete speciation is performed using speciation profiles containing weight fractions for each chemical compound (e.g., profiles found in EPA's SPECIATE data base);

- ***lumped-model speciation*** - refers to splitting emissions for a pollutant into groups of components that represent numerous discrete compounds. The groups of components are referred to as lumped-model species. The lumped-model species for TOG are developed using split factors that are specific to the type of chemical mechanism employed by the photochemical model to be used.

  For example, the UAM model uses the Carbon Bond IV (CB-IV) mechanism, therefore discrete compounds are lumped together based on the compounds' carbon bond structure. The single carbon-carbon bond hydrocarbon compounds, for instance, are lumped into the paraffin (PAR) lumped-model species. For the California Statewide Air Pollution Research Center (SAPRC) mechanism employed by the Regional Acid Deposition Model (RADM) and the San Joaquin Valley Air Quality Study/Atmospheric Utilities Signatures, Predictions and Experiments Regional Modeling Adaption Project (SARMAP) Air Quality Model (SAQM), discrete compounds are lumped together based on their relative reactivity with the hydroxyl radical.

The EMS-95 Speciation Model performs lumped-model speciation of TOG emissions. For NO_x emissions, these are discretely speciated into nitric oxide (NO) and nitrogen dioxide (NO_2) (and sometimes HONO). SO_x is discretely speciated into SO_2 and SO_4. The chemical mechanisms supported by EMS-95 for lumped-model speciation of TOG are the CB-IV and SAPRC mechanisms. However, EMS-95 does have a module that allows for the use of any other chemical mechanism for developing split factors (referred to as the *External CB-IV Split Factors Module*).

The following equation is used to compute CB-IV split factors for TOG emissions:

$$sf_{i,j} = \sum_i \sum_j \frac{xmf_{i,k}}{mw_k} \bullet xnum_{j,k}$$

where:
- *sf* = CB-IV split factor (moles of lumped-model species/gram TOG
- *i* = the TOG species profile index
- *j* = the CB-IV lumped-model species index
- *k* = the index for the discrete TOG species in the emissions stream
- *xmf* = mass fraction of discrete TOG species in the emissions stream (grams discrete TOG species/gram TOG)
- *mw* = molecular weight of the discrete TOG species in the emissions stream (grams of discrete TOG species/mole of discrete TOG species)
- *xnum* = assignment of lumped-model species to discrete TOG species (moles of lumped-model species/mole of discrete TOG species)

For the most recent version of EMS-95 (e.g., the version used during the OTAG modeling), the lumped-model split factors were derived from discrete speciation profiles from EPA's SPECIATE data base. For other versions of EMS-95, other sources of speciation data may have been used to derive split factors. Therefore, users should check with their source of the EMS-95 software to determine the origin of speciation data. As mentioned above, revised split factors can be derived using the *External CB-IV Split Factors Module*, if better discrete speciation profiles or lumped-model species assignments (i.e., *xnum* in the equation above) exist. For SIP modeling efforts, any such revisions should be coordinated with the EPA Regional Office.

The EMS-95 Speciation Model also performs a reactive organic gas (ROG) to TOG adjustment to account for some emissions measurement techniques that do not capture all of the discrete hydrocarbon compounds in the emissions stream. This adjustment must be performed since the speciation profiles are based on TOG, not ROG.

The NO and NO_2 split factors for NO_x are based on an assumed composition of 90 percent by mass NO as NO_2 and 10 percent NO_2. However, the NO mass can vary between 89 and 95 percent by weight.[12] For a small number of cases, HONO mass is also included in the speciation (less than 2 percent of NO_x mass).

In summary, EMS-95 speciates the gridded, hourly emission estimates with the use of the following equation:[12]

chemest = ee x rogtotog x (sf/divisor)

where: *chemest* = gridded, hourly lumped-model species emissions estimate (moles/hour)
ee = gridded, hourly emissions estimate (grams/hour)
rogtotog = ROG-to-TOG conversion factor (unitless)
sf = lumped-model species split factor (unitless)
divisor = a conversion factor for lumped-model species other than the TOG species described above

The development of split factors, *sf*, for TOG species other than biogenic species are described above. For biogenic species, the split factors are as follows:

- 1.0 for biogenic isoprene (ISOP)
- 0.5 for olefins from biogenic terpenes [OLE_{TERP} (e.g., one-half mole of olefins from each mole of biogenic terpenes)]
- 6.0 for paraffins from biogenic terpenes (PAR_{TERP})
- 1.5 for higher molecular weight aldehydes from biogenic terpenes ($ALD2_{TERP}$)
- 0.5 for olefins from other biogenic VOC (OLE_{OVOC})
- 8.5 for paraffins from other biogenic VOC (PAR_{OVOC})
- 0.5 for nonreactive organic compounds from other biogenic VOC (NR_{OVOC})
- 0.97 for SO_2 (97 percent of SO_x is SO_2; the remaining 3 percent SO_4 is dropped)
- 1.0 for aerosols (AERO)
- 1.0 for CO
- 0.9 for NO (as NO_2) and 0.1 for NO_2, as described above for NO_x

The divisor in the above equation is used to convert emissions from a mass to a molar basis. For biogenic emissions, the divisor consists of a conversion from micrograms to kilograms and the assumed molecular weight of the biogenic species: 68.12 for ISOP; 136.23 for TERP; and 86.00 for OVOC. The divisors used in the equation are obtained from Reference 11 and are given below:

- 1.0 for non-biogenic TOG species
- 8.812×10^{10} for biogenic ISOP
- 1.3623×10^{11} for biogenic OLE_{TERP}, PAR_{TERP}, and $ALD2_{TERP}$
- 8.6×10^{10} for biogenic OLE_{OVOV}, PAR_{OVOC}, and NR_{OVOC}
- 30.0 for NO
- 46.0 for NO_2
- 64.0 for SO_2
- 1.0 for AERO
- 28.0 for CO

SECTION 4.0
DATA REPORTING REQUIREMENTS

The draft CERR requires specific data elements to be reported by States to EPA for point, area, nonroad mobile, onroad mobile, and biogenic source categories. The following sections summarize the reporting requirements for each of these four major source sectors, as well as biogenic and geogenic emission source categories. Electronic data transfer options are also discussed. The draft CERR, including the preamble, is included as Appendix A to this report, and is referenced where appropriate.

Required data elements for States subject to the Section 110 NO_x SIP call budgets are listed in the draft CERR to demonstrate how Section 110 reporting can be coordinated with reporting for other emissions inventory requirements. The NO_x SIP call data reporting requirements support a rulemaking that establishes NO_x emissions budgets for 23 eastern States to decrease the transport of ozone across State boundaries. States should be aware that this guidance document only addresses the 8-hour ozone, $PM_{2.5}$, and regional haze emission inventory requirements of the draft CERR.

4.1 POINT SOURCES

Point sources are large, stationary, identifiable emissions sources that release pollutants into the atmosphere. Sources are generally defined by State or local agencies as point sources if they annually exceed a specified pollutant emissions threshold. These thresholds may vary by State, but EPA has established certain minimum point source thresholds for both pollutant nonattainment areas and attainment areas.

According to the draft CERR, States should report data for point sources on both an annual and triennial basis, starting with the 1999 inventory. Point sources are divided into two categories for reporting purposes: Type A and Type B. Type A sources represent larger point sources and emissions for these sources are required to be reported every year. Type B sources include those point sources not reporting under the Type A source requirement. The reporting frequency for Type B sources has been established as once every 3 years.

The pollutant emission thresholds that define Type A and Type B sources, as well as the data items required, are listed in Appendix A, Table 2a. The emissions thresholds also vary depending on whether a point source is located in a pollutant nonattainment area or attainment area (but the data items are the same regardless of attainment status). It should also be noted that additional stack data elements, while not required for annual point source reporting, should be reported every 3 years.

4.2 AREA SOURCES

Area sources are smaller sources that do not qualify as point sources under the relevant emissions cutoffs. Area sources encompass more widespread sources that may be abundant, but that, individually, release small amounts of a given pollutant. Examples of area sources include dry cleaners, residential wood heating, autobody painting, and consumer solvent use.

Every 3 years, beginning with the 1999 inventory, States should submit to EPA area source emissions data representing all relevant area source categories for the entire State. The data items required for area source reporting are listed in Table 2b of Appendix A.

4.3 NONROAD MOBILE SOURCES

Nonroad mobile sources can be defined as mobile and portable internal combustion powered equipment not generally licensed or certified for highway use. Nonroad engines can be classified according to distinct nonroad equipment categories, ranging from small lawn and garden equipment to heavy-duty construction equipment, large aircraft, and diesel locomotives. These general categories comprise specific types of applications (e.g., chainsaws, front mowers, and leaf blowers/vacuums are examples of lawn and garden applications).

Every 3 years, States should submit to EPA a statewide nonroad mobile source emissions inventory, starting with the 1999 inventory. Table 2c of Appendix A presents the data items required to be reported for mobile sources (both nonroad and onroad). For nonroad sources, the activity is typically expressed in terms of horsepower-hours, the amount of fuel consumed, or hours of use (not VMT as listed in Table 2c, which applies to onroad mobile sources). If States make changes to the default NONROAD model inputs, discussed in more detail in Section 5.5.3, these input files should be submitted to EPA along with the nonroad data elements.

4.4 ONROAD MOBILE SOURCES

Onroad mobile sources are defined as those vehicles registered for use on public roadways, and include automobiles, light-duty and heavy-duty trucks, buses and motorcycles. Onroad emissions are comprised of both exhaust (i.e., tailpipe) and non-exhaust (e.g., refueling, tire and brake wear) components.

States are required to submit a statewide onroad mobile source emissions inventory on a 3-year basis, starting with the year 1999. Table 2c of Appendix A presents the data items required to be reported by States for onroad mobile sources. The MOBILE model input files should also accompany the onroad mobile source data, so that these inputs are available for national and regional air quality modeling studies.

4.5 BIOGENIC AND GEOGENIC SOURCES

Biogenic and geogenic sources are natural (i.e., nonanthropogenic) emissions sources. Biogenic sources are biological sources of ozone precursor emissions such as trees, agricultural crops, or microbial activity in soils or water. VOC and NO_x emissions can also result from geological activity, most notably from seeps of oil or natural gas, volcanoes, and fumaroles (i.e., vapor or gas vents in a volcanic region). Soil wind erosion is a geogenic source of PM_{10} and $PM_{2.5}$ emissions (although in the past this process has also been considered to be an anthropogenic fugitive dust component of PM emissions inventories). In addition, lightning may also be a significant contributor to natural NO_x emissions in an inventory area. Table 2d of the draft CERR specifies the data elements for biogenic and geogenic source reporting.

According to the draft CERR, a baseline biogenic emissions inventory is required to be established for each State. Triennial updates to this baseline inventory are only required if land use characteristics used in determining biogenic emissions have changed, or if a new method is used to determine emissions. To the extent that the EPA develops a biogenic baseline for the specified base year inventory [e.g., using Biogenic Emissions Inventory System-2 (BEIS-2)], it would be acceptable and practical for a State to use

these EPA-generated emission estimates as the basis for their SIP planning and modeling inventories. However, States may use non-BEIS-2 estimates if they believe they have more representative data for estimating biogenic emissions, and can demonstrate better quality emissions data.

The EPA also encourages States to prepare an inventory of all significant geogenic sources in the inventory area. EPA-generated PM emissions for wind erosion are expected to be available for use by States in their SIP base year and 3-year cycle inventories, but if other geogenic sources are contributing to either PM, regional haze, or ozone precursor emissions, these should be inventoried as well.

4.6 DEVELOPMENT OF COMPREHENSIVE EMISSION DATA BASE AT EPA

The EPA is establishing the NET ORACLE data base to store and distribute the EPA's NET inventory. The NET data base will serve as a central repository for EPA, State/local agencies, and the general public to access the national inventory to use in air quality modeling, tracking progress in meeting CAA requirements, setting policy and answering questions from the public. The NET data base is being redesigned in ORACLE using the data elements and data relationships defined by the EIIP Data Model, discussed in section 4.7. The NET ORACLE data base is expected to be completed in 1999 and the NET Input Format is available now.

The EPA has announced that it will be closing out the emissions component of the Aerometric Information Retrieval System (AIRS)/Facility Subsystem (AFS) effective September 30, 2000. States should anticipate this and are encouraged to develop plans for using the NET data base with their emission inventory data.

4.7 ELECTRONIC DATA TRANSFER REQUIREMENTS

4.7.1 Overview

To facilitate the transfer of the State-generated inventory data, the EPA has supported the development of standard data transfer through the EIIP. Electronic reporting of inventory data is an issue that is dynamic and changing. States should use resources such as EPA's Data Submission section at http://www.epa.gov/ttn/chief/ei for tracking the latest developments related to emissions reporting.

According to the draft CERR, four basic options for electronic data reporting exist:

- EPA NET data base format
- AFS format (for prior source data only)
- EIIP/Electronic Data Interchange (EDI) format
- Direct source reporting for Title IV sources and sources participating in regional NO_x trading programs (e.g., 40 CFR Part 96).

All of these electronic formats will accommodate the data transfer of annual and average summer day emissions. Note that any State that submits complete data in these formats has met EPA emission reporting requirements.

These reporting options are discussed in more detail in the sections that follow. If an agency submits their data in another electronic format (i.e., aside from one of the acceptable formats), EPA may

not be able to enter their data into the EPA system (because of limited resources). In these cases, EPA-generated default data may be used to represent emissions for the area. In addition, although not listed as an option in the CERR, the EPA has acknowledged that some State or local agencies may choose to update the NET data by overwriting the NET distribution file. However, the potential for transcription errors is high, and, if significant revisions are necessary to improve the EPA NET data, this option is not recommended.

Note that prior to using the EIIP/EDI data transfer procedure, States should contact EFIG to determine the status and operating procedure for supporting this option.

4.7.2 EPA NET Input Format

The NET Input Format creates relational, normalized data sets which conform to the relational standards and structure of the NET ORACLE data base. The relational nature of the format design enables it to be mapped to a wide variety of data base structures.

The basic steps for data transfer using the EPA NET data base format include:

(1) Map State inventory data to the EPA NET data base format.

(2) Program a conversion utility to translate data in the State's data base to EPA NET data base input format files, using the mapping scheme developed in Step 1. (Software needed for the translation could be any data base or spreadsheet program or other data handling system capable of generating files compatible with the NET file structure. Some States' data storage systems may be able to be programmed to output stored data in the correct format.)

(3) Use the software developed in Step 2 to translate State's data into EPA NET data base files.

(4) Transfer the EPA NET data base files to EPA/EFIG.

Detailed user documentation for the NET Input Format is available on EPA's Internet web site at http://www.epa.gov/ttn/chief/ei under "Data Submission." The documentation includes important user conventions and code tables, as well as format specifications and data submission procedures.

4.7.3 AIRS Format

The AIRS format has been used for electronic reporting for previous inventories and is still the primary inventory data storage vehicle for several States. Using the AIRS format is a valid method to make an electronic inventory submittal, but States should be aware that this method of reporting is limited to point source information. For States that choose to submit point source data via AIRS/AFS, it will be necessary to use one of the other data transfer options to submit area, mobile, and biogenics data.

To accommodate point source data submittals in the AIRS/AFS format, a utility will be available in AFS, and used by EPA to translate AFS-formatted data into a NET-compatible format. This will allow EPA to move point source data from AFS into the NET data base to complete the national emission inventory for point, area, mobile, and biogenic sources. Further information about how to use AIRS/AFS can be found on the Office of Air Quality Planning and Standards (OAQPS) Technology Transfer Network (TTN) web page at the following address: http://www.epa.gov/ttn/airs/.

4.7.4 EIIP/EDI Format

The EIIP has developed a data transfer format using existing EDI standards. Electronic Data Interchange is a nonproprietary data exchange technique created and maintained by the American National Standards Institute (ANSI). The EIIP/EDI format can provide a common data exchange format for federal, State and local government agencies, and eventually for industry, to exchange emissions inventory information electronically using a single data transfer format.

The EIIP/EDI format was developed and tested as a prototype data transfer demonstration with two pilot States and EPA. The technical documentation necessary for the EDI data transfer prototype demonstration may be found on the EIIP web page, under Data Management Committee Procedures Documents. Also included is the document *Results of the EIIP EDI Prototype Data Transfer Demonstration*, which best describes how the EIIP EDI data transfer is accomplished and the purpose of the different technical documents.

The EDI data transfer procedure may be available to State/local agencies through EPA assistance. While the EIIP successfully tested the use of EDI through its prototype demonstration, the EPA is determining how to best establish and support EDI data transfer procedures across the Agency.

The general steps involved in the EIIP/EDI data transfer process are:

(1) Identify a commercially available EDI translator that is compatible with the data application and local computing system environment. (The initial participants are using the same EDI translator, provided as part of the EIIP prototype system.)

(2) Program the translator using the EIIP/EDI technical documents. (The programming of the shared EDI translator is provided as part of the EIIP prototype system.)

(3) Define the loader file format for the translator. (The loader file format for the shared translator is provided as part of the EIIP prototype system.)

(4) Program a conversion utility to extract and map the State data into the appropriate fields of the loader file format.

(5) Convert the extract file of State data to an EDI formatted file, using the EDI translator.

(6) Transfer the EIIP/EDI standard format file to EPA.

Inventory data that have been converted to the EIIP/EDI standard format can be made available to the EPA or any other requestor by sending it on a floppy disk, electronically through Internet E-mail, or by providing a downloadable file on an Internet file transfer protocol (FTP) site. Prior to using the EIIP/EDI data transfer procedure, States should contact EFIG to determine the status and operating procedure for supporting this option.

4.7.5 Direct Source Reporting

Certain point sources may already be reporting electronic emissions data directly to EPA. For example, electricity-generating units subject to Title IV Acid Rain monitoring and reporting provisions must report continuous emission monitoring system (CEMS) data in a specified electronic data reporting (EDR) format to EPA. In addition, large industrial combustion sources participating in regional NO_x

mass emissions trading programs (e.g., under 40 CFR Part 96) are allowed to submit data using this method. This CEMS data may not directly fulfill reporting requirements for all pollutants that would constitute a State's ozone, PM, or regional haze SIP submittal. However, EPA acknowledges this to be a viable data option where reporting requirements overlap, and would like to encourage and facilitate the use of continuous emission monitoring data by States and EPA. One possible option may involve the calculation of emissions for pollutants not reported under Part 75 or Part 96 (e.g., PM_{10}, $PM_{2.5}$) by applying emission factor ratios to the highly temporally-allocated emission estimates available for other pollutants such as NO_x and SO_2.

To avoid duplication of effort, the EPA envisions that these emissions data will either be: (1) transferred into EPA's central emissions data base after submittal by the source; or (2) if a State prefers, the data can be made available to States for incorporation into their emissions inventory, which ultimately will be entered into EPA's NET data base.

4.8 SUMMARY DATA REPORTING

In addition to the detailed emissions data submitted in electronic form, the EPA recommends that general summaries of the emissions inventory data be compiled and submitted by States. EPA Headquarters and EPA Regional Offices will use these summaries for easy and efficient comparison with other States' inventories, and as a check for approximate and valid ranges of emissions. Examples of statewide emissions summaries are presented in Tables 4.8-1 and 4.8-2. States may also want to consider summarizing pollutant emissions by county.

Table 4.8-1. Statewide Ozone Precursor Emissions by Source Sector

	VOC Emissions		CO Emissions		NO_x Emissions	
Source Type	**tons/yr**	**lbs/day**	**tons/yr**	**lbs/day**	**tons/yr**	**lbs/day**
Point Sources						
Area Sources						
Onroad Mobile Sources						
Nonroad Mobile Sources						
Biogenic Sources						
TOTAL EMISSIONS						

Table 4.8-2. Statewide $PM_{2.5}$ and Precursor Emissions by Source Sector

Source Type	$PM_{2.5}$ Emissions	VOC Emissions	NO_x Emissions	SO_2 Emissions	NH_3 Emissions
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Point Sources					
Area Sources					
Onroad Mobile Sources					
Nonroad Mobile Sources					
Biogenic Sources					
TOTAL EMISSIONS					

SECTION 5.0
EMISSION INVENTORY DEVELOPMENT

5.1 AVAILABLE GUIDANCE

EPA has developed numerous guidance documents to assist State/local agencies in developing emissions inventories for various pollutants. These include the EIIP guidance documents, AP-42,[15] and older documents such as *Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume I.*[16] These documents can be accessed using EPA's CHIEF web site at http://www.epa.gov/ttn/chief/. The EIIP guidance documents are EPA's most recent emission inventory development guidance and should be the primary source of guidance for State/local agencies. In addition, emission inventory software is available through EPA's State Emissions Inventory Software Clearinghouse found at the following address: http//www.epa.gov/ttn/airs/afs/reeng/clearhse.html.

For PM, EFIG will be developing a "getting started" web page in 1999. This web page, titled "$PM_{2.5}$ Emission Inventory Resource Center," will be active by summer 1999 and will be available at http://www.epa.gov/ttn/chief/eiip/pm2.5inventory/. While EIIP is currently developing relevant guidance material, the "getting started" web site will be prepared and available before these additional materials.

EPA is also evaluating its current projections guidance, *Procedures for Preparing Emissions Projections*,[17] to determine how it should be updated/revised to reflect the requirements of the new NAAQS, regional haze, and other programs. State/local agencies should refer to the existing projections guidance, until new guidance is issued by EPA.

5.2 NATIONAL EMISSION TRENDS INVENTORY

EPA develops the NET inventory every year and will provide it to the States. The NET contains statewide emission estimates for all of the pollutants and pollutant precursors required by this guidance. The NET is comprehensive and includes emission estimates for point sources, area sources, mobile sources, and biogenic sources. EPA believes that some State and local agencies will find the NET to be a useful tool in preparing their emission inventories required by this guidance. If States choose to use the NET in their inventory preparation, EPA would suggest the following as a means of prioritizing their inventory efforts and resources:

- Point Sources - this should be the States' main point of emphasis. The NET point source data are best for utility emissions since a national data base is available from the Department of Energy.

- Area Sources - States should review their area source emission estimates in the NET. The State may want to concentrate their efforts on the large area source categories. In general, the greatest opportunity for improving the NET area source estimates is for the State or local agency to develop locally specific activity data.

- Mobile Sources - if State or local agencies choose to use the NET onroad emission estimates as a starting point, improvements in the estimates can be made by providing locally specific

inputs to the MOBILE model and more precise estimates of VMT. Improvements to the nonroad estimates can best be made by using the EPA NONROAD model when it becomes available.

- Biogenic Sources - The NET biogenic estimates are believed to be reliable. However, if State or local agencies want to improve these estimates, locally specific land use/land cover data can be obtained.

5.3 POINT SOURCES

Volume II of the EIIP guidance documents includes major chapters that address various combustion, manufacturing, and production activities that are point sources.[18] Information in these chapters should be used to estimate ozone and $PM_{2.5}$ precursor emissions where they address the source categories of interest. The EIIP point source chapters within Volume II at various States of production are as follows:

- Chapter 2: *Preferred and Alternative Methods for Estimating Air Emissions from Boilers*
- Chapter 3: *Preferred and Alternative Methods for Estimating Air Emissions from Hot-Mix Asphalt Plants*
- Chapter 4: *Preferred and Alternative Methods for Estimating Fugitive Air Emissions from Equipment Leaks*
- Chapter 5: *Preferred and Alternative Methods for Estimating Air Emissions from Wastewater Collection and Treatment*
- Chapter 6: *Preferred and Alternative Methods for Estimating Air Emissions from Semiconductor Manufacturing Facilities*
- Chapter 7: *Preferred and Alternative Methods for Estimating Air Emissions from Surface Coating Operations*
- Chapter 8: *Preferred and Alternative Methods for Estimating Air Emissions from Paint and Ink Manufacturing Facilities*
- Chapter 9: *Preferred and Alternative Methods for Estimating Air Emissions from Metal Production Facilities*
- Chapter 10: *Preferred and Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production and Processes*
- Chapter 11: *Preferred and Alternative Methods for Estimating Air Emissions from Plastic Products Manufacturing*

Each industry- or source-specific document contains a brief description; identification of emission points; an overview of methods available for estimating emissions; example calculations for each technique presented; a brief discussion on quality assurance and quality control; and the SCCs needed for entry of the data into a data base management system. The SCCs included in each volume apply to the process emission points, in-process fuel use, storage tank emissions, fugitive emissions, and control device fuel

(if applicable). More details on PM emission inventories will be available in a "getting started" web site on PM, available in the summer of 1999.

Table 5.3-1 lists potential point source categories. This table is presented as a guide to aid State/local agencies in focusing their point source emission inventory efforts, and is based on an analysis of EPA's NET data base. The table shows where in EPA's data base significant point source emissions occur. The H (high), M (medium), and L (low) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant. A ✓ indicates that emissions of the pollutant may occur from that category but are not considered significant. A blank cell indicates that no emissions of the pollutant were recorded in EPA's NET data base for that source category. Note that local priorities for inventory development may vary depending on the nature of sources in the area. State/local agencies should also be aware that some of these source categories may have both point and area source components, and that they should be careful to avoid double-counting of emissions.

5.4 AREA SOURCES

Area sources are generally described as those sources that are too small, numerous, or difficult to be inventoried individually. Potential area sources of emissions are given in Table 5.4-1 and potential crustal (dust) sources of emissions are given in Table 5.4-2. These tables are presented as guides to assist State/local agencies in focusing their area source emission inventory efforts. The tables are based on an analysis of EPA's NET data base and show where in the data base significant area source emissions occur. As with Table 5.3-1, the H (high), M (medium), and L (low) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant. A ✓ indicates that emissions of the pollutant may occur from that category but are not considered significant. A blank cell indicates that no emissions of the pollutant were recorded in EPA's NET data base for that source category. Note that local priorities for inventory development may vary depending on the nature of sources in the area. State/local agencies should also be aware that some of these source categories may have both point and area source components, and that they should be careful to avoid double-counting of emissions.

The EIIP Area Source Committee has issued preferred and alternate emission estimation methods documents under EIIP Volume III for the following categories:[19]

- Chapter 2: *Residential Wood Combustion*
- Chapter 3 *Architectural Surface Coating*
- Chapter 4: *Dry Cleaning*
- Chapter 5: *Consumer and Commercial Solvent Use*
- Chapter 6: *Solvent Cleaning*
- Chapter 7: *Graphic Arts*
- Chapter 8: *Industrial Surface Coating*
- Chapter 9: *Pesticides - Agricultural and Nonagricultural*

Table 5.3-1. Point Sources of Emissions

CATEGORY	SO_2	PM	NH_3*	VOC	NO_x	CO
Fuel Combustion - Electric Utility						
Coal	H	H	✓	L	H	L
Gas	L	✓	L	L	M	L
Internal Combustion	L	M	✓	L	M	L
Oil	M	L	L	L	L	L
Other	✓	✓		✓	✓	✓
Fuel Combustion - Industrial						
Coal	H	M	✓	L	M	L
Gas	H	M	L	M	M	L
Internal Combustion	L	M	✓	M	H	L
Oil	M	M	L	L	M	L
Other	L	H	✓	L	L	L
Fuel Combustion - Other						
Commercial/Institutional Coal	M	L	✓	✓	L	L
Commercial/Institutional Gas	L	L		L	L	L
Commercial/Institutional Oil	L	L		L	L	L
Residential Wood	✓	✓		✓	✓	✓
Residential Other	✓	✓		✓	✓	✓
Miscellaneous Fuel Combustion except Residential	L	L		L	L	L
Chemical and Allied Products Manufacturing						
Agricultural Chemicals	L	L	M	L	L	L
Inorganic Chemicals	M	L		L	L	L
Organic Chemicals	L	M		M	L	L
Paints, Varnishes, Lacquers, Enamels	✓	✓		L	✓	✓
Pharmaceuticals	✓	✓		L	✓	✓
Polymers and Resins	✓	L		M	L	L
Other Chemicals	L	M		M	L	M
Metals Processing						
Ferrous Metals	M	H	L	L	L	M
Nonferrous Metals	M	M	✓	L	L	L
Metals Processing NEC	L	M	✓	L	L	L
Petroleum and Related Industries						
Asphalt Manufacturing	L	L		L	L	L
Oil and Gas Production	L	✓	✓	M	L	L
Petroleum Refineries and Related Industries	M	M	L	M	L	L
Other Industrial Processes						
Agriculture, Food, and Kindred Products	L	M	L	M	L	L
Construction		✓				
Electronic Equipment	✓	✓		L	✓	L
Machinery Products	✓	L		L	L	✓
Mineral Products	M	H	✓	L	M	L
Rubber and Miscellaneous Plastic Products	✓	L		M	✓	✓

Table 5.3-1 (continued)

CATEGORY	SO_2	PM	NH_3*	VOC	NO_x	CO
Other Industrial Processes (continued) Textiles, Leather, and Apparel Products	✓	✓		L	✓	✓
Transportation Equipment	✓	✓		L	✓	✓
Wood, Pulp and Paper, and Publishing Products	M	H		M	L	L
Miscellaneous Industrial Processes	L	✓		L	L	L
Solvent Utilization						
Degreasing	✓	✓		L	✓	✓
Dry Cleaning	✓	✓		L	✓	✓
Graphic Arts	✓	✓		M	✓	✓
Other Industrial				L		L
Surface Coating		L		H	L	
Storage and Transport						
Bulk Materials Storage	✓	M		✓	✓	L
Bulk Materials Transport		✓				
Storage and Transport (continued)						
Bulk Terminals and Plants	✓	✓		M	✓	L
Inorganic Chemical Storage	✓	✓		✓	✓	✓
Inorganic Chemical Transport	✓	✓		✓		
Organic Chemical Storage	✓	✓		L	L	L
Organic Chemical Transport	✓	✓		L	✓	✓
Petroleum and Petroleum Product Storage	✓	✓		M	✓	L
Petroleum and Petroleum Product Transport	✓	✓		M	✓	✓
Service Stations: Stage I				L		
Service Stations: Stage II	✓	✓		L	✓	✓
Waste Disposal and Recycling						
Incineration	L	M		L	L	L
Industrial Waste Water	✓	✓		L	✓	✓
Landfills	✓	✓		L	✓	L
POTWs	✓	✓		L	✓	✓
TSDFs		✓		L	✓	✓
Other	✓	✓		L	✓	✓
Miscellaneous						
Cooling Towers		L		L	✓	✓
Health Services				✓		

* The emissions from all NH_3 source categories need to be better characterized because of their role in the formation of secondary particles.

Note: The H (high), M (medium), and L (low) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant.

A ✓ indicates that emissions of that pollutant may occur from that source category, but they are not considered significant.

A blank cell indicates that no emissions of that pollutant are emitted from that source category based on the data in EPA's NET inventory.

Table 5.4-1. Area Sources of Emissions

CATEGORY	SO_2	PM	NH_3*	VOC	NO_x	CO
Fuel Combustion - Electric Utility						
Internal Combustion				✓	L	L
Fuel Combustion - Industrial						
Coal	H	L		L	L	L
Gas	L	L	L	L	M	L
Internal Combustion	✓	✓		L	L	L
Oil	H	L	L	L	L	L
Other	L	L		L	L	L
Fuel Combustion - Other						
Commercial/Institutional Coal	L	L		✓	L	L
Commercial/Institutional Gas	L	L	L	L	M	L
Commercial/Institutional Oil	M	L	L	L	L	L
Residential Wood	L	H		H	L	M
Residential Other	M	M	L	L	H	L
Miscellaneous Fuel Combustion except Residential	L	H		L	L	L
Chemical and Allied Product Manufacturing						
Inorganic Chemicals				✓		
Organic Chemicals				L	✓	
Pharmaceuticals				L		
Polymers and Resins				M		
Metals Processing						
Ferrous Metals					✓	✓
Nonferrous Metals				✓	✓	
Metals Processing NEC		✓		✓	✓	✓
Petroleum and Related Industries						
Asphalt Manufacturing				✓	✓	✓
Oil and Gas Production	L	L		M	L	L
Petroleum Refineries and Related Industries				M		
Other Industrial Processes						
Agriculture, Food, and Kindred Products		L		M	✓	✓
Machinery Products				✓	✓	
Mineral Products	✓	✓		✓	L	✓
Rubber and Miscellaneous Plastic Products		✓		L		
Wood, Pulp and Paper, and Publishing Products		L		✓	✓	✓
Miscellaneous Industrial Processes	L	M	L	L	L	✓
Solvent Utilization						
Degreasing				H		
Dry Cleaning				M		
Graphic Arts				M		
Nonindustrial				H	✓	✓
Other Industrial				L		

Table 5.4-1 (continued)

CATEGORY	SO_2	PM	NH_3*	VOC	NO_x	CO
Solvent Utilization (continued)						
Surface Coating				H	✓	✓
Solvent Utilization NEC						
Storage and Transport						
Bulk Materials Storage			✓			
Bulk Terminals and Plants				M		
Organic Chemical Storage				L		
Petroleum and Petroleum Product Storage				L	✓	
Petroleum and Petroleum Product Transport				L		
Service Stations: Breathing and Emptying				L		
Service Stations: Stage I				H		
Service Stations: Stage II				H		
Waste Disposal and Recycling						
Incineration	L	M		L	L	L
Industrial Waste Water				L		
Landfills				L	✓	✓
Open Burning	L	H		M	L	L
POTWs			M	L		
TSDFs				L	✓	✓
Other				L		
Miscellaneous						
Agriculture and Forestry		L	H	M		
Catastrophic/Accidental Releases				L		
Health Services				✓		
Other Combustion (Structure Fires, Forest Fires, Slash Burning, Prescribed Burning, Managed Burning)	L	H		H	M	H

* The emissions from all NH_3 source categories need to be better characterized because of their role in the formation of secondary particles.

Note: The H (high), M (medium), and L (low) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant.

A ✓ indicates that emission of that pollutant may occur from that source category, but they are not considered significant.

A blank cell indicates that no emissions of that pollutant are emitted from that source category based on the data in EPA's NET inventory.

Table 5.4-2. Crustal Sources of Emissions

CATEGORY	VOC	NO_x	SO_2	CO	PM	NH_3
Natural Sources						
Geogenic, Wind Erosion					M	
Miscellaneous						
Agricultural Crops (Tillage)					M	
Construction					M	
Paved Roads					M	
Unpaved Roads					H	
Other Fugitive Dust (e.g., Mining and Quarrying)					M	

Note: The impact of crustal sources on $PM_{2.5}$ ambient concentrations is much lower than would be suggested by their estimated emissions (relative to other directly emitted $PM_{2.5}$).

The H (high) and M (medium) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant.

- Chapter 11: *Gasoline Marketing*
- Chapter 12: *Marine Vessel Loading, Ballasting, and Transfer*
- Chapter 13: *Autobody Refinishing* (currently available as a draft; to be revised in 1999)
- Chapter 14: *Traffic Paints*
- Chapter 15: *Municipal Landfills*
- Chapter 16: *Open Burning* (available as a draft)
- Chapter 17: *Asphalt Paving*

The EIIP Volume III, Chapter 1 document lists potential activity data sources by category. *Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume I* (Reference 16) also gives detailed guidance for estimating ozone precursor emissions from area sources. Agencies should review the EIIP documents carefully for information on the types and sources of data needed to develop emissions estimates for each source category. Table 5.4-1 lists the area source categories that EPA believes are significant sources for the pollutants in the table.

5.5 MOBILE SOURCES

Mobile sources consist of both highway vehicles (cars and trucks) and nonroad mobile sources (e.g., airplanes, motorboats, farm equipment, etc.). Table 5.5-1 lists mobile source categories that EPA believes are significant sources of emissions. This table can be used as a guide to assist State/local agencies in focusing their mobile source emission inventory efforts, and is based on an analysis of EPA's

NET data base. The H (high), M (medium), and L (low) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant. A ✓ indicates that emissions of the pollutant may occur from that category but are not considered significant. A blank cell indicates that no emissions of the pollutant were recorded in EPA's NET data base for that source category. Note that local priorities for inventory development may vary depending on the nature of sources in the area.

Table 5.5-1. Mobile Sources of Emissions

CATEGORY	SO_2	PM	NH_3*	VOC	NO_x	CO
Highway Vehicles						
Light-Duty Gas Vehicles and Motorcycles	M	M	M	H	H	H
Light-Duty Gas Trucks	M	M	M	H	H	H
Heavy-Duty Gas Vehicles	L	L	L	H	M	M
Diesels	M	H	L	H	H	M
Off-Highway						
Nonroad Gasoline	L	M	**	H	M	H
Nonroad Diesel	M	H	**	H	H	M
Aircraft	L	M	**	M	M	M
Marine Vessels	M	M	L	L	M	L
Railroads	M	M	L	L	H	L

* The emissions from all NH_3 source categories need to be better characterized because of their role in the formation of secondary particles

** While NH_3 emissions may occur from these source categories, at this time EPA does not have the capability to make an estimate of these emissions.

Note: The H (high), M (medium), and L (low) designations indicate the level of significance of a source category's emissions to the overall emissions of that pollutant.

The following sections discuss the models and data sources for onroad mobile sources and nonroad mobile sources, respectively.

5.5.1 Onroad Mobile Sources

Onroad mobile source populations are typically characterized according to the following vehicle categories:

- Light-duty gasoline vehicles (LDGV);
- Light-duty gasoline trucks I (LDGT1);
- Light-duty gasoline trucks II (LDGT2);
- Heavy-duty gasoline vehicles (HDGV);
- Light-duty diesel vehicles (LDDV);
- Light-duty diesel trucks (LDDT);
- Heavy-duty diesel vehicles (HDDV); and
- Motorcycles.

Ozone precursor emissions for onroad sources are estimated using the MOBILE emission factor model developed by EPA's Office of Mobile Sources (OMS). In general this model generates emission factors to apply to VMT estimates for each of the above vehicle categories. PART5 is an emission factor model developed by OMS to estimate onroad emissions for PM_{10}, $PM_{2.5}$, and SO_2. The use of VMT activity data and both of these onroad mobile emission factor models are discussed further below.

VMT Activity Data

Each State's highway or transportation agency provides annual data to the FHWA's Highway Performance Monitoring System (HPMS). The FHWA uses the data provided by the States to report the condition of the nations' highways to Congress. The HPMS compiles VMT at the State level for rural, small urban, and individual urbanized areas by 12 different road types, and six distinct vehicle types. Updated guidance for converting HPMS VMT data to the vehicle classes contained within MOBILE5a is provided by the EIIP in section 2.0 of the report, *Use of Locality Specific Transportation Data for the Development of Mobile Source Emission Inventories.*[20] This report also contains sections addressing improvements to travel demand model outputs. In 1993, FHWA issued a letter indicating that all urban areas greater than 50,000 population should have individual HPMS sample panels representative of travel within those areas.

EPA guidance, *Procedures for Emission Inventory Preparation - Volume IV: Mobile Sources*,[21] provides a very detailed discussion of HPMS and travel demand models (TDM). Pages 62 to 94 of this document discuss how to use HPMS data and the more limited cases when TDMs may be used. In general, HPMS is the preferred method for estimating historical VMT and TDMs are the preferred method for allocating VMT to the county level and road classes and for calculating growth factors for future years. The guiding principal of this policy is that the State should provide the same estimate of travel to the EPA as it uses internally and provides to the FHWA.

In the unusual circumstance that the State believes that an alternative to HPMS provides a better estimate of historical VMT, the State should write a letter for inclusion in the SIP to that effect to both EPA and the FHWA signed by the appropriate authorities, normally the State Department of Transportation, local metropolitan planning organizations, and the State environmental agency responsible for submitting the SIP. The letter should document why the State believes its proposed alternative is superior to HPMS for purposes of estimating historical VMT. The letter should also address the following three issues:

- How the State proposes to create a historical record, at least back to 1990, so that the SIP planning elements are internally consistent, in the event that the State proposes to substitute its alternative approach when satisfying the requirements associated with the 1-hour standard;

- How the State plans to assure that the statistical design and funding level of the alternative program are stable for an extended period of time to assure that the proposed methodology will continue to be available for conformity and other analyses; and

- The frequency at which the State plans to update its historical VMT estimates to accommodate the reporting requirements of the various SIP elements and transportation planning processes.

The approval of the use of any alternative to HPMS will be made by the EPA Regional Office. States are encouraged to identify in their IPP their proposed method for determining historical VMT, for allocating VMT to the county level and road classes, and for calculating growth factors for future years.

MOBILE5 Model

Onroad mobile source VOC, NO_x, and CO emission factors are calculated using the MOBILE5a model. MOBILE5a generates exhaust and evaporative emission factors in grams per mile. These factors are then applied to the VMT activity estimates, discussed above.

Although MOBILE5b was released as an interim update to the MOBILE5a model during August 1997, States are not required to use MOBILE5b. States can continue to use either MOBILE5a or MOBILE5b until the time that MOBILE6 becomes available. This applies to SIP inventories and modeling, conformity determinations, and the quantification of emission reductions for open market trading purposes. The MOBILE5a and MOBILE5b models, user's guides, and associated documentation are all available at EPA's OMS web page at http://www.epa.gov/oms/m5.htm. Guidance concerning the use of MOBILE6 versus MOBILE5 for preparing the 1999 and projected emission inventories for ozone and PM SIPs will be issued by OMS after it is determined how all final updates to MOBILE6 emission factors will affect pollutant emissions inventories. States also have the option of using their own mobile source emission factor model if they have coordinated its use with OMS.

Although the MOBILE6 model is not yet available, many of the optional local MOBILE5 inputs are also expected to be used in MOBILE6. To this end, States should plan for compiling a 1999 onroad inventory using MOBILE6 by developing the best possible set of local inputs for variables such as registration distribution, I/M program inputs, defining the geographic and temporal applicability of other control programs (e.g., in which counties and what months is oxygenated fuel used), mileage accumulation rates, and determining what temperature data will be used for each of the different types of inventories. It is also recommended that States have methods in place for 1999 for determining fuel characteristics throughout the State and according to season, including fuel Reid vapor pressure (RVP), sulfur level, oxygen content, and the makeup of reformulated gasoline. For all types of onroad vehicle emission modeling (e.g., ozone modeling, 3-year cycle inventories, transportation conformity), having an accurate, local registration distribution is important to determining accurate emission inventories. Because wide differences between actual model year fleet distributions and default distributions in the MOBILE model have been observed, States are encouraged to use county-specific motor vehicle model year distributions obtained from their State motor vehicles office. For the 3-year cycle and modeling inventories, having accurate representations of control programs in place during the modeled time periods is crucial, particularly for I/M program modeling. For example, if a set of phase-in cutpoints are being used in an I/M program in 1999, it is important to model that set of cutpoints rather than the final set of emission cutpoints. On the other hand, for attainment demonstration or projection inventories, where allowable emissions are calculated, the final planned I/M program may be modeled. Modeling accurate speeds by roadway type, while important for all inventory types, is particularly important in transportation conformity modeling. In this case, it is necessary to capture the changes in average speeds by roadway type or roadway link due to the presence or absence of particular transportation-related programs.

Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources (Reference 21) provides recommendations for determining appropriate values for MOBILE model inputs such as ambient temperature and speed. EPA encourages the use of non-default inputs by users of the MOBILE model, but requests that States discuss the selection of any non-default values in documentation submitted with the onroad mobile source emission inventory.

Several months before the final release of MOBILE6, OMS will make available a working beta version of MOBILE6 to obtain user feedback on program operation. To allow stakeholder and peer review of proposed model changes, OMS has posted background reports to describe the various inputs

and assumptions used within MOBILE6, available at the following address: http://www.epa.gov/oms/m6.htm. Examples of changes that are likely to be implemented for the final MOBILE6 model include:

- incorporate effects of non-FTP, or "off-cycle," driving patterns on emissions;
- update heavy-duty engine emission conversion factors, including brake specific fuel consumption (BSFC), fuel economy, non-engine fuel economy improvements, and fuel densities;
- expand emission factor calculations for four distinct subcategories of HDDVs similar to PART5 model;
- update evaporative emissions to incorporate real-time diurnal emissions estimates, as well as improving hot soak, resting loss, and running loss emissions;
- evaluate effects of fuel characteristics on emissions, including in-use sulfur content and oxygenates; and
- update default fleet characterization data (registration distributions and average annual mileage accumulation rates by vehicle type.).

The MOBILE6 web page also lists public workshops being held on MOBILE6.

PART5 Model

PART5 is a model that estimates in-use particulate air pollutant emissions (i.e., PM_{10}, $PM_{2.5}$, and SO_2) for gasoline and diesel-fueled vehicles and gives emission factors in grams per mile. The model contains emission factors corresponding to exhaust particulate emissions, exhaust particulate components, brake wear, tire wear, and reentrained road dust. PART5 contains default values for the majority of the emission factor calculations, but also allows for user-supplied data for certain inputs. For the vehicle registration distribution, PART5 uses the same vehicle classifications as the MOBILE model, except that the MOBILE HDDV class is divided into five subclasses in PART5 (see Table 5.5-2). One potential method for developing the vehicle distribution for PART5 may be to use the MOBILE model vehicle class distribution, and apportion the value for MOBILE HDDV among the five PART5 HDDV subclasses using HDDV sales data, survival rates, and diesel market shares. As indicated in section 5.5.2, MOBILE6 and PART5 vehicle classes may be identical in the future.

Details concerning the inputs to be supplied to the PART5 program are included in the PART5 user's guide. States can download electronic copies of the user's guide, as well as the most recent version of the PART5 model from the OMS web page at the following address: http://www.epa.gov/oms/part5.htm. OMS plans to update PART5 by issuing a PART6 model after MOBILE6 is released. When updated, the PART6 vehicle classes are likely to be identical to vehicle classes in MOBILE6. In addition, PART6 will reflect any available updated emission factor data developed by OAQPS. For example, the AP-42 emission factor section for unpaved roads has been revised, and this latest information will be incorporated into PART6.

Table 5.5-2. PART5 Vehicle Classes

Vehicle Class		FHWA Class	Gross Vehicle Weight (lbs)
LDGV	light-duty gasoline vehicles		
LDGT1	light-duty gasoline trucks, I	1	<6,000
LDGT2	light-duty gasoline trucks, II	2A	6,001-8,500
HDGV	heavy-duty gasoline trucks	2B - 8B	>8,500
MC	motorcycles		
LDDV	light-duty diesel vehicles	1	<6,000
LDDT	light-duty diesel trucks	2A	6,001-8,500
2BHDDV	class 2B heavy-duty diesel vehicles	2B	8,501-10,000
LHDDV	light heavy-duty diesel vehicles	3,4,5	10,001-19,500
MHDDV	medium heavy-duty diesel vehicles	6,7,8A	19,501-33,000
HHDDV	heavy heavy-duty diesel vehicles	8B	33,000+
BUSES	buses		

5.5.2 Nonroad Mobile Sources

The EPA's OMS is developing a computer model, NONROAD, to directly estimate pollutant emissions in tons for the following nonroad equipment categories:

- Lawn and Garden
  - residential
  - commercial
- Construction and Mining
- Agricultural
- Industrial
- Airport Service
- Recreational Vehicles
- Logging
- Recreational Marine
- Light Commercial
- Railway Maintenance

Within these general categories are more specific types of equipment (e.g., 2-wheel tractors, balers, and combines are examples of 10-digit SCCs within the broader 7-digit SCC defining agricultural equipment). Because of the variations in hours of use, horsepower, and load factors corresponding to engines in various applications, these distinctions are necessary. These applications can be further classified according to fuel and engine type [diesel, gasoline 2-stroke, gasoline 4-stroke, compressed natural gas (CNG), and liquid petroleum gas (LPG)].

The NONROAD model estimates emissions for six exhaust pollutants: hydrocarbons (HCs), NO_x, CO, PM, SO_2, and CO_2. Hydrocarbons can be reported as total hydrocarbons (THC), TOG, nonmethane organic gases (NMOG), NMHC, or VOC. Particulate matter can be reported as total PM, PM_{10} (which is equivalent to total PM), or $PM_{2.5}$. The model also estimates non-exhaust HC emissions, including crankcase, diurnal, and refueling emissions. The model allows the user to report total HC emissions,

which account for both exhaust and relevant non-exhaust components (depending on the engine type and pollutant). At the present time, reliable nonroad NH_3 emission factors are not available, and the NONROAD model does not generate nonroad NH_3 emissions. The EPA anticipates that NH_3 emission factors for nonroad may be available by 2002.

NONROAD allows the calculation of pollutant emissions at the national, State, and county level. The model can also estimate sub-county (i.e., nonattainment area) emissions if the necessary inputs to perform this calculation are supplied by the user. By using estimates of annual activity for each equipment type, annual emissions inventories can be calculated. Additional inventories can be calculated on a seasonal (i.e., summer, fall, winter, spring), monthly, or daily (i.e., week or weekend day) basis by allocating annual activity to these smaller time periods. Past year, present year, and future year inventories (up to the year 2050) can be generated with this model.

The NONROAD model estimates emissions for each specific type of nonroad equipment by multiplying the following input variables:

- Equipment population for a specified year, distributed by age, horsepower, fuel type, and application;
- Average load factor expressed as average fraction of available power;
- Activity in hours of use per year; and
- Emission factor, accounting for engine deterioration and any applicable new standards.

The emissions are then temporally and geographically distributed using appropriate allocation factors.

States have the option of replacing default model values with more representative data if available. If a State makes changes to default model values such as local equipment populations, geographic allocations, and local growth rates, States should submit the input files to EPA, as well as a description and justification of why the defaults were changes. However, EPA does not recommend that NONROAD users change values for certain model variables, including useful life and scrappage, activity data (i.e., load factors and hours of use), and emission deterioration factors. This is largely because all of these variables are related to and affect the overall engine scrappage function. If one of these variables changes, other variables should be adjusted accordingly. The EIIP has published a report entitled, *Guidance for Estimating Lawn and Garden Activity Levels*[22] that discusses methods for improving estimates of local lawn and garden equipment populations according to commercial and residential use.

The OMS has posted technical reports on their web site that describe the various default input variables. Copies of these reports, as well as the most recent version of the NONROAD model (including user's guide) can be downloaded from the web site: http://www.epa.gov/oms/nonrdmdl.htm#model. In addition, a CD-ROM copy of the model can be obtained from OMS by request.

Commercial Marine Vessels, Aircraft, and Locomotives

The first final version of the NONROAD model will not provide States with a tool for estimating emissions for commercial marine, aircraft, and locomotives. For further guidance on developing emission estimates for these nonroad categories, States are referred to EPA guidance, *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*. Emission factors will ultimately be

available in a revised version of Section II of the 5th edition of AP-42, Volume II. The completion date for this new AP-42 section is uncertain, but when complete, the emission factors will be posted at the following web site address: http://www.epa.gov/oms/ap42.htm. In the interim, those seeking updated nonroad mobile source emission factor information should direct inquiries to Mr. Greg Janssen of EPA's OMS, at (734) 214-4285; e-mail: janssen.greg@epa.gov. Following is a discussion on the status of preparing updated guidance for commercial marine, aircraft, and locomotive categories.

The OMS originally intended to incorporate a commercial marine module into the first version of the NONROAD model. However, due to unexpected complications in developing input data and the requisite computer code, OMS will discontinue work on the electronic commercial marine module for the NONROAD model, and concentrate instead on written guidance. This guidance may provide "best estimate" default emissions inventories for approximately 150 ocean, lake, and river ports, but may allow for the use of more accurate, locally-specific emissions data if available to the user. The electronic commercial marine module will be reconsidered for a subsequent update of the NONROAD model.

For aircraft, activity data in the form of landing and take-offs (LTO's) can be obtained from the Federal Aviation Administration (FAA). The Federal Aircraft Engine Emission Data Base (FAEED), developed by the FAA and EPA, is a tool for calculating aircraft emissions. This data base is a stand-alone application that allows a user to compute pollutant emissions produced by a specified fleet. However, users should be aware that emission factor data for newer engine models are not available in this version of the FAEED. EPA's OMS will continue to work with the FAA to potentially develop an updated emissions estimation data base that reflects emissions data for all engine types, and may also provide the necessary activity data. The FAEED is available at EPA's OMS web site.

For locomotives (especially Class II and Class III line haul and yard operations), the majority of the activity data are obtained by directly contacting individual railroads in the inventory area. Written guidance for estimating locomotive emissions will be prepared by OMS after further investigating input data availability.

5.6 BIOGENIC AND GEOGENIC SOURCES

Biogenic and geogenic sources contribute to pollutant emissions as indicated in Table 5.6-1.

Table 5.6-1. Natural Source Categories and Pollutants Emitted

Source	Pollutant			
	VOC	NO_x	PM_{10}	$PM_{2.5}$
Biogenic				
– Vegetation	✓			
– Soil Microbial Activity		✓		
Geogenic				
– Oil and Gas Seeps	✓			
– Wind Erosion			✓	✓
Other Natural				
– Lightning		✓		
– Stratospheric Injection*		✓		
– Oceans*		✓		

* NO_x emissions from each of these sources contribute 2 percent or less of the total global NO_x budget, and will not be discussed further.

5.6.1 Biogenic Sources

Biogenic sources are a subset of natural emissions sources that may contribute significantly to an emissions inventory. Vegetation (i.e., forests and agriculture) is the predominant biogenic source of VOC and is typically the only source that is included in a biogenic VOC emissions inventory. Microbial activity in the soil contributes to natural biogenic NO_x emissions.

States are referred to the EIIP document, *Volume V, Biogenic Sources Preferred Methods*,[23] for a detailed description of some of the biogenic source emissions that should be considered when preparing an emissions inventory. One of the major constituents of biogenic emissions, isoprene, is highly photoreactive. Because of this characteristic, inclusion of biogenic emissions is deemed essential for photochemical air quality modeling for ozone. In addition, some biogenic VOC may ultimately contribute to secondary particle formation, and would therefore be important with respect to a PM or regional haze inventory. Computer models available for States to estimate speciated biogenic emissions include the following:

- BEIS-2;
- The Personal Computer version of the BEIS-2.2 (PCBEIS-2.2); and
- Biogenic Model for Emissions (BIOME).

The BEIS-2 model and PCBEIS-2.2 can be used to estimate speciated VOC emissions from vegetation, as well as NO_x emissions from soils. BIOME can be used to estimate speciated VOC emissions from vegetation.

The BEIS-2 is a stand-alone processor that produces biogenic estimates for use with several existing air quality models, including the Urban Airshed Model (UAM), Regional Oxidant Model (ROM) and RADM. As such, the model is the preferred method for generating biogenic estimates required for air quality modeling. The BEIS-2 model also estimates biogenic emissions from soil, which may be a significant source of NO_x emissions in rural areas. PCBEIS-2.2 output is typically used only for inventory reporting purposes [and in some cases for Empirical Kinetic Modeling Approach (EKMA) runs]. Other alternative (but less preferable) methods for estimating biogenic emissions are also discussed in Volume V of the EIIP document.

Although States are encouraged to develop their own independent biogenic emission estimates, the EPA will allow States to use EPA-generated BEIS-2 emission estimates as the basis for their SIP planning and modeling inventories. States should note that biogenic emissions are required in a projected year inventory. However, unless there are anticipated changes in land use or vegetation patterns for the modeling area, it is appropriate to assume that biogenic emissions will remain the same between the base year and projected year. It is expected that the output from BEIS-2, as well as any updates to this emissions model, will be compatible as input to the planned regional air quality model, MODELS3.

EPA is updating the BEIS-2 model and plans to release BEIS-3 in late 1999. BEIS-3 will be based in part on data collected for the Ozark Isoprene Experiment, and is expected to generate lower emission estimates than BEIS-2 for some areas due to adjustments in estimates of ground cover vegetation. In addition, EPA recently updated PCBEIS-2.2 with the release BEIS-2.3. Further details on the status of biogenic emissions modeling are available at EPA's web page at http://www.wpa.gov/asmdnerl/biogen.html.

5.6.2 Geogenic and Other Natural Sources

Geogenic emissions are primarily the result of oil or natural gas seeps and soil wind erosion. In addition, lightning may also be a significant contributor to natural NO_x emissions in an inventory area. Volcanoes and fumaroles (i.e., vapor or gas vents in a volcanic region) can be additional sources of geogenic emissions.

As a source of ozone precursor emissions, geogenic sources are less significant than biogenic sources. However, geogenic wind erosion can contribute substantially to PM emissions in an area. As indicated in Section 4.5, EPA typically generates PM_{10} and $PM_{2.5}$ emissions for wind erosion, and these estimates are expected to be available for use by States in their SIP base year and 3-year cycle inventories. At this time, the emission estimation methodology for wind erosion is being refined by EPA to produce more representative PM estimates for this category.

States should also prepare an inventory of all other significant geogenic sources in the inventory area. Methods for estimating VOC emissions from oil and gas seeps, as well as NO_x emissions from lightning, are described in the EIIP document, *Volume V, Biogenic Sources Preferred Methods*. For oil and gas seeps, the preferred method is to develop a local emission factor based on the study of oil or gas seeps in the inventory area. The document also describes an alternative method developed by the California Air Resources Board (CARB)[24] that includes simplifying assumptions for oil or gas seeps whose specific flow rates and volatile fractions have not been studied and are not known.

Lightning produces NO, which is oxidized to NO_2 in the presence of ozone or in a photochemically reactive atmosphere. Because lightning is not a direct source of NO_2, accounting for this source category is more important for air quality modeling purposes than for SIP inventory purposes. NO emissions from

lightning can be estimated by collecting activity data on the cloud-to-ground (CG) lightning flashes, assuming a frequency of intra-cloud (IC) flashes based on the value for CG lightning flashes, and applying appropriate emission factors (in molecules NO per flash) to these activity levels.

SECTION 6.0
QUALITY ASSURANCE/
DOCUMENTATION OF THE INVENTORY

6.1 QUALITY ASSURANCE

As part of the 8-hour ozone NAAQS, $PM_{2.5}$ NAAQS, and regional haze rule, States will be required to perform QA checks and procedures on their inventories. States can develop and select the QA procedures they will perform, and should include the details of their QA program (including specific procedures) in their IPPs.

The purpose of QA is to ensure the development of a complete, accurate, and consistent emission inventory. A well-developed and well-implemented QA program fosters confidence in the inventory and in any resulting regulatory and/or control program.

The overall QA program consists of two components: QC and external QA activities. Quality control is a system of routine technical activities designed to measure and control the quality of the inventory as it is being developed. The QC system provides routine and consistent checks and documentation points in the inventory development process to verify data integrity, correctness, and completeness; identifies and reduces errors and omissions; maximizes consistency within the inventory preparation and documentation process; and facilitates internal and external inventory review processes. Quality control activities include technical reviews, accuracy checks, and the use of approved, standardized procedures for emission calculations, and should be included in inventory development planning, data collection and analysis, emission calculations, and reporting.

External QA activities include a planned system of review and audit procedures conducted by personnel not actively involved in the inventory development process. The key concept in the QA activities is an independent, objective review by a third party to assess the effectiveness of the internal QC program and the quality of the inventory, and to reduce or eliminate any inherent bias in the inventory process.

An effective QA program includes planning, numerous QC checks during the inventory development process, and QA audits at strategic points in the process. EPA has developed several guidance documents designed to assist State/local agencies in designing and implementing their QA programs. The EIIP Volume VI address QA issues, including the following:[3]

- Chapter 1: *Introduction - The Value of QA/QC*
- Chapter 2: *Planning and Documentation*
- Chapter 3: *General QA/QC Methods*
- Chapter 4: *Evaluating the Uncertainty of Emission Estimates*
- Chapter 5: *Model QA Plan*

These documents can be downloaded from EIIP's web site at http://www.epa.gov/oar/oaqps/eiip/. Additional EPA QA guidance is found in the following documents:

- *Guidance for the Preparation of Quality Assurance Plans for O_3/CO SIP Emission Inventories*[25]

- *Quality Assurance Program for Post-1987 Ozone and Carbon Monoxide State Implementation Plan Emission Inventories*[26]

- *Quality Review Guidelines for 1990 Base Year Emission Inventories*[27]

Section 4.0 of this document provides State and local agencies with information on how to submit their data to EPA. Once EPA receives these data, the data will undergo an interim processing step as EPA performs automated QA checks on the submitted data. The data that pass these checks will be entered into the NET. EPA will inform a State or local agency when data it has submitted have not passed the automated checks. State and local agencies will be given the opportunity to correct and resubmit these data to EPA.

To assist State and local agencies in the QA process, EPA will make available to these agencies the QA checks that EPA will run on their submitted data. States may decide to pre-screen their data using these QA checks prior to submitting their data to EPA.

6.2 DOCUMENTATION OF THE INVENTORY

The written presentation to support an emissions inventory submittal for the ozone and $PM_{2.5}$ NAAQS, as well as the regional haze rule, should contain documentation that is sufficiently detailed for EPA to evaluate how the emission inventory was prepared. The EPA requires that States prepare adequate documentation; the level of detail required in the documentation should be agreed upon with the Regional Office and specified in a State's Inventory Preparation Plan. This section refers to prior guidance issued by EPA to assist in developing appropriate documentation for emission inventories.

Written documentation of calculation, assumptions, and all other activities associated with developing the emission estimates is a key element of the QA program. Documentation of the work that is actually performed during inventory development includes documentation of calculations (hand calculations, spreadsheets, and data bases), documentation of the QA program implementation, and documentation of the results (the inventory report). Examples of topics requiring good documentation in the inventory development process include:

- point/area source cutoffs to demonstrate that double-counting of emissions does not occur

- point source information on survey mailout procedures, tracking and logging of returned surveys, and verification procedures for source test data

- adjustments made to source test data to represent longer periods of time, seasonal influences, etc.

- data obtained from permit and compliance files

- adjustments made for applicable rules, including control efficiency, RP, and RE

- information obtained on emission factors and activity data (primarily for area sources)
- data references
- adjustments made for local conditions and assumptions made to adjust for scaling up emissions to account for nonreported sources
- VMT, traffic speeds, miles of roadway for each roadway class, hot- and cold-start percentages, vehicle age distribution, etc., for the mobile source documentation

Chapter 2 of the EIIP's *Volume VI,* titled *Planning and Documentation* provides valuable, detailed guidance on documenting inventory components.

For a complete example of how an inventory should be compiled and documented, States are referred to the document, *Example Documentation Report for 1990 Base Year Ozone and Carbon Monoxide State Implementation Plan Emission Inventories.*[28] This document provides States with a list of elements deemed to be essential for documenting an emissions inventory in written form. An outline for the organization and content of a State's inventory report is presented in Table 6.2-1. This table references another document entitled *Example Emissions Inventory Documentation for Post-1987 Ozone State Implementation Plans.*[29] This document also addresses inventory documentation requirements, but was not explicitly designed to address 1990 inventories. However, much of the guidance provided for post-1987 inventories would still be applicable for inventories developed for the new ozone and $PM_{2.5}$ NAAQS, and regional haze rule. In addition, although these documents focus on ozone precursor and CO emission inventories, the principles defined in these reports would also apply to PM and regional haze inventories.

Another guidance document, *Quality Review Guidelines for 1990 Base Year Emission Inventories* presents review guidelines for State and local agencies to use as a self-check prior to submitting the inventories they prepare to EPA. This document presents checklists for States to use to verify that effective QC and QA practices are applied to an inventory during the process of developing and documenting an emissions inventory. EPA does not intend to use this document to determine whether or not to approve a State's inventory submittal. As stated in Section 2.5, Inventory Approval, the inventory approval process will be negotiated between the EPA Regional Office and the State. Rather, EPA believes that the checklists represent sound practice and will be a useful tool in the development of a State's inventory.

Table 6.2-1. Outline for Format/Contents for SIP Emission Inventory Reports

I. Cover and Title Page
   A. Title (geographic area, type of inventories, pollutants, base year)
   B. Responsible agency
   C. Report date (date completed/distributed)
   D. Preparer (if different from responsible agency - e.g., contractor)

II. Table of Contents
   A. Contents
   B. Tables
   C. Figures

III. Introduction
   A. Reason for report being prepared, purpose
   B. Geographic area covered, base year, type of inventory (ozone SIP, PM SIP, Regional Haze), pollutants included (VOC, NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$, NH_3)
   C. Brief discussion of contents of report
   D. Discussion of automated data systems used
   E. Major problems, deficiencies, portions of inventory not included
   F. List of primary guidance documents and references used (EPA guidance documents, EIIP documents, AP-42, etc.)
   G. List of contacts for each distinct portion of the inventory

IV. Summary
   A. Emissions (annual and seasonal) of each pollutant by major category
   B. See example tables and graphics given in *Example Emissions Inventory Documentation for Post-1987 Ozone State Implementation Plans* (EPA-450/4-89-018)

V. Documentation of Emissions Methods/Data Estimates
   A. Stationary Point Source Emissions
      1. discussions of procedures and methodologies
      2. example surveys/questionnaires
      3. list of plants by primary product and total emissions
      4. point source emissions summary

Table 6.2-1 (continued)

B. Stationary Area Source Emissions
   1. discussion of procedures and methodologies
   2. list of source categories and emissions
   3. calculations and discussion for each source category
   4. area source emissions summary

C. Mobile Source Emissions
   1. Nonroad Mobile Sources
      a. same information as for stationary area sources
   2. Onroad Vehicles
      a. mobile model inputs and outputs
      b. VMT estimates
      c. documentation (can put all or part in Appendices)
      d. mobile source emissions summary
      e. discussion of procedures and methodologies

VI. Quality Assurance/Quality Control (QA/QC)

A. QA/QC plan - discussion of QA/QC methodologies used

B. Results

C. QA procedures can also be discussed in individual source category sections

SECTION 7.0
REFERENCES

1. *Implementation Guidance for the Revised Ozone and Particulate Matter (PM) National Ambient Air Quality Standards (NAAQS) and the Regional Haze Program*, U.S. Environmental Protection Agency, Research Triangle Park, NC, 1998.

2. *Introduction to the Emission Inventory Improvement Program*, Volume I, U.S. Environmental Protection Agency, Research Triangle Park, NC, July 1997.

3. *Quality Assurance/Quality Control, Volume VI*, EIIP, U.S. Environmental Protection Agency, Research Triangle Park, NC, 1997.

4. *Guidelines for Estimating and Applying Rule Effectiveness for Ozone/CO State Implementation Plan Base Year Inventories*, EPA-452/R-92-010, U.S. Environmental Protection Agency, Research Triangle Park, NC, November 1992.

5. *The 1985 NAPAP Emissions Inventory: Development of Temporal Allocation Factors*, EPA-600/7-89-010d, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1990.

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APPENDIX A
DRAFT CONSOLIDATED EMISSIONS REPORTING (CER) RULE

NOTE: THE ATTACHED DRAFT CER RULE IS BEING REVIEWED WITHIN EPA AND MAY CHANGE. IT IS INCLUDED AS A DRAFT TO SHOW STATE AND LOCAL AGENCIES WHAT EPA'S CURRENT INTENTIONS ARE. WHEN THE CER RULE BECOMES FINAL, IT WILL TAKE PRECEDENCE OVER ALL APPLICABLE PORTIONS OF THIS GUIDANCE.

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 51

[AD-FRL-]

RIN

Consolidated Emissions Reporting

AGENCY: Environmental Protection Agency (EPA)

ACTION: Proposed rule

SUMMARY: EPA is proposing this rule to improve and simplify emissions reporting. Many state and local agencies asked EPA to take this action to: determine reporting requirements; improve reporting efficiency; provide flexibility for data gathering and reporting; better explain to program managers and the public the need for a consistent inventory program. Consolidated reporting should increase the efficiency of the emission inventory program and provide more consistent and uniform data. Although EPA is proposing the submission of more data for $PM_{2.5}$, its precursors, and HAPs, it is proposing to reduce the reporting requirements for other criteria pollutants.

DATES: Submit comments on or before **[insert date 45 days after date of publication in the Federal Register]**.

ADDRESSES: Send comments (in duplicate, if possible) to: Air and Radiation Docket (6102), US Environmental Protection agency, Attn: Docket No. A9840, 401 M Street, SW, Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: Steven Bromberg, Emissions, Monitoring, and Analysis Division (MD-14), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711, Telephone: (919) 541-1000, email:bromberg.steve@epamail.epa.gov.

SUPPLEMENTARY INFORMATION:

I. AUTHORITY

Sections 110(a)(2)(F), 110(a)(2)(K), 110(a)(2)(J),112, 182(a)(3)(B), 172(c)(3), 182(a)(3)(A), 187(a)(5), 301(a)

II. BACKGROUND

Emission inventories are critical for the efforts of state, local, and federal agencies to attain and maintain the National Ambient Air Quality Standards (NAAQS) that EPA has established for criteria pollutants such as ozone, particulate matter, and carbon monoxide. Pursuant to its authority under section 110 of Title I of the Clean Air Act, EPA has long required State Implementation Plans (SIPs) to provide for the submission by States to EPA of emission inventories containing information regarding the emissions of criteria pollutants and their precursors (e.g., volatile organic compounds (VOCs)). EPA codified these requirements in 40 CFR part 51, subpart Q in 1979 and amended them in 1987.

The 1990 Amendments to the Clean Air Act (Act) revised many of the provisions of the Clean Air Act related to the attainment of the NAAQS and the protection of visibility in mandatory class I Federal areas (certain national parks and wilderness areas). These revisions establish new periodic inventory requirements applicable to certain areas that were designated nonattainment for certain pollutants. For example, section 182(a)(3)(A) required States to submit an inventory every 3 years (3-Year cycle) for ozone nonattainment areas beginning in 1993. Emissions reported must include VOC, NO_x, and CO for point, area, mobile (onroad and nonroad), and biogenic sources. Similarly, section 187(a)(5) requires States to submit an inventory every 3 years for CO nonattainment areas for the same source classes, except biogenic sources. EPA, however, did not codify these statutory requirements in the CFR, but simply relied on the statutory language to implement them.

EPA recently revised both the ozone and particulate matter NAAQS. EPA established an 8-hour ozone standard that replaces the 1-hour ozone standard applicable at the time of the 1990 Clean Air Act Amendments. EPA also revised the PM_{10} standards and established new standards for $PM_{2.5}$ and regional haze.

EPA also recently promulgated the NO_x SIP Call (§51.122) which calls on 22 States and the District of Columbia to submit SIP revisions providing for NO_x reductions in order to reduce the amount of ozone and ozone precursors

transported between states. As part of that rule, EPA established reporting requirements to be included in the SIP revisions to be submitted by States in accordance with that action.

This proposal consolidates the various reporting requirements that already exist in one place in the CFR and establishes new ones for the $PM_{2.5}$ NAAQS and regional haze.

In this action, we refer to these types of inventories as the following:

- Point source inventories
- 3-Year cycle inventories
- NO_x SIP call inventories

The Rule also takes advantage of data from Emission Statements available to states but not reported to EPA. As appropriate, states may use this data to meet their reporting requirements for point source data. Combining data from these activities gets the most information from sources with the least burden on the industry and less effort by state and local government agencies. By treating this information as a comprehensive emission inventory, states and local agencies may do the following:

- measure their progress in reducing emissions.
- have a tool they can use to support future trading programs.
- set a baseline from which to do future planning.

We intend these inventories to help nonattainment areas develop and meet SIP requirements to reach the NAAQS. Inventories represent a typical work week's daily emissions for peak nonattainment seasons, such as summer for O_3 and winter for CO.

States use data obtained through current annual reporting requirements (in the future to be called Point Source inventory) to record emissions from large sources and to track progress in reducing emissions from them. States get 3-Year cycle data from stationary sources with lower yearly emission levels and use them with the point source inventories to update their emission inventory every 3 years. States use this updated data to do the following:

- measure trends in emission reductions
- demonstrate emission changes from previous years
- answer the public's request for information

As noted above, this proposal would require the submission of emissions inventories to support the implementation of the new $PM_{2.5}$ standards and regional haze. States will need to inventory direct emissions of $PM_{2.5}$ and its precursors beginning in 2003 for the inventory year 2002. States will also have to estimate direct emissions of soil dust and $PM_{2.5}$ precursor emissions of condensible organics and ammonia. These $PM_{2.5}$ related data elements are needed as input to emission models. The Administrator has determined that States should submit statewide point and 3-Year cycle inventories for PM_{10}, $PM_{2.5}$, and regional haze, consistent with the data requirements for 3-Year cycle inventories for O_3 and CO. Sections 110(a)(2)(F) and 172(c) provide ample statutory for this proposal as it relates to criteria pollutants. Section 110(a)(2)(F) provides that SIPs are to require "as may be prescribed by the Administrator...(ii)periodic reports on the nature and amounts of emissions and emissions-related data from such sources." Section 172(c)(2)(3) provides that SIPs for nonattainment areas are to "include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant or pollutants in such area, including such periodic revisions as the Administrator may determine necessary to assure that the requirements of this part are met." Additional statutory authority for emissions inventories from 1-hour ozone nonattainment areas is provided by section 182(a)(3)(A) and for emissions inventories from CO nonattainment areas is provided by section 187(a)(5). Section 301(a) provides authority for EPA to promulgate regulations embodying these provisions.

In addition to the emission inventory provisions related to NAAQS pollutants, EPA is also proposing emission inventory provisions regarding hazardous air pollutants (HAPs). EPA is proposing these provisions under authority of section 301(a) which authorizes the Administrator to prescribe such regulations as are necessary to carry out her functions under the Act.

Title V of the Act requires the Administrator to perform an oversight role with respect to State issued permits, including permits issued to major sources of HAP emissions. In order to determine whether that program is being appropriately and lawfully administrated by the States with respect to major HAP sources, a HAP emission inventory is necessary. These regulations requiring States to submit such an inventory to EPA are authorized by section 301(a).

States are developing programs to regulate Hazardous Air Pollutants (HAPs) that are listed in section 112(b)(1) and their Title V programs must include permits for all HAP sources emitting major quantities of HAPs (10 tons of one HAP or 25 tons of multiple HAPs per year). Thus, the Administrator believes including HAPs in the point source inventory is appropriate and necessary. This information will help us support the HAP programs (MACT determinations, support to residual risk, Urban Area source program, and the Great Waters program).

What is the purpose of the Consolidated Emissions Reporting Rule (CERR)?

The purpose of this rule is threefold:

- simplify emissions reporting,
- offer options for data exchange, and
- unify reporting dates for various categories of inventories. Previous requirements may have, at times, led to inefficient reporting. This rule provides options for reporting that allow States to match normal activities with federal requirements.

This action consolidates the requirements of emission inventory programs for point sources, 3-Year cycles, and NO_x SIP Calls.

How are the CERR's requirements different from existing requirements?

(a) additional pollutants

Your State's inventory will add $PM_{2.5}$, $PM_{2.5}$ precursors, and HAPs to the criteria pollutants.

(b) geographic coverage of inventory

Your State now reports point source emissions statewide and emissions from area and mobile sources by nonattainment area. Your State's new inventory will be statewide by county for all source types, regardless of the attainment status.

(c) frequency of reporting

Your State will continue to report emissions from very large point sources (See Table 1) annually. Your State has a choice to report smaller point sources every 3 years or one-third of the sources each year. Your State will continue to report emissions from nonattainment areas for area and mobile sources every 3 years. Attainment areas will be required, for the first time, to report area and mobile source emissions.

How will EPA use the data collected under this reporting requirement?

EPA uses emission inventories to form realistic public policy by the following:

- modeling analyses,
- projecting future control strategies,
- tracking progress to meet requirements of the Clean Air Act,
- calculating risk, and
- responding to public inquiries.

Why does EPA want my State's data?

Most of the information EPA needs are readily available from States because of the State's efforts to follow the Clean Air Act and its amendments. Using data States have already estimated or collected is a cheaper, more efficient way for us to get information to analyze. EPA can pull your data into a central repository of emissions data and extract what we need to fulfill our mandates.

How will others use my data collected under this requirement?

Recent events have shown that some states need emissions data for areas outside their borders. Programs such as the Ozone Transport Assessment Group, the Ozone Transport Commission NO_x Baseline study, and the Grand Canyon

Visibility Transport Commission demonstrated this need. As we recognize pollution as a regional problem, agencies will need multistate inventories more often to do such things as regional modeling.

We can meet our common needs by creating a central repository of data from state and local agencies, or a group of regional emissions data bases. Such repositories offer the advantage of ready access and availability, common procedures for ensuring the quality of data, and an ability to meet the general needs of many potential users.

What happens if EPA doesn't get my agency's emissions data?

If we don't receive your emissions information at the time this rule specifies, we'll use whatever we have to produce emissions data for your agency. Congress often mandates our analyses, so we depend on you to complete them. If we don't get your data, we must find other ways to compile similar information.

We can estimate your agency's inventory by an of the following:

- national allocation (top down) methods,
- projecting from previous data, or
- using our best judgment.

For area and mobile sources, our methods usually represent your emissions reasonably well. For point sources, our estimates are less accurate. We have to estimate activity and plant parameters based on general knowledge rather than using your specific information.

The Act provides for other actions against a State if we do not receive your data. For example, if a State does not provide emissions data for NAAQS pollutants, EPA may take actions such as making findings of failure to implement, that are authorized in instances where a State fails to fulfill SIP obligations. As the HAP emissions data would be required by this regulation, States could face consequences under section 113 for failure to comply with a regulation.

III. ADMINISTRATIVE REQUIREMENTS

A. Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4, 1993), we must determine whether the regulatory action is "significant" and therefore subject to review by the Office of Management and Budget (OMB) and to the Executive Order's requirements. We've determined this action is "significant" and therefore does require OMB review, based on the Order's definition of a "significant" regulatory action as one that is likely to result in a rule that may do any of the following:

1. Have an annual effect on the economy of $100 million or more or materially harm the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State and local governments or communities. The ICR (EPA ICR No. 0916.09) analysis shows that the costs to implement the Rule are less than $100 million.

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another Agency. The rule will increase data consistency, thus assisting other Agencies.

3. Materially alter the budgetary effect of entitlements, grants, user fees, or loan programs or the rights and obligations of those who receive them. Grant funds are being increased to State agencies.

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles in the Executive Order.

B. Paperwork Reduction Act

Today's action does require new information for newly regulated pollutants but reduces reporting for previously regulated pollutants. It revises part 51 to consolidate old reporting requirements and recognizes new reporting needs for $PM_{2.5}$ and HAPs. The Office of Management and Budget has approved the current information collection requirements in part 51 under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. and has assigned OMB control number 2060-0088 (EPA ICR No. 916.07). A new information request (EPA ICR No.

0916.09) that covers the new reporting requirements is being submitted to OMB (OMB control number 2060-0088) for approval.

C. Impact on Small Entities

Under the Regulatory Flexibility Act we don't need to analyze this proposed regulation's flexibility because it doesn't affect small entities whose jurisdictions cover fewer than 50,000 people. Under 5 USC 605(b), I certify that this action won't significantly affect the economic well-being of a substantial number of small entities. Also, because this modification is minor, it requires no additional review.

D. E.O. 13045: Children's Health Protection

Executive Order 13045: "Protection of Children from Environmental health Risks and Safety Risks" (62FR19885, April 23, 1997) applies to any rule that: (1) is determined to be "economically significant" as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

EPA interprets E.O. 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5-501 of the Order has the potential to influence the regulation. This rule is not subject to E.O. 13045 because it is based on technology performance and not on health or safety risks.

E. The National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Pub L. No. 104-113, § 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed

or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This proposed rule making does not involve technical standards. Therefore, EPA is not considering the use of any voluntary consensus standards.

F. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. The additional work required by this rule takes advantage of information already in the possession of reporting groups. Using existing data leverages past work and reduces the burden of this rule. This conclusion is supported by the analysis done in support of EPA ICR No. 0916.09, OMB control number 2060-0088. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA.

G. Executive Order 12875: Enhancing the Intergovernmental Partnership

Under Executive Order 12875, EPA may not issue a regulation that is not required by statute and that creates a mandate upon a State, local or tribal government, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by those governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 12875 requires EPA to provide to the Office of Management and Budget a description of the extent of EPA's prior consultation with representatives of affected State, local and tribal governments, the nature of their concerns, copies of any written communications from the governments, and a statement supporting the need to issue the regulation. In addition, Executive Order 12875 requires EPA to develop an effective process permitting elected officials and other representatives of State, local and tribal governments to provide meaningful and timely input in the development of regulatory proposals containing significant unfunded mandates.

Today's rule does not create a mandate on State, local, or tribal governments. As explained in the discussion on UMRA (Section III.D), this rule does not impose an enforceable duty on these entities. Accordingly, the requirements of section 1(a) of Executive Order 12875 do not apply to this rule.

H. Executive Order 13084: Consultation and Coordination with Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.

Today's rule does not significantly or uniquely affect the communities of Indian tribal governments. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

CONSOLIDATED EMISSIONS REPORTING, PAGE 13 OF 38

List of Subjects in 40 CFR Part 51

Environmental protection, Administrative practice and procedure, Air pollution control, Intergovernmental relations, Reporting and record keeping requirements.

_____ _____

Dated: Carol M. Browner,

Administrator.

For the reasons stated in the preamble, title 40, chapter I, of the Code of Federal Regulations is proposed to be amended as follows:

PART 51 -- [AMENDED]

1. The authority citation for part 51 continues to read as follows:

Authority: 42 U.S.C. 7401-7671q.

2. Part 51 is amended by adding subpart A to read as follows:

Subpart A - Emission Inventory Reporting Requirements

Sec.

51.001 For what sources must States do emissions reporting?

GENERAL INFORMATION FOR INVENTORY PREPARERS

51.005 Who is responsible for actions described in this rule?

51.010 What tools are available to help prepare and report emissions data?

51.015 How does my State reduce the effort for reporting?

SPECIFIC REPORTING REQUIREMENTS

51.020 What data does my State need to report to EPA?

51.025 What are the emission thresholds that separate point and area sources?

51.030 What geographic area must my State's inventory cover?

51.035 When does my State report the data to EPA?

51.040 In what form should my State report the data to EPA?

51.045 Where should my State report the data?

Appendix A to Subpart A of Part 51 - Tables and Glossary

§51.001 For what sources must States do emissions reporting?

(a) Point sources for which States must report emissions annually **under** §51.321 are defined as follows:

(1) For PM_{10}, **$PM_{2.5}$, ammonia**, sulfur oxides, VOC, and nitrogen oxides, any plant that actually emits at least 90.7 metric tons (100 tons) per year of any pollutant.

(2) For carbon monoxide, any plant that actually emits at least 907 metric tons (1000 tons) per year.

(3) For lead and lead compounds measured as elemental lead, any plant that actually emits at least 4.5 metric tons (5 tons) per year.

(4) For HAPs, any plant that actually emits at least 10 tons per year of any HAP or at least 25 tons per year of two or more HAPs combined.

(b) Annual reporting applies only to an emission point within the plant that emits:

(1) For PM_{10}, $PM_{2.5}$, ammonia, sulfur oxides, VOC and nitrogen oxides, at least 22.7 metric tons (25 tons) per year.

(2) For carbon monoxide, at least 227 metric tons (250 tons) per year.

(3) For lead or lead compounds measured as elemental lead, at least 4.5 metric tons (5 tons) per year.

(4) For HAPs, at least 10 tons per year of one HAP or 25 tons per year of two or more HAPs.

GENERAL INFORMATION FOR INVENTORY PREPARERS

§51.005 Who is responsible for actions described in this rule?

State and local agencies whose geographic coverage include any point, area, mobile, or biogenic sources must inventory these sources and report this information to EPA.

§51.010 What tools are available to help prepare and report emissions data?

(a) We urge your State to use estimation procedures described in documents from the Emission Inventory Improvement Program (EIIP). Their procedures are standardized and ranked according to relative uncertainty for each emission estimating technique. Using this guidance will enable others to use your State's data and be able to evaluate its quality and consistency with other data. If your State chooses not to use the EIIP estimating methods, your State should follow the procedures EIIP recommends for assigning appropriate uncertainty scores to your emission estimates.

(b) Your State should use traditional estimating procedures for HAPs (emission factor x activity level) as the EIIP documents describe. However, if your State has developed a speciation profile unique to a local source, you may use it instead of the traditional approach to estimate emissions.

§51.015 How does my State reduce the effort for reporting?

(a) Compiling smaller point source (Type B) and 3-Year cycle inventories means much more effort every 3 years, but your state may ease this workload spike by reporting one-third of your Type B point and 3-Year cycle sources each year. For these sources, your State will therefore have data from 3 successive years at any given time, rather than from the single year in which it is compiled. If your State needs to inventory the entire category of Type B point and 3-Year cycle sources in a single year, your State should report this data instead of a third of the estimates each year. If your State is a NO_x SIP Call state as defined in §51.122, your State can't use these optional reporting frequencies for NO_x.

(b) If your State needs a base year emission inventory for a selected pollutant, your State must compile an inventory of all affected source categories for the specified year.

(c) If your State choose the method of reporting one-third of your Type B sources and 3-Year cycle sources each year, your State must compile each year of the 3 year period identically. For example, if a process hasn't changed for a source category or individual plant, your State must use the same emission factors to calculate emissions for each year of the 3 year period. If your State has revised emission factors during the 3 years for a process that hasn't changed, resubmit previous year's data using the revised factor. If your State uses models to estimate emissions during any year of the 3 year period, make them identical for all 3 years.

SPECIFIC REPORTING REQUIREMENTS

§51.020 What data does my State need to report to EPA?

(a) Pollutants. (1) Report emissions of the following:

(I) Sulfur oxides.

(ii) VOC.

(iii) Nitrogen oxides.

(iv) Carbon monoxide.

(v) Lead and lead compounds.

(vi) Particulate matter.

(vii) PM_{10}.

(viii) $PM_{2.5}$.

(ix) $PM_{2.5}$ precursors.

(x) HAPs.

(2) See Table 3 of appendix A to this subpart for the HAPs covered under this rule. Table 4 of appendix A to this subpart contains the priority list of HAPs to be inventoried. If your State has inventory data for any of the remaining HAPs listed in Table 3 of appendix A to this subpart, we encourage you to submit this information along with the data on Table 4 of appendix A to this subpart HAPs. If your State can show that a HAP has a residual risk of less that one in a million, it does not have to report that pollutant.

(b) Supporting information. Report the data elements in Table 2a through 2d of appendix A to this subpart. Depending on the format you choose to report your State data, additional information not listed in Tables 2a through 2d will be required. Specific instructions for your State system format should be consulted. Any you don't report we'll have to generate with our own techniques. We may ask you for other data to meet special requirements.

(c) Confidential data. We don't consider the data in Tables 2a through 2d of appendix A to this subpart confidential, but some states limit release of this type of data. If Federal and State requirements are inconsistent, consult your EPA Regional Office for a final reconciliation.

§51.025 What are the emission thresholds that separate point and area sources?

(a)(1) Use the following actual emissions thresholds in attainment areas for point source reporting:

(I) At least 100 tpy for SO_x, VOC, NO_x, PM_{10}, $PM_{2.5}$.

(ii) At least 1000 tpy for CO.

(iii) At least 5 tpy for Pb.

(iv) At least 10 tpy for HAPs.

(2) See Table 1 of appendix A to this subpart for reporting thresholds on point sources in nonattainment areas.

(b) Your State has the option to inventory and report any stationary sources below these thresholds as point or area sources. If you have lower emission thresholds for point sources in your state, you should use them. See Table 1 of appendix A to this subpart for thresholds to report 3-Year cycle data and Tables 2a through 2d of appendix A to this subpart for data elements to report.

(c) In moderate PM_{10} nonattainment areas your State should inventory sources emitting at least 100 tpy (actual) as point sources. In serious PM_{10} nonattainment areas, this requirement applies to sources emitting at least 70 tpy (actual). Inventory $PM_{2.5}$ sources emitting at least 100 tpy (actual) as point sources. Inventory ammonia (a precursor to $PM_{2.5}$) as a point or area source. We recognize that some HAPs in Table 3 of appendix A of this subpart may be precursors to $PM_{2.5}$, so, your State may inventory them as point or area sources, as appropriate.

(d) A HAP point source is any stationary facility emitting at least 10 tpy (actual) of any individual HAP, or at least 25 tpy for any combination of HAPs. Your State has the option to inventory and report facilities emitting less than these thresholds as point or area sources. If your State has lower emission thresholds for point sources, you should use them.

(e) Reexamine the list of HAP facilities each year of the cycle. Work with your EPA Regional Office periodically to examine the HAP sources being inventoried and insure they're relevant.

§51.030 What geographic area must my State's inventory cover?

Because of the regional nature of these pollutants, your State's inventory must be statewide, regardless of an area's attainment status.

§51.035 When does my State report the data to EPA?

Your State must report data for all inventory types 12 months (by December 31) after the end of the calendar year.

(a) Point source.(1) As seen in Table 1 of appendix A to this subpart, your State should divide your point source inventory into two subsets - Type A source inventory and Type B source inventory - with different reporting frequencies. Report actual annual emissions from Type A point sources each calendar year. Review stack data (height, diameter, flow rate, temperature, velocity, and stack number) every 3 years and send in changes shown in Table 2a of appendix A to this subpart.

(2) For point sources within your state that your State is controlling to meet the NO_x reductions in § 51.121, submit estimates of NO_x annually for the ozone season.

(b) 3-Year cycle. (1) Your State should send EPA its annual and daily estimates of actual emissions every 3 years for Type B point sources and area and mobile sources. For Type B point source inventories, include facilities not reported under the Type A source requirement. Area data includes sources below the thresholds for Type B point sources. Report HAPs on the same frequency as the Type B inventories. Your State may report emissions from one-third of your State's Type B, area, and mobile sources each year or from all sources every 3 years.

(2) Your State and your EPA Regional Office may tailor the reporting by selecting sources that most affect your agency.

(3) We encourage your State to integrate your State's own reporting requirements with EPA's. If your State legislature requires HAP data

reporting, contact your EPA Regional Office to reconcile your state and federal reporting requirements.

(4) If sources within your state are controlled to meet NO_x reductions in §51.121, your State must report all their NO_x area and mobile source data every year.

(c) Other. Your State must establish an initial baseline for biogenic emissions. Your State need not submit more biogenic data unless land use characteristics or the methods for estimating emissions change. If either of these variables change, your State must report new biogenic emissions during the reporting period in the following year as shown in Table 2d of appendix A of this subpart.

§51.040 In what form should my State report the data to EPA?

(a) For better access by everyone, report emissions in your State in an electronic format using one of the following options:

(1) Submit your State's data in the EIIP/NET Input format.

(2) Submit your State's data in the AIRS-AFS format.

(3) Submit your State's data in the EIIP/EDI format.

(b) Some meta data describing your submission are not listed in Tables 2a through 2d of appendix A of this subpart are also required. Because electronic reporting technology continually changes, contact your EPA Regional Office for acceptable formats. You should consult specific instructions for your State system format to determine additional requirements not listed in Tables 2a through 2d. You can find specific instructions for each optional format at the following Internet addresses:

(1) EIIP/NET Input format - www.epa.gov/oar/oaqps/efig/ei/index.html#Data

(2) AIRS-AFS format - www.epa.gov/ttnairs1/afs/

(3) EIIP/EDI format - www.epa.gov/ttn/chief/eiip/techrep.htm#dmproc

§51.045 Where should my State report the data?

(a) Your State may continue entering your data to the EPA AIRS system using the AFS format for point sources.

(b) If your State uses either the EIIP/NET Input format the EIIP/EDI format, you State *submits* or *reports* data by either providing it to another party directly or notifying the other party that it is available in the specified format and at a specific electronic location (FTP site). For an individual plant your State may continue to report data directly to us under 40 CFR part 96 or Subpart H of 40 CFR Part 75.

(c) For the latest information on data reporting procedures, call our Info Chief help desk at (919)541-5285 or email to info.chief@epamail.epa.gov.

Appendix A to Subpart A of Part 51 - Tables and Glossary

Table 1. Summary of Requirements For Reporting Emission Inventories

Provision	Point Source Inventory		NO_x SIP Call Inventory	3-Year Inventory
	Type A Sources[1]	**Type B Sources**[1]		
CAA citation	§ 110(a)(2)(F)	§110(a)(2)(F), § 112	§110(a)(2)	§ 172(c)(3), § 182(a)(3)(A), and § 187(a)(5), § 112
Frequency of reporting	Annual	Every 3 years	Annual	Every 3 years
Estimating period	Annual	Annual and Daily[4]	Five month season	Annual and Daily[4]
Areas to which provision applies	Entire U.S. (Statewide)	Entire U.S. (Statewide)	NO_x SIP Call areas (Statewide)	Entire U.S. (Statewide)
Pollutants and source size thresholds	Pollutant / tpy[2] $SO_x \geq$ 2,500 $NO_x \geq$ 2,500 VOC≥ 250 $PM_{10} \geq$ 250 $PM_{2.5} \geq$ 250 CO ≥ 2,500	Pollutant / tpy $SO_x \geq$ 100 $NO_x \geq$ 100 VOC≥ 100 $PM_{10} \geq$ 100 $PM_{2.5} \geq$ 100 CO ≥ 1,000 Pb ≥ 5 [3]HAPs≥ 10	Pollutant / tpy $NO_x \geq$ 100 Lesser thresholds to be defined by state. All sources not inventoried as point sources shall be inventoried as area or mobile sources and reported only if they are to be controlled to meet emission budget.	Pollutant Ozone NA areas[5]: tpy VOC≥ 10 $NO_x \geq$ 100 CO≥ 100 CO NA areas[5]: CO≥ 100 PM-10 NA areas[5]: $PM_{10} \geq$ 70 (serious) $PM_{10} \geq$ 100 (moderate) $PM_{2.5}$ NA areas[5]: $PM_{2.5} \geq$ 100 Ammonia may be inventoried as a point or area source Inventory includes: • Point sources ≥ specified tpy. • Area sources < specified tpy. • Onroad mobile sources. • Nonroad mobile sources. • Biogenic sources.

[1] Previously, the Type A sources and the Type B sources together constituted the annual inventory (40 CFR Part 51.321-323); all such sources were required to report annually.
[2] tpy = tons per year.
[3] A HAPs point source is defined as a stationary source emitting 10 tpy or more of any individual HAP, or 25 tpy or more of any combination of HAPs. Facilities emitting less than these threshold amounts will be inventoried and reported as area sources unless already inventoried as a point source.
[4] Ozone daily emissions = summer work weekday; CO daily emissions = winter work weekday; PM daily emissions = to be defined in consultation with Regional office.
[5] Thresholds apply to nonattainment areas only; remainder of state uses Type B Source thresholds to distinguish between point and area sources.

Table 2a. Data Elements that States Must Report for Point Sources

Data Elements	Annual		Every 3 Years		
	Entire US	NO_x SIP Call	Entire US	NAA	NO_x SIP Call
Emission levels	VOC≥250 NO_x≥2500 SO_x≥2500 PM_{10}≥250 $PM_{2.5}$≥250 CO ≥2500	NO_x≥100 Lesser thresholds to be defined by state	VOC≥100 NO_x≥100 SO_x≥100 PM_{10}≥100 $PM_{2.5}$≥100 CO ≥1000 Pb ≥5 [3]HAPS≥10 NH_3	[1]VOC≥10 [1]NO_x≥100 [1]PM_{10}≥70 [1]CO ≥100	NO_x≥100
Inventory year	✔		✔	✔	✔
Inventory start date	✔		✔	✔	✔
Inventory end date	✔		✔	✔	✔
Inventory type	✔		✔	✔	✔
State FIPS code	✔	✔	✔	✔	✔
County FIPS code	✔	✔	✔	✔	✔
Federal ID code (plant)	✔	✔	✔	✔	✔
Federal ID code (point)	✔	✔	✔	✔	✔
Federal ID code (process)	✔	✔	✔	✔	✔
Site name	✔	✔	✔	✔	✔
Physical address	✔	✔	✔	✔	✔
SCC	✔	✔	✔	✔	✔
Heat content (fuel)(annual)	✔	✔	✔	✔	✔
Ash content (fuel)(annual)	✔	✔	✔	✔	
Sulfur content (fuel)(annual)	✔	✔	✔	✔	
Heat content (fuel)(seasonal)		✔			✔
Source of fuel heat content		✔			✔
Pollutant code	✔	✔	✔	✔	✔
Activity/throughput (annual)	✔	✔	✔	✔	✔
Activity/throughput (daily)[2]	✔	✔	✔	✔	
Activity/throughput (NO_x ozone season)		✔			✔
Source of activity/throughput (NO_x ozone season)		✔			✔
Work weekday emissions	✔	✔	✔	✔	✔

Data Elements	Annual		Every 3 Years		
	Entire US	NO_x SIP Call	Entire US	NAA	NO_x SIP Call
Annual emissions	✔	✔	✔	✔	
NO_x Ozone season emissions		✔			✔
Area classification		✔			✔
Emission factor	✔	✔	✔	✔	✔
Source of emission factor		✔			✔
Winter throughput(%)	✔		✔	✔	
Spring throughput(%)	✔		✔	✔	✔
Summer throughput(%)	✔		✔	✔	✔
Fall throughput(%)	✔		✔	✔	✔
Hr/day in operation	✔	✔	✔	✔	✔
Start time (hour)	✔	✔	✔	✔	✔
Day/wk in operation	✔	✔	✔	✔	✔
Wk/yr in operation	✔	✔	✔	✔	✔
Federal ID code (stack number)			✔	✔	✔
X stack coordinate (latitude)			✔	✔	✔
Y stack coordinate (longitude)			✔	✔	✔
Stack Height			✔	✔	✔
Stack diameter			✔	✔	✔
Exit gas temperature			✔	✔	✔
Exit gas velocity			✔	✔	✔
Exit gas flow rate			✔	✔	✔
SIC/NAICS			✔	✔	✔
Design capacity			✔	✔	✔
Maximum nameplate capacity			✔	✔	✔
Primary control eff(%)			✔	✔	✔
Secondary ctl eff (%)			✔	✔	✔
Control device type			✔	✔	✔
Rule effectiveness (%)			✔	✔	

[1] Both daily and annual emission estimates required
[2] May be derived from annual or seasonal throughput.
[3] Any stationary facility emitting 10 tpy or more of any individual HAP, or 25 tpy or more of any combination of HAPs.

Table 2b. Data Elements that States Must Report for Area and Nonroad Sources

Data Elements	Annual		Every 3 Years		
	Entire US	NO_x SIP Call	Entire US	NAA	NO_x SIP Call
Emissions levels			[1]VOC <10 [1]NO_x <100 [1]PM_{10} <100 [1]$PM_{2.5}$ <100 [1]CO <100 HAPS <10 NH_3		[1]NO_x <100
Inventory year			✔		✔
Inventory start date			✔		✔
Inventory end date			✔		✔
Inventory type			✔		✔
State FIPS code			✔		✔
County FIPS code			✔		✔
SCC			✔		✔
Emission factor			✔		✔
Source of emission factor					✔
Activity/throughput level (annual)			✔		✔
Activity/throughput (daily)[2]					
Activity/throughput (NO_x ozone season)					✔
Source of activity/throughput (NO_x ozone season)					✔
Total capture/control efficiency (%)			✔		✔
Rule effectiveness (%)			✔		
Rule penetration (%)			✔		
Pollutant code			✔		✔
Summer/winter work weekday emissions			✔		
Annual emissions			✔		
NO_x Ozone season emissions					✔

Data Elements	Annual		Every 3 Years		
	Entire US	NO_x SIP Call	Entire US	NAA	NO_x SIP Call
Source of emissions data					✔
Winter throughput (%)			✔		
Spring throughput (%)			✔		✔
Summer throughput (%)			✔		✔
Fall throughput (%)			✔		✔
Hr/day in operations			✔		✔
Day/wk in operations			✔		✔
Wk/yr in operations			✔		✔

[1] Both daily and annual emission estimates required

[2] May be derived from annual or seasonal throughput.

Table 2c. Data Elements that States Must Report for Onroad Mobile Sources

Data Elements	Annual		Every 3 Years		
	Entire US	NO_x SIP Call	Entire US	NAA	NO_x SIP Call
Inventory year			✔		✔
Inventory start date			✔		✔
Inventory end date			✔		✔
Inventory type			✔		✔
State FIPS code			✔		✔
County FIPS code			✔		✔
SCC			✔		✔
Emission factor[1]			✔		✔
Activity (VMT by Roadway Class)			✔		✔
Source of activity data					✔
Pollutant code			✔		✔
Summer/winter work weekday emissions			✔		✔
Annual emissions			✔		
NO_x ozone season emissions					✔
Source of emissions data					✔

[1] Mobile model input files should be submitted

Table 2d. Data Elements that States Must Report for Biogenic Sources

Data Elements	Annual		Every 3 Years		
	Entire US	NO_x SIP Call	Entire US	NAA	NO_x SIP Call
Inventory year			✔		
Inventory start date			✔		
Inventory end date			✔		
Inventory type			✔		
State FIPS code			✔		
County FIPS code			✔		
SCC			✔		
Pollutant code			✔		
Summer/winter work weekday emissions			✔		
Annual emissions			✔		

Table 3. Hazardous Air Pollutants (HAPs)

Chemical Abstracts Service Number	Pollutant
75-07-0	Acetaldehyde
60-35-5	Acetamide
75-05-8	Acetonitrile
98-86-2	Acetophenone
53-96-3	2-Acetylaminofluorene
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
107-05-1	Allyl chloride
92-67-1	4-Aminobiphenyl
62-53-3	Aniline
90-04-0	o-Anisidine
1332-21-4	Asbestos
71-43-2	Benzene (including benzene from gasoline)
92-87-5	Benzidine
98-07-7	Benzotrichloride
100-44-7	Benzyl chloride
92-52-4	Biphenyl
117-81-7	Bis(2ethylhexyl) phthalate (DEHP)
542-88-1	Bis(chloromethyl) ether
75-25-2	Bromoform
106-99-0	1,3-Butadiene
156-62-7	Calcium cyanamide
105-60-2	Caprolactam (Removed 6/18/96, 61FR30816)
133-06-2	Captan
63-25-2	Carbaryl
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
463-58-1	Carbonyl sulfide
120-80-9	Catechol
133-90-4	Chloramben
57-74-9	Chlordane
7782-50-5	Chlorine
79-11-8	Chloroacetic acid
532-27-4	2-Chloroacetophenone
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate
67-66-3	Chloroform
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene
1319-77-3	Cresol/Cresylic acid (mixed isomers)
95-48-7	o-Cresol
108-39-4	m-Cresol
106-44-5	p-Cresol
98-82-8	Cumene

Chemical Abstracts Service Number	Pollutant
N/A	2,4-D (2,4-Dichloro-phenoxyacetic Acid) (including salts and esters)
72-55-9	DDE (1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)
334-88-3	Diazomethane
132-64-9	Dibenzofuran
96-12-8	1,2-Dibromo-3-chloropropane
84-74-2	Dibutyl phthalate
106-46-7	1,4-Dichlorobenzene
91-94-1	3,3'-Dichlorobenzidine
111-44-4	Dichloroethyl ether (Bis[2-chloroethyl]ether)
542-75-6	1,3-Dichloropropene
62-73-7	Dichlorvos
111-42-2	Diethanolamine
64-67-5	Diethyl sulfate
119-90-4	3,3'-Dimethoxybenzidine
60-11-7	4-Dimethylaminoazo benzene
121-69-7	N,N-Dimethylaniline
119-93-7	3,3'-Dimethylbenzidine
79-44-7	Dimethylcarbamoyl chloride
68-12-2	N,N-Dimethylformamide
57-14-7	1,1-Dimethylhydrazine
131-11-3	Dimethyl phthalate
77-78-1	Dimethyl sulfate
N/A	4,6-Dinitro-o-cresol (including salts)
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)
122-66-7	1,2-Diphenylhydrazine
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
106-88-7	1,2-Epoxybutane
140-88-5	Ethyl acrylate
100-41-4	Ethylbenzene
51-79-6	Ethyl carbamate (Urethane)
75-00-3	Ethyl chloride (Chloroethane)
106-93-4	Ethylene dibromide (Dibromoethane)
107-06-2	Ethylene dichloride (1,2-Dichloroethane)
107-21-1	Ethylene glycol

151-56-4	Ethyleneimine (Aziridine)
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)
50-00-0	Formaldehyde
76-44-8	Heptachlor
118-74-1	Hexachlorobenzene
87-68-3	Hexachlorobutadiene
N/A	1,2,3,4,5,6-Hexachlorocyclyhexane (all stereo isomers, including lindane)
77-47-4	Hexachlorocyclo-pentadiene
67-72-1	Hexachloroethane
822-06-0	Hexamethylene diisocyanate
680-31-9	Hexamethyl-phosphoramide
110-54-3	Hexane
302-01-2	Hydrazine
7647-01-0	Hydrochloric acid (Hydrogen chloride [gas only])
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)
123-31-9	Hydroquinone
78-59-1	Isophorone
108-31-6	Maleic anhydride
67-56-1	Methanol
72-43-5	Methoxychlor
74-83-9	Methyl bromide (Bromomethane)
74-87-3	Methyl chloride (Chloromethane)
71-55-6	Methyl chloroform (1,1,1-Trichloroe-thane)
78-93-3	Methyl ethyl ketone (2-Butanone)
60-34-4	Methylhydrazine
74-88-4	Methyl iodide (Iodomethane)
108-10-1	Methyl isobutyl ketone(Hexone)
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
1634-04-4	Methyl tert-butyl ether
101-14-4	4,4'-Methylenebis(2-chloroaniline)
75-09-2	Methylene chloride (Dichloromethane)
101-68-8	4,4'-Methylenedi-phenyl diisocyanate (MDI)
101-77-9	4,4'-Methylene-dianiline
91-20-3	Naphthalene
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl
100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
684-93-5	N-Nitroso-N-methylurea
62-75-9	N-Nitrosodime-thylamine
59-89-2	N-Nitrosomorpholine
56-38-2	Parathion
82-68-8	Pentachloroni-trobenzene (Quintobenzene)
87-86-5	Pentachlorophenol
108-95-2	Phenol
106-50-3	p-Phenylenediamine
75-44-5	Phosgene
7803-51-2	Phosphine
N/A	Phosphorus Compounds
85-44-9	Phthalic anhydride
1336-36-3	Polychlorinated biphenyls (Aroclors)
1120-71-4	1,3-Propane sultone
57-57-8	beta-Propiolactone
123-38-6	Propionaldehyde
114-26-1	Propoxur (Baygon)
78-87-5	Propylene dichloride (1,2-Dichloropropane)
75-56-9	Propylene oxide
75-55-8	1,2-Propylenimine (2-Methylaziridine)
91-22-5	Quinoline
106-51-4	Quinone (p-Benzoquinone)
100-42-5	Styrene
96-09-3	Styrene oxide
1746-01-6	2,3,7,8-Tetrachloro-dibenzo-p-dioxin
79-34-5	1,1,2,2-Tetrachloroe-thane
127-18-4	Tetrachloroethylene (Perchloroethylene)
7550-45-0	Titanium tetrachloride
108-88-3	Toluene
95-80-7	Toluene-2,4-diamine
584-84-9	2,4-Toluene diisocyanate
95-53-4	o-Toluidine
8001-35-2	Toxaphene (chlorinated camphene)
120-82-1	1,2,4-Trichloro-benzene
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
121-44-8	Triethylamine
1582-09-8	Trifluralin
540-84-1	2,2,4-Trimethyl-pentane
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)
1330-20-7	Xylenes (mixed isomers)
95-47-6	o-Xylene
108-38-3	m-Xylene

106-42-3	p-Xylene
	Antimony Compounds
	Arsenic Compounds (inorganic including arsine)
	Beryllium Compounds
	Cadmium Compounds
	Chromium Compounds
	Cobalt Compounds
	Coke Oven Emissions
	Cyanide Compounds[1]
	Glycol ethers[2]
	Lead Compounds
	Manganese Compounds
	Mercury Compounds
	Fine mineral fibers[3]
	Nickel Compounds
	Polycyclic Organic Matter[4]
	Radionuclides (including radon)[5]
	Selenium Compounds

NOTE: Unless otherwise specified, all listings above which contain the word compounds or glycol ethers include any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

1. X'CN where X = H' or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)2.

2. (Under review) Glycol Ether draft ptions for defining:

Possible Correction to CAA 112(b)(1) footnote that would be consistent with OPPTS modified definition.

New OPPTS definition as published is:

R - (OCH2CH2)n - OR' where:
n = 1,2, or 3
R = alkyl C7 or less
or R = phenyl or alkyl substituted phenyl
R' = H or alkyl C7 or less
or OR'= carboxylic acid ester, sulfate, phosphate, nitrate or sulfonate

CAA's definition of Glycol ether exactly as in the statute (errors included):

"Includes mono- and di ethers of ethylene glycol, diethylene glycol, and triethylene glycol
R - (OCH2CH2)n-OR' where n = 1,2, or 3
R = alkyl or aryl groups
R' = R,H or groups which, when removed, yield glycol ethers with the structure R-(OCH2CH)n-OH. Polymers are excluded from the glycol category.

CAA's definition of Glycol ether with technical correction. (a 2 was left out of the last formula)

"Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n -OR' where

n = 1, 2, or 3
R = alkyl or aryl groups
R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH2CH2)n-OH. Polymers are excluded from the glycol category.

3- (Under Review)

4- (Under Review)

5- A type of atom which spontaneously undergoes radioactive decay.

Table 4. Priority Hazardous Air Pollutants (HAPS)

HAP	CAS #
Acetaldehyde	75070
Acrolein	107028
Acrylamide	79061
Acrylonitrile	107131
Arsenic & compounds	
Benzene	71432
Benzyl chloride	100447
Beryllium & compounds	
bis(2-ethylhexyl)phthalate	117817
1,3-Butadiene	106990
Cadmium & compounds	
Carbon tetrachloride	56235
Chlorine	7782505
Chloroform	67663
Chromium & compounds	
Coke oven emissions	
1,2-Dibromoethane	
1,2-Dichloroethane	107062
1,4-Dichlorobenzene	106467
1,2-Dichloropropane	78875
1,3-Dichloropropene	542756
1,4-Dioxane	
Ethyl acrylate	
Ethylene dichloride	107062
Ethylene oxide	75218
Ethylidene dichloride	75343
Formaldehyde	50000
Glycol ethers	
Hexachlorobenzene	118741
Hexachlorocyclopentadiene	77474
Hydrazine	302012
Hydrochloric acid	7647010
Lead & compounds	
Maleic anhydride	108316
Manganese & compounds	
Mercury & compounds	
Methyl bromide	
Methyl chloride	74873
Methylene chloride	75902
MDI(methylene diphenyl	106688

diisocyanate)	101688
Nickel & compounds	
2-Nitropropane	
Phosgene	75445
POM (PAHs)**	
Quinoline	91225
2,3,7,8-TCDF/2,3,7,8-TCDD*	
Tetrachloroethylene	127184
Trichloroethylene	79016
Toluene	108883
Vinyl chloride	75014

* Inventory as TEQ.
** Inventory as sum of 16 PAH and speciate. 16 PAH compounds include: Acenaphthene, Naphthalene, Benzo(b)fluoranthene***, Acenaphthylene, Phenanthrene, Benzo(k)fluoranthene***, Anthracene, Pyrene, Chrysene***, Benzo(ghi)perylene, Benz(a)anthracene***, Dibenz(a,h)anthracene***, Fluoranthene, Benzo(a)pyrene*** Indeno(1,2,3-cd)pyrene***, Fluorene
*** These 7 PAHs are carcinogenic and are usually reported as the sum of 7 PAH.

GLOSSARY

Activity rate/throughput (annual) - A measurable factor or parameter that relates directly or indirectly to the emissions of an air pollution source. Depending on the type of source category, activity information may refer to the amount of fuel combusted, raw material processed, product manufactured, or material handled or processed. It may also refer to population, employment, number of units, or miles traveled. Activity information is typically the value that is multiplied against an emission factor to generate an emissions estimate.

Activity rate/throughput (daily) - The beginning and ending dates and times that define the emissions period used to estimate the daily activity rate/throughput.

Area classification - The Clean Air Act classification of the nonattainment area containing the reporting source (transitional, marginal, moderate, serious, severe, extreme).

Area sources - Area sources collectively represent individual sources that have not been inventoried as specific point, mobile, or biogenic sources. These individual sources treated collectively as area sources are typically too small, numerous, or difficult to inventory using the methods for the other classes of sources.

Annual emissions - Actual emissions for a plant, point, or process - measured or calculated that represent a calender year.

Ash content - Inert residual portion of a fuel.

Biogenic sources - Biogenic emissions are all pollutants emitted from non-anthropogenic sources. Example sources include trees and vegetation, oil and gas seeps, and microbial activity.

Control device type - The name of the type of control device (e.g., wet scrubber, flaring, or process change).

County/parish/reservation (FIPS) - Federal Information Placement System (FIPS). FIPS is the system of unique numeric codes the government developed to identify states, counties, towns, and townships for the entire United States, Puerto Rico, and Guam.

Day/wk in operations - Days per week that the emitting process operates.

Design capacity - A measure of the size of a boiler, based on the reported maximum continuous steam flow. Capacity is calculated in units of MMBtu/hr.

Emission factor - Ratio relating emissions of a specific pollutant to an activity or material throughput level.

Exit gas flow rate - Numeric value of stack gas's flow rate.

Exit gas temperature - Numeric value of an exit gas stream's temperature.

Exit gas velocity - Numeric value of an exit gas stream's velocity.

Fall throughput(%) - Part of the throughput for the three Fall months (September, October, November). This expresses part of the of annual activity information based on four seasons - typically spring, summer, fall, and winter. It can be a percentage of the annual activity (e.g., production in summer is 40% of the year's production) or units of the activity (e.g., out of 600 units produced, spring =150 units, summer = 250 units, fall = 150 units, and winter = 50 units).

Federal ID code (plant) - Unique codes for a plant or facility, containing one or more pollutant-emitting sources.

Federal ID code (point) - Unique codes for the point of generation of emissions, typically a physical piece of equipment.

Federal ID code (process) - Unique codes for the process generating the emissions, typically a description of a process.

Federal ID code (stack number) - Unique codes for the point where emissions from one or more processes release into the atmosphere.

Heat content - The amount of thermal heat energy in a solid, liquid, or gaseous fuel. Fuel heat content is typically expressed in units of Btu/lb of fuel, Btu/gal of fuel, joules/kg of fuel, etc.

Hr/day in operations - Hours per day that the emitting process operates.

Inventory end date - Last day of the inventory period.

Inventory start date - First day of the inventory period.

Inventory type - Type of inventory represented by data (i.e., point, 3-Year cycle, daily).

Inventory year - The calendar year for which you calculated emissions estimates.

Maximum design rate - Maximum rate of fuel use based on the equipment's or process' physical size or operational capabilities.

Maximum nameplate capacity - A measure of a generator's size that the manufacturer puts on the unit's nameplate. The data element is reported in MW or KW.

Mobile source - A motor vehicle, nonroad engine or nonroad vehicle.

- A "motor vehicle" is any self-propelled vehicle used to carry people or property on a street or highway.
- A "nonroad engine" is an internal combustion engine (including fuel system) that is not used in a motor vehicle or vehicle only used for competition, or that is not affected by sections 111 or 202 of the CAA.
- A "nonroad vehicle" is a vehicle that is run by a nonroad engine and that is not a motor vehicle or a vehicle only used for competition.

NO_x ozone season emissions - Actual ozone season emissions for a plant, point, or process, either measured or calculated. Ozone season emissions for NO_x SIP Call are the emissions between May 1 and September 30. (Note that 40 CFR Part 58 contains a different definition for ozone season monitoring.)

Physical address - Street address of a facility.

Point source - Point sources are large, stationary (non-mobile), identifiable sources of emissions that release pollutants into the atmosphere. State or local air regulatory agencies define a plant as a point source whenever it annually emits more than a specified amount of a given pollutant; these "cutoff" levels definitions vary among state and local agencies. A stationary source which emits less than a "cutoff" is an area source.

Pollutant code - A unique code for each reported pollutant assigned in the EIIP Data Model. The model uses character names for criteria pollutants and Chemical Abstracts Service (CAS) numbers for all other pollutants. You may be using SAROAD codes for pollutants, but you should be able to map them to the pollutant codes in the EIIP Data Model.

Rule effectiveness (RE) - How well a regulatory program achieves all possible emission reductions. This rating reflects the assumption that controls typically aren't 100 percent effective because of equipment downtime, upsets, decreases in control efficiencies, and other deficiencies in emission estimates. RE adjusts the control efficiency.

Rule penetration - The percentage of an area source category covered by an applicable regulation.

SCC - Source category code. A process-level code that describes the equipment or operation which is emitting pollutants.

Seasonal activity rate/throughput - A measurable factor or parameter that relates directly or indirectly to the ozone season emissions of an air pollution source. Depending on the type of source category, activity information may refer to the amount of fuel combusted, raw material processed, product manufactured, or material handled or processed. It may also refer to population, employment, number of units, or miles traveled. Activity information is typically the value that is multiplied against an emission factor to generate an emissions estimate.

Seasonal fuel heat content - The amount of thermal heat energy in a solid, liquid, or gaseous fuel used during the ozone season. Fuel heat content is typically expressed in units of Btu/lb of fuel, Btu/gal of fuel, joules/kg of fuel, etc.

Secondary control eff (%) - The emission reduction efficiency of a secondary control device. Control efficiency is usually expressed as a percentage or in tenths.

Source of activity rate/throughput data - Source of data from which you got the activity rate/throughput.

Source of emission factor - Source of data from which you got the emission factor.

Source of fuel heat content data - Source of data from which you got the fuel heat content.

SIC/NAICS - Standard Industrial Classification code. NAICS (North American Industry Classification System) codes will replace SIC codes. U.S. Department of Commerce's code for businesses by products or services.

Site name - The name of the facility.

Spring throughput(%) - Part of throughput or activity for the three spring months (March, April, May). See the definition of Fall Throughput.

Stack diameter - A stack's inner physical diameter.

Stack height - A stack's physical height above the surrounding terrain.

Start time (hour) - Start time (if available) that you used to calculate of emissions estimates.

State/providence/territory (FIPS) - Federal Information Placement System (FIPS). FIPS is the system of unique numeric codes the government developed to identify states, counties, towns, and townships for the entire United States, Puerto Rico, and Guam.

Sulfur content - Sulfur content of a fuel, usually expressed as a percentage.

Summer throughput(%) - Part of throughput or activity for the three summer months (June, July, August). See the definition of Fall Throughput.

Summer/winter work weekday emissions - Average day's emissions for a typical day. Ozone daily emissions = summer work weekday; CO and PM daily emissions = winter work weekday.

Total capture/control efficiency - The emission reduction efficiency of a primary control device, which shows the amount controls or material changes reduce a particular pollutant from a process' emissions. Control efficiency is usually expressed as a percentage or in tenths.

Type A source - Very large point sources defined by emission thresholds listed in Table 1.

Type B source - Smaller point sources defined by emission thresholds listed in Table 1.

VMT by Roadway Class - VMT expresses vehicle activity and is used with emission factors. The emission factors are usually expressed in terms of grams per mile of travel. Because VMT doesn't correlate directly to emissions that occur while the vehicle isn't moving, these non-moving emissions are incorporated into the emission factors in EPA's Mobile Model.

Winter throughput (%) - Part of throughput or activity for the three winter months (December, January, February). See the definition of Fall Throughput.

Wk/yr in operation - Weeks per year that the emitting process operates.

Work Weekday - Any day of the week except Saturday or Sunday.

X stack coordinate (latitude) - An object's east-west geographical coordinate.

Y stack coordinate (longitude) - An object's north-south geographical coordinate.

Subpart Q - [Amended]

3. Section 51.322 is revised to read as follows:

§51.322 Sources subject to emissions reporting.

The requirements for reporting emissions data under the plan are in **§51**.001 of part 51 of this chapter.

4. Section 51.323 is revised to read as follows:

§51.323 Reportable emissions data and information.

The requirements for reportable emissions data and information under the plan are in subpart A of part 51 of this chapter.

TECHNICAL REPORT DATA

(Please read Instructions on reverse before completing)

1 REPORT NO EPA-454/R-99-006	2	3 RECIPIENT'S ACCESSION NO
4 TITLE AND SUBTITLE Emission Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations		5 REPORT DATE April 1999 6 PERFORMING ORGANIZATION CODE
7 AUTHOR(S) Emission Factor and Inventory Group		8. PERFORMING ORGANIZATION REPORT NO
9 PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Emissions Monitoring and Analysis Division Emission Factor and Inventory Group Research Triangle Park, NC 27711		10 PROGRAM ELEMENT NO 11 CONTRACT/GRANT NO 68-D7-0067, Work Assignment 2-07 E. H. Pechan
12 SPONSORING AGENCY NAME AND ADDRESS Director Office of Air Quality Planning and Standards Office of Air and Radiation U.S. Environmental Protection Agency Research Triangle Park, NC 27711		13 TYPE OF REPORT AND PERIOD COVERED Guidance Document June 1998 - April 1999 14 SPONSORING AGENCY CODE EPA/200/04

15 SUPPLEMENTARY NOTES
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16 ABSTRACT This document provides guidance to State and local agencies for the development of emission inventories. This guidance is specifically for emission inventories developed for ozone and $PM_{2.5}$ State Implementation Plans (SIPs). Topics covered by this guidance include: types of inventories, specification of Base Year, inventory approval, pollutants to be inventoried, sources to be inventoried, geographic coverage, temporal basis of the inventory, data reporting requirements, and quality assurance and inventory documentation.

17 KEY WORDS AND DOCUMENT ANALYSIS

a DESCRIPTORS	b IDENTIFIERS/OPEN ENDED TERMS	c COSATI Field/Group
emission inventory, ozone, particulate matter, regional haze, guidance		

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