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**EMISSION INVENTORY
REQUIREMENTS FOR OZONE
STATE IMPLEMENTATION PLANS**

By

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PREFACE

This document describes the emission inventory requirements related to the preparation and submission of ozone State Implementation Plans (SIPs) for those areas required to revise their plan as a result of provisions contained in the 1990 Clean Air Act Amendments (CAAA). This document represents a revision and an update to the document entitled Emission Inventory Requirements for Post-1987 Ozone State Implementation Plans (EPA-450/4-88-019), issued in December 1988 in response to the proposed Post-1987 Ozone/CO Policy.

As with the previous requirements document, the primary focus of this document and its requirements discussion is base year emission inventories. Although they are not due as soon as the base year, other ozone SIP inventories required or necessitated by the CAAA, including periodic, reasonable further progress (RFP) projection, and modeling inventories, are also identified and requirements for these inventories are briefly discussed. More detailed guidance on these inventories will be issued by the Environmental Protection Agency (EPA) in subsequent guidance documents (see Section 6.0).

Guidance herein provides details of the 1990 CAAA Ozone SIP emission inventory requirements beyond those discussed in Guidance for Initiating Ozone/CO SIP Emission Inventories Pursuant to the 1990 Clean Air Act Amendments, February 1991. While discussions in this document are consistent with the February 1991 guidance, one addition concerns the schedule for submittal of Inventory Preparation Plans, which describe how the inventories will be prepared and reported. In the February guidance document, a date was listed (October 1, 1991) by which the plans must be agreed upon by EPA and in final form. However, no initial submittal date was mentioned. Guidance herein includes the October 1 date for a final Inventory Preparation Plan and adds a requirement for submittal of the initial Inventory Preparation Plan by July 31, 1991 (see Section 3.1).

The most significant changes incorporated into this guidance from that provided to support the Post-1987 Policy are summarized below.

- As mentioned above, inventory preparation plans (IPPs) shall be developed for each nonattainment area that describe how and when the required emission inventories for the area will be prepared and submitted to EPA. IPPs were not required under the proposed Post-1987 Ozone/CO policy guidance. The plan shall present a blueprint for the methods and data sources a State plans to use to compile and document its inventories. The IPP shall also contain a specification of the intended quality assurance program for each inventory compilation and a schedule for preparation and submittal of each inventory. Each IPP must be submitted to EPA no later than July 31, 1991, for review and approval. IPPs must be agreed upon with EPA and in final form by October 1, 1991. EPA will not accept for review any submitted ozone SIP inventory for which there is not an approved IPP.
- Under the CAAA, States are required to develop and include in their base year inventories estimates for biogenic emissions. There were no biogenic emission requirements in the proposed Post-1987 Policy. EPA will provide States with a personal computer (PC) based model for calculating biogenic releases. The model is known as PC-BEIS (Biogenic Emissions Inventory System). States desiring to use an approach other than PC-BEIS must describe the alternative approach in its IPP and have the approach approved by EPA.
- The MOBILE4 model, required under the proposed Post-1987 Policy guidance for estimating on-road (highway) mobile source emission factors, is being revised and updated by EPA. The revised model, MOBILE4.1 (to be issued in May 1991), must be used to estimate on-road mobile emissions for CAAA SIP inventories. The majority of the changes to the model are internal such that there are essentially no added requirements placed on the user, with the possible exception of generating emissions on an hourly basis. Specific guidance on the updated model will be issued in May 1991.
- Computerized data management and reporting requirements for CAAA SIP inventories have been significantly expanded beyond those found in the guidance accompanying the previous policy. All ozone SIP emission inventory data must be provided to EPA in an AIRS (Aerometric Information Retrieval System) compatible format or directly into AIRS. The data elements States must input into AIRS for SIP inventories are discussed in the document. EPA will be issuing additional guidance in 1991 on the use of AIRS and its subsystems.

- Written inventory documentation requirements have been clarified and expanded for the purpose of providing EPA with a better basis to perform inventory quality review assessments. A specific outline has been provided to States to indicate the content and organization of the information that States shall provide to EPA.
- EPA's Joint Emission Inventory Oversight Group (JEIOG) is actively engaged in research to develop new methodologies for estimating volatile organic compound (VOC), nitrogen oxides (NO_x), and carbon monoxide (CO) emissions from a variety of source categories. Interim research results which have been provided and which are recommended for States' use in ozone SIP inventory development are discussed. The source categories principally affected are area solvent emission sources and non-road mobile sources such as airplanes and trains.
- States with SIP emission inventories prepared under the proposed Post-1987 Policy that have 1987, 1988, or 1989 base years and that have been determined by the EPA Regional Offices to be complete, comprehensive, and accurate will be allowed to update certain portions of these inventories to a 1990 base year instead of having to totally redevelop the inventories with 1990 data. Criteria for determining which inventories can be updated and which can not have been developed by EPA and will be applied on an inventory-specific basis by the EPA Regional Offices. Some specifications for updating are provided in this document.
- The CAAA require that the base year inventory be adjusted to remove emissions that are not to be considered in determining if minimum required emission reduction targets have been met. Adjusted base year inventories were not required under the proposed Post-1987 Ozone/CO Policy. The provisions States shall use to make the necessary adjustments are discussed in the document.
- Ozone SIP revisions under the CAAA must include certain inventories that go beyond requirements in the proposed Post-1987 Policy. States shall prepare periodic, RFP projection, and modeling inventories that are associated with tracking required emission reductions and demonstrating attainment. Overviews of these inventories and their requirements are presented and schedules are provided to indicate when detailed development guidance will be forthcoming.
- Source-specific process and emissions data must be reported for all VOC sources of 10 tons/yr or greater. Previously, sources that had VOC emissions in the range of 10 to 25 tons/yr could be inventoried by extrapolating the results of a limited survey of sources in the category to the entire category. Such extrapolations are no longer allowed. Each

individual VOC source down to 10 tons/yr must be inventoried separately.

- States shall provide EPA with statewide point source inventories for input to regional scale air quality modeling the Agency is planning to conduct. All sources that emit 100 tons/yr or more of VOC, NO_x, or CO must be included in the inventory. EPA is conducting the modeling for the purpose of providing States with data to support ozone attainment control strategy development. The nature of the data requirements for the point source inventories is described in the document. Area and mobile source emissions for attainment areas in the regional modeling domain will be estimated by EPA.

TABLE OF CONTENTS

	<u>Page</u>
DISCLAIMER	ii
PREFACE	iii
LIST OF TABLES	ix
1.0 OVERVIEW OF DOCUMENT	1
1.1 Purpose	1
1.2 Summary of Document Contents	1
2.0 INTRODUCTION TO INVENTORY REQUIREMENTS	3
2.1 Nonattainment Classifications	3
2.2 Summary of Inventory Types	4
3.0 EMISSION INVENTORY REQUIREMENTS	6
3.1 Inventory Preparation Plans	6
3.2 Base Year Inventories	10
3.2.1 AIRS Compatible Reporting	13
3.2.2 Geographic Area to be Inventoried	14
3.2.3 Major Sources in the 25-Mile Boundary	15
3.2.4 Pollutants to be Inventoried	16
3.2.5 Applicable Source Categories	17
3.2.6 Updated Mobile Emissions Model (MOBILE4.1)	18
3.2.7 Updating from 1987/1988/1989 to 1990	18
3.2.8 Adjustments to Base Year Inventory	22
3.3 Temporal Basis of Emissions	23
3.3.1 Peak Ozone Season	23
3.3.2 Typical Operating Day Emissions	24
3.4 Temperature	25
3.5 Rule Effectiveness (RE) and Penetration	25
3.6 Point Sources	28
3.6.1 Offshore Point Sources	29
3.6.2 Statewide Point Source Emission Inventories for Regional Modeling	30
3.7 Area Sources	31
3.8 Mobile Sources	33
3.9 Biogenic Sources	34

TABLE OF CONTENTS

	<u>Page</u>
3.10	Periodic Inventories 35
3.11	Reasonable Further Progress (RFP) Projection Inventories 36
3.12	Modeling Inventories 38
3.13	Quality Assurance 39
3.14	References 40
4.0	COMPUTERIZED DATA MANAGEMENT AND REPORTING 42
4.1	Point Source Inventory 43
4.2	Point Source Data Elements 46
4.3	Area and Mobile Source Inventory 51
4.4	Area and Mobile Source Data Elements 53
4.5	Format for Area and Mobile Source Data 56
5.0	DOCUMENTATION OF THE INVENTORY 57
6.0	BIBLIOGRAPHY 65
	APPENDIX A - SUMMARY OF REQUIRED OZONE SIP INVENTORIES BY NONATTAINMENT AREA CLASSIFICATION A-1
	APPENDIX B - POINT, AREA, AND MOBILE SOURCE CATEGORIES NECESSARY FOR CONSIDERATION IN OZONE SIP INVENTORIES B-1

LIST OF TABLES

	<u>Page</u>
3-1	Topics to be Included in Inventory Preparation Plans 11
5-1	Outline for EPA Recommended Format/Contents for Ozone SIP Emission Inventory Reports 59

1.0 OVERVIEW OF DOCUMENT

1.1 Purpose

This document describes the emission inventory requirements that are contained, either explicitly or implicitly, in the 1990 Clean Air Act Amendments (CAAA) for those areas that are required to revise their State Implementation Plan (SIP) for attainment of the National Ambient Air Quality Standard (NAAQS) for ozone. The purposes of the document are to identify the types of inventories required, to describe the objective and ultimate use of the inventories, and to define specifications for what data elements must be contained in the inventories and how these elements must be developed.

1.2 Summary of Document Contents

As noted above, this section presents the purpose of the document and also provides an overview of the document organization and contents. The key points and format of the material presented in the remaining sections of this document are outlined below.

Section 2.0 presents an introduction to ozone SIP emission inventory requirements under the CAAA. It summarizes the different ozone nonattainment classifications and the general emission inventory requirements applicable to each classification.

The specific details of inventory development and compilation requirements are provided in Section 3.0. The majority of the discussion is focused on the base year inventory. Topics such as AIRS (Aerometric Information Retrieval System) compatible data reporting, geographic areas of inventory coverage, pollutants of interest, source categories of interest, inventory updating, adjustments to the base year inventory, and newly developed tools for inventory development are discussed. EPA requirements for a new feature, inventory preparation plans, are presented and fully explained.

In addition, requirements regarding the temporal allocation of emissions, the selection of ambient temperatures, the application of rule effectiveness, the calculation of biogenic emissions, and the definition of point, area, and mobile sources are discussed. Section 3.0 also addresses requirements relating to periodic, reasonable further progress (RFP) projection, and modeling inventories, and quality assurance provisions.

Section 4.0 discusses the computerized data management and reporting requirements that have been established by the Environmental Protection Agency (EPA) for SIP inventories compiled under the CAAA. These data management provisions apply to point, area, and mobile data. Section 4.0 details State requirements relating to the use of AIRS for reporting all SIP emissions data.

Section 5.0 specifies the manner in which States shall provide written documentation for their emission inventories. Requirements for both documentation format and content are discussed.

Section 6.0 provides bibliographic citations of currently existing EPA guidance materials for the development of ozone SIP inventories. The list of guidance is divided into four categories: ozone SIP inventory guidance/requirements, quality assurance/inventory review guidance, emission factors/models, and general inventory guidance.

2.0 INTRODUCTION TO INVENTORY REQUIREMENTS

This section of the document summarizes the different classifications, found in the CAAA of 1990, by which ozone nonattainment areas are delineated. The types of SIP inventories that are either explicitly or implicitly contained in the CAAA, according to nonattainment classification, are also identified in this section. These different inventory types and their requirements are specified in greater detail in Section 3.0.

2.1 Nonattainment Classifications

For ozone, the CAAA establish nonattainment area classifications and inventory requirements ranked according to the severity of the area's air pollution problem. For ozone, there are five nonattainment classifications known as marginal, moderate, serious, severe, and extreme [Section 181(a)]. The classifications are based on ranges of ozone design values for 1987 to 1989. Each of the 96 areas currently designated as being in nonattainment of the ozone National Ambient Air Quality Standard (NAAQS) has been placed into one of the classifications. The design value ranges and the required attainment date for each classification are given below [Section 181(a) (1),(2)].

Ozone Nonattainment Classifications

<u>Area Class</u>	<u>Design Value (ppm)</u>	<u>Attainment Date</u>
Marginal	0.121 up to 0.138	3 years after enactment (Nov. 15, 1993)
Moderate	0.138 up to 0.160	6 years after enactment (Nov. 15, 1996)
Serious	0.160 up to 0.180	9 years after enactment (Nov. 15, 1999)
Severe	0.180 up to 0.280	15 years after enactment (Nov. 15, 2005)*
Extreme	0.280 and above	20 years after enactment (Nov. 15, 2010)

*An exception is made to the schedules for attainment dates above for severe areas with design values between 0.190 up to 0.280 based on 1986-1988 air quality data [Section 181(a)(2)]. For these areas, the attainment date is 17 years after enactment or November 15, 2007.

Two 1-year extensions for reaching ozone attainment are available to States if: (1) all SIP requirements and commitments for an area were met and (2) no more than one exceedance of the ozone NAAQS occurred in the year preceding the extension year [Section 181 (a)(5) and Section 186 (a)(4)].

2.2 Summary of Inventory Types

The type and number of ozone SIP emission inventories that are required under the CAAA is generally a function of the nonattainment classification assigned to an area. For ozone nonattainment areas, there are essentially four basic kinds of inventories that States are required to develop under the CAAA. These four are a base year inventory, periodic inventories, RFP projection inventories, and modeling inventories. The **base year inventory**, required for all nonattainment classifications, is the primary inventory from which all of the other three inventories are derived. Thus, all inventories should be consistent with data provided in the base year inventory. The CAAA call for States to ensure that this inventory is comprehensive, accurate, and current for all actual emissions of volatile organic compounds (VOC), nitrogen oxides (NO_x), and carbon monoxide (CO) in the area. The inventory must include emissions of these pollutants from stationary point and area sources (from both anthropogenic and biogenic origin), on-road mobile sources, and non-road mobile sources.

The CAAA require moderate, serious, severe, and extreme ozone nonattainment areas to submit a plan within three years of the date of enactment to reduce VOC emissions by 15 percent within six years of enactment. A baseline level of emissions, from which the 15 percent reduction is calculated, is determined by adjusting the base year inventory to exclude certain emissions and emission reductions. The adjusted base year inventory equals the base year inventory minus biogenic emissions, emission reductions from Federal Motor Vehicle Control Program (FMVCP) regulations promulgated prior to January 1, 1990, emission reductions from RVP rules promulgated prior to CAAA enactment or required under CAAA Section 211(h), and any sources outside of the nonattainment area (such as major point sources in the 25-mile outer boundary - see Section 3.2.3). Only VOC and

NO_x emissions have to be addressed in adjusted inventories [Section 182 (b)(1)(B)]. More details are specified in Section 3.2.8 for making adjustments to inventories.

RFP projection inventories must be developed by States to demonstrate the strategies by which the CAAA-required RFP emission reductions will be achieved in an area. RFP projection inventories are required for moderate nonattainment areas and above. They are to be based on allowable emissions rather than actual emissions, where allowable emissions exist. The number of RFP projection inventories (for various years) required of an area increases with the severity of the nonattainment classification.

States are also required to develop periodic inventories for all classifications of ozone nonattainment areas [Section 182 (a)(3)(A)]. Periodic inventories are to be based on actual emissions and must address both VOC and NO_x emission sources. The primary function of the periodic inventories is to track emission reductions, particularly relating to RFP requirements.

Modeling inventories must be compiled for ozone nonattainment areas where photochemical grid modeling is required (i.e., serious areas and above and multi-state moderate areas) [Section 182 (c)(2)(A) and 182 (j)(1)(B)] and where modeling is necessary for demonstration of attainment but photochemical grid modeling is not specifically required (i.e., moderate areas that are not part of a multi-state region) [Section 182 (b)(1)(A)]. Both base year episode day (actual emissions) and projected (allowable emissions) modeling inventories are needed.

More detailed specifications of the requirements States must adhere to for periodic, RFP projection, and modeling inventories are provided in Sections 3.10, 3.11, and 3.12, respectively. A summary of inventory requirements by ozone nonattainment classification is provided in Appendix A.

3.0 EMISSION INVENTORY REQUIREMENTS

As discussed in Section 2.0, revised O₃ SIPs under the CAAA shall include base year, periodic, RFP projection, and modeling inventories. Emission estimates shall be determined to the extent possible using source specific information in conjunction with methodologies described in the inventory guideline references listed in Section 6.0. One such reference, Procedures for the Preparation of Emission Inventories for Precursors of Ozone - Volume I¹, is recommended for inventorying base year VOC, NO_x, and CO emissions from stationary sources. A revised and updated version of this document is scheduled to be issued by EPA in May 1991. Another reference, Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources² should be referred to for inventorying base year VOC, NO_x, and CO emissions from mobile sources. A revised and updated version of the mobile sources document is also scheduled to be issued by EPA in May 1991.

More specifically, States shall be guided by the requirements described in this section of the document for SIP inventory preparation under the CAAA. The nature and requirements of each inventory type are presented and discussed. Base year inventory requirements and their relation to other inventories requirements are discussed in Section 3.2. Specific requirements for periodic inventories are discussed in Section 3.10, RFP projection inventories in Section 3.11, and modeling inventories in Section 3.12. Inventory elements common to all inventory types (e.g., temporal basis of emissions, temperature, rule effectiveness, etc.) are discussed in other parts of Section 3.0. Quality assurance (QA) requirements for all SIP inventory submittals are discussed in Section 3.13.

3.1 Inventory Preparation Plans

Under the previously proposed Post-1987 Ozone/CO Policy, States were not required to tell EPA how they planned to prepare, document, and submit their base year emission inventories prior to the actual submittal of the materials. For the purposes of the CAAA and their emission inventory requirements, EPA is adopting a new approach. For

CAAA base year inventories, EPA is requiring that States prepare a brief Inventory Preparation Plan (IPP) that specifies to EPA how they intend to develop, document, and submit their inventories. The plans will give States the chance to tell EPA how they plan to compile the required inventories, and will allow EPA to provide feedback to avoid having States use approaches that are not consistent with EPA requirements. With the use of IPPs, EPA can help guide the preparation of inventories and attempt to ensure that emission estimates are of higher quality and are consistent with the CAAA requirements. States shall submit IPPs to EPA Regional Offices and EPA Headquarters no later than July 31, 1991. IPPs are due in final form (i.e., agreed upon by EPA) by October 1, 1991.

In addition to technical data, the IPPs shall contain schedules for when the States plan to submit draft and final inventories or inventory components to EPA. If the State plans to submit an inventory in component pieces (e.g., point source component, area source component, etc.), the IPP shall clearly make this distinction and indicate a draft and final submittal date for each component. The final submittal dates shall be consistent with the ultimate inventory delivery dates specified in the CAAA and presented in Section 3.0 of this document.

Each States shall submit its IPP to its EPA Regional Office (RO) for review no later than July 31, 1991. Each State should also send EPA Headquarters a copy of the document and any correspondence relating to the plans. EPA Headquarters copies should be sent to: Chief, Inventory Guidance and Evaluation Section, Emission Inventory Branch (MD-14), Technical Support Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711.

States shall prepare an IPP for each specific nonattainment area for which a base year inventory is required by the CAAA, to the extent that different approaches will be used. If a State has multiple nonattainment areas but plans to use the same overall approach for each, the State can submit a single IPP that details that approach and the areas to which it will apply. States need to be aware that EPA will not accept a base year inventory for review from a State until EPA has received, reviewed, and approved an IPP for that inventory. EPA

approval of an IPP does not, however, signify that EPA unconditionally accepts all of the information to be contained in the actual inventory. The inventory will be reviewed separately and on its own merits regardless of how well or how poorly the IPP was assembled. In approving an IPP submitted, EPA will accept the intended approach for inventory compilation. The results produced by these approved approaches will have to undergo a separate review and approval process.

An IPP shall address how a State plans to inventory all sources (regardless of size) of the ozone pollutants (VOC, NO_x, CO). Separate discussions shall be used to address stationary point, stationary area, on-road mobile, non-road mobile, and biogenic sources. If an inventory started under other programs will be utilized (e.g., under the proposed Post-1987 Policy), this should be stated. Generally, the State's starting point for the base year inventory effort should be summarized.

For point sources, States shall define how all pertinent emission sources will be identified and located. States shall describe how point source activity levels and associated parameters will be developed, and how these data will be used to calculate emission estimates. States shall also discuss how and when statewide point source reporting to EPA will be conducted (Section 3.6.2) and how it will be coordinated with reporting for nonattainment area sources. States must describe any source surveys that are planned, and if they intend to use existing data contained in systems such as SAMS (SIP Air Pollutant Inventory Management System), AIRS (Aerometric Information Retrieval System), EIS (Emissions Inventory System), individual State emission systems, or State permitting files. The extent to which a State plans to use EPA's AIRS and PC-SAMS data base management systems to compile their point source inventory shall be explained.

For stationary area and non-road mobile sources, the plan shall explicitly state which source categories will be addressed and which will not be addressed (with justification for exclusion). For those categories to be included, the plan shall indicate what calculational method will be used to calculate emissions. If a State plans on using EPA's inventory guidance for all categories, it should report that it will be applying the EPA-recommended approaches. If the EPA guidance has alternative methods for a category, the IPP should

clearly indicate which method the State intends to use in its inventory. Particular emphasis should be given to categories for which the State plans to use an approach other than that recommended in EPA's guidance. Any major assumptions that will be used that affect the development of emission estimates in a category shall be clearly stated.

For highway mobile sources, the IPP shall provide a clear indication of how the State intends to develop VMT (vehicle miles traveled) estimates and mobile source emission factors. Any predictive models that will be applied shall be identified and key assumptions in the use of the models shall be stated. Other items that shall be addressed include specifications of the vehicle classes that will be covered, the fuel RVP (Reid vapor pressure) level to be used or method used to determine RVP, ambient temperatures to be used, inspection/maintenance (I/M) and anti-tampering programs that are in place, and a specification of whether vehicle refueling losses will be estimated using MOBILE4.1 or calculated separately as an area source. The control effectiveness the State uses for adopted Stage II controls should also be stated.

Because temperature is such an important variable for evaporative VOC emissions estimates, particularly for mobile source emission estimates, States shall clearly present and document the basis of all temperature values used in the inventory to calculate evaporative VOC losses. States should identify any source category that has temperature as a variable in the procedures used to estimate emissions (e.g., on-road vehicles, gasoline and organic solvent storage tanks).

The IPP must clearly describe how the State plans to present document, and submit the inventory to EPA. The general kinds of documentation that will be provided and the form of this documentation shall be described to the extent that EPA can judge if it would be satisfactory for inventory review purposes. The IPP shall specify the written and computerized methods that a State plans to compile and submit its data, keeping in mind that States must submit their final SIP inventory data in AIRS or in an AIRS-compatible format. States must clearly delineate whether and how State data base/data systems will be used and how data will be input into the AIRS Facility Subsystem (AFS) and the AIRS Area and Mobile Source (AMS) Subsystem.

One component that must be contained in an IPP is the QA plan for the inventory. This plan shall describe the overall QA program that the State intends to use during the compilation of the inventory. The QA plan shall be constructed according to the guidance provided in Section 3.13 of this discussion.

Generally, EPA envisions that the IPPs will be brief. It is EPA's intent that they be concise and to the point, and only provide as much detail as is necessary to communicate to the Agency how the State intends to develop and present its inventory. However, the document must contain sufficient information to enable EPA to make a judgment that the intended State inventory approach is sound and consistent with EPA's requirements. Although no specific IPP format is required, the discussion should include the topics listed in Table 3-1.

3.2 Base Year Inventories

The base year inventory is the primary inventory from which the other three required ozone SIP inventories are derived. The CAAA require that the base year inventory be a comprehensive, accurate, and current inventory of actual emissions in the nonattainment area [Section 182(a)(1)]. The inventory shall include emissions of VOC, NO_x, and CO from stationary point and area sources, on-road mobile sources, and non-road mobile sources. Both anthropogenic and biogenic emission sources shall be included in the inventory. Emissions are to be based on conditions that exist during the peak ozone season (generally June through August) of the year of enactment of the

TABLE 3-1. TOPICS TO BE INCLUDED IN
INVENTORY PREPARATION PLANS

IPP Topics

A. Introduction

- define what nonattainment area the plan is for, whether attainment for O₃, CO, or both, classification(s) of the area.
- background/basis for the inventory (i.e., previous efforts that are viable and related), starting point
- define how the plan is structured, what does it contain
- specify who is responsible for the inventory and who is actually compiling it (air agency, consultants, etc.)

B. Point Sources Approach

- how will sources be identified and located
- how will minor sources be identified
- define role of existing data (AIRS, NAPAP, permitting data, etc.)
- identify data collection methods to be used (e.g., surveys, etc.)
- basis for activity level data and emission estimates
- basis for control efficiencies
- application of rule effectiveness
- basis for rule penetration and rule effectiveness levels

C. Area and Non-Road Mobile Sources Approach

- what categories will be addressed and why
 - what categories will be excluded and why
-

TABLE 3-1. Continued

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-
- what estimation methods will be used (e.g., AP-42, Procedures Document, site-specific surveys, etc.)
 - methods for collecting activity/commodity level data
 - application of rule effectiveness
 - basis for rule penetration and rule effectiveness levels

 - D. On-Road Mobile Sources Approach
 - specification of how VMT are to be determined
 - specification of the mobile source emissions model used (will be an updated version of MOBILE4)
 - specification of key assumptions for the emissions model involving parameters such as temperature, speeds, existence of I/M and anti-tampering programs, incorporation of vehicle refueling losses, etc.

 - E. Documentation Approach
 - written presentation and documentation
 - computerized compilations and documentation
 - use of AIRS online, PC-SAMS and PC-AMS
 - submission of data in AIRS-compatible format

 - F. Quality Assurance Plan
 - description of QA program
 - how QA program will affect and benefit inventory
 - description of adherence to previously issued QA guidance
-
-

CAAA, i.e., 1990. Industrial activity, population, VMT, etc. and emissions must represent a typical peak ozone season weekday for the base year 1990.

The term "typical ozone season day" refers to activities that occur during the three-month period at which the highest ozone exceedances occur, averaged on a daily basis. For example, if during the summer weekdays of 1990 (Monday - Fridays, June - August) a manufacturing process produces 12,000 tons of material, and this period includes 13 weeks, 5 operating days per week, then the average or "typical" ozone season day activity would be: $12,000 / (13 \times 5) = 185$ tons/day. This value would then be multiplied by the emission factor, control factor, and rule effectiveness factor, if applicable, to calculate the typical ozone season day emissions.

States are required to submit the final base year inventory for each of their ozone nonattainment areas to EPA no later than November 15, 1992. The final adjusted base year inventory is also due no later than November 15, 1992. In order to meet this schedule and allow sufficient time for EPA review and State incorporation of EPA comments, draft base year inventories must be submitted during the period of January 1 to May 1, 1992.

The remainder of Section 3.2 presents base year inventory requirements pertaining to factors such as AIRS compatible reporting (3.2.1), inventory geographic area (3.2.2), point sources in the 25-mile boundary (3.2.3), pollutants to be inventoried (3.2.4), source categories to be inventoried (3.2.5), an updated version of MOBILE4 (3.2.6), inventory updates from 1987/88/89 to 1990 (3.2.7), and adjustments that must be made to the base year inventory (3.2.8).

3.2.1 AIRS Compatible Reporting

The AIRS will be the official repository for all emission inventory data. Therefore, all SIP data must be submitted in an AIRS compatible format in order to be accepted. The EPA will provide PC software packages for States to perform preliminary inventory preparation activities. Point source data transfer from the SAMS PC package to the

AFS will be possible beginning in January 1992. Area source data transfer from the new area and mobile source PC package to the AIRS Area and Mobile Source Subsystem (AMS) will be available in May 1992. Specifications for AIRS reporting are detailed in Section 4.0 of this document.

3.2.2 Geographic Area to be Inventoried

Most geographic areas for ozone nonattainment designations will be defined by EPA by July 13, 1991. These designations will be made under the provisions of the CAAA, which require each State to submit to EPA a list of all areas in the State indicating designations (attainment, nonattainment, unclassifiable) for ozone (or affirming existing designations) and describing their boundaries. The designations will be published in Part 81 of the Code of Federal Regulations.

Areas designated in nonattainment of ozone shall be used to define the core boundaries of the ozone SIP inventories. However, geographic requirements of all inventories should be examined early on so that a base year inventory can be prepared that will serve as the basis for all required inventories. Base year, modeling and periodic inventories shall include all sources within the nonattainment areas as well as major point sources outside of, but within 25 mile of, the nonattainment area boundaries (see Section 3.2.3). Modeling inventories (both episode day and projected) may require inclusion of additional sources, as defined by the modeling domain. For this reason, the modeling domain should be defined as early as possible so that emission data for point, area and mobile sources can be gathered for the entire modeling domain as part of the base year inventory preparation process. Adjusted base year inventories (for RFP planning) and RFP projection inventories shall include only those sources within the designated nonattainment area.

3.2.3 Major Sources in the 25-Mile Boundary

Under the CAAA, the EPA requires that 100 ton/yr and greater VOC, NO_x, and CO emission sources, located within 25 miles of the designated nonattainment area, be included in the area's 1990 base year inventory. This is because these sources may contribute to exceedances of the NAAQS within the nonattainment area and should therefore be included in air quality modeling exercises. As before, States need to use good judgement in deciding which 100 ton sources to include in terms of sources near the edge but outside of the 25-mile boundary. Generally, all 100 ton sources within 25 miles of the nonattainment zone boundary must be included. Ones just outside of the 25-mile limit may also be included if the State feels they likely contribute to the area's nonattainment problem for a variety of reasons (e.g., they have very large emissions, they are influenced by prevailing winds, etc.).

In addition to inclusion in the base year inventory, major sources in the 25-mile boundary should also be included in modeling and periodic inventories. Modeling inventories will likely include additional point sources (point sources beyond the 25-mile boundary, point sources in adjacent nonattainment areas, etc.) as well as area and mobile sources outside of the nonattainment area, as defined by the modeling domain. However, all sources outside of the nonattainment area shall be excluded from the adjusted base year inventory (for RFP planning) and from the RFP projection inventories. It is the responsibility of the States to coordinate the exchange of inventory data for sources in the 25-mile band that may cross State boundaries.

Sources do not have to be included in an area's 25-mile boundary if they also fall into the designated geographic boundaries of another nonattainment area. EPA is preparing maps of the nonattainment areas and their 25-mile boundary zones to show where overlaps occur. These maps will be distributed to the RO and be available for State use in May 1991.

3.2.4 Pollutants to be Inventoried

The pollutants of interest for ozone base year inventories under the CAAA remain unchanged from those examined under the proposed Post-1987 Policy. The inventory shall contain a summary of emission estimates of VOC, NO_x, and CO from stationary point, area, non-road mobile and on-road mobile sources. Evidence from smog chamber studies indicates that CO plays a small but significant role in ozone production. Reductions in CO, due to automotive and other emission control programs, will reduce ozone levels and the required amount of VOC control necessary to attain the NAAQS.

Emission inventories for VOC should be consistent with the Agency's reactivity policy discussed in the Federal Register.³⁻⁶ Nonreactive VOC compounds shall be excluded from the inventory for purposes of ozone SIPs, because controls on emissions of nonreactive compounds will neither contribute to the attainment and maintenance of the NAAQS for ozone, nor be credited toward achievement of that standard. These compounds include:

methane
ethane
methylene chloride
methyl chloroform (1,1,1-trichloroethane)
(CFC-11) trichlorofluoromethane
(CFC-12) dichlorodifluoromethane
(CFC-22) chlorodifluoromethane
(CFC-23) trifluoromethane
(CFC-113) trichlorotrifluoroethane
(CFC-114) dichlorotetrafluoroethane
(CFC-115) chloropentafluoroethane
(HCFC-123) 2,2-dichloro-1,1,1-trifluoroethane (306-83-2)
(HCFC-124) 2-chloro-1,1,1,2-tetrafluoroethane (2837-89-0)
(HFC-125) pentafluoroethane (354-33-6)
(HFC 134) 1,1,2,2-tetrafluoroethane (359-35-3)
(HFC-134a) 1,1,1,2-tetrafluoroethane (811-97-2)
(HCFC-141b) 1,1-dichloro-1-fluoroethane (1717-00-6)
(HCFC-142b) 1-chloro-1,1-difluoroethane (75-68-3)

(HFC 143a) 1,1,1-trifluoroethane (420-46-2)

(HFC 152a) 1,1-difluoroethane (75-37-6)

the following four classes of perfluorocarbon (PFC):

- 1) cyclic, branched, or linear, completely fluorinated alkanes.
- 2) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations.
- 3) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations.
- 4) sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

Perchloroethylene has not been designated as a nonreactive VOC and should be included in the inventory.

States are encouraged to use source specific test or mass balance data to estimate the magnitude of emissions for each major source. Emission factors should be used where source specific data are not available. Emission factors for VOC, NO_x, and CO are contained within Compilation Of Air Pollutant Emission Factors, AP-42.⁷ Additional emission factors are available in AIRS and in the AIRS SCC emission factor listing.⁸ New VOC emission estimation procedures are available for industrial wastewater treatment facilities, and Publicly Owned (wastewater) Treatment Works (POTW).^{9,10} Emissions of VOC, NO_x, and CO shall also be included in modeling and periodic inventories. Adjusted base year and RFP projection inventories should include estimates on VOC and NO_x emissions.

3.2.5 Applicable Source Categories

The types of sources to be included in base year inventories under the CAAA include those found in the proposed Post-1987 Policy, with the addition of biogenic emission sources. Base year inventories are required to address all stationary point and area sources, non-road mobile sources, and on-road mobile sources. The point, area, and mobile source categories that must be evaluated for inclusion in the inventory are listed in Appendix B. Table B-1 lists individual point source categories that shall be evaluated. Applicable area and mobile source categories for consideration in ozone SIP inventories are listed in Table B-2.

Formats for reporting 1990 emission inventory data will differ from previous requirements. Information and requirements on formats and systems for base year inventory data reporting are contained in Section 4.0. More detailed information on reporting requirements for projection inventories will be issued in July 1991.

3.2.6 Updated Mobile Emissions Model (MOBILE4.1)

In May of 1991, EPA plans to issue an updated version of its mobile source emissions estimation model, MOBILE4. The updated version of MOBILE4 will be known as MOBILE4.1 and will replace and supersede its predecessor. States are required to use MOBILE4.1 in determining highway mobile source emissions for all of their base year emission inventories under the CAAA. California shall consult with EPA Region 9 in determining the mobile model to be used. The overall application of MOBILE4.1 for base year inventory purposes is generally the same as that used for MOBILE4 with the exception of an option to run hour by hour. The majority of the enhancements in the revised model are internal to the model and do not directly impact the user for base year inventory emission factor generation purposes. Specific guidance on the scope of the model changes and their impacts, and on the use of the model for base year inventories will be issued in May 1991.

3.2.7 Updating from 1987/1988/1989 to 1990

Several ozone and CO nonattainment areas that received SIP calls in 1988 or 1989 have prepared or have begun preparation of base year emission inventories per the requirements and guidance in the proposed Post-1987 O₃/CO Policy (52 FR 45044, November 24, 1987). These inventories have either 1987, 1988, or 1989 as their base year. For the purposes of the CAAA, these inventories have to be either updated to 1990, the year of enactment of the CAAA, or redone totally to reflect a 1990 base year. States which have fully completed portions of their base year inventories for 1987, 1988, or 1989 that they desire to update and have received EPA approval of these portions will be considered for approval to update. Otherwise, States shall prepare a completely new inventory for base year 1990. For the purposes of accuracy and providing an inventory that will meet the goals of the CAAA,

EPA encourages all areas to prepare new 1990 base year inventories even if they assembled base year inventories for 1987/1988/1989.

States shall work with their respective EPA RO to determine if they can perform updates to 1987/1988/1989 inventories that have been prepared, and to determine how these updates should be performed. Regional Office questions will be resolved by EPA air headquarters staff [Office of Air Quality Planning and Standards (OAQPS)]. Before any updating can be performed on 1987/1988/1989 inventories, States shall receive written authorization from the appropriate EPA Regional Office allowing them to do so. EPA will not accept any updated inventories in cases where this prior authorization is not received. For nonattainment areas that meet the above stated conditions, States shall request their EPA Regional Office as soon as possible for the approval to perform an update if the State does not desire to reconstruct a 1990 base year inventory from the start. In their petition, States should clearly document the case for why they should be allowed to perform an update of the 1987/1988/1989 inventory. Once approval to perform an update is received, the State shall complete and submit an IPP as required by EPA under the CAAA (see Section 3.1 for details on the IPP requirements).

For States that are able to perform updates to the 1987/1988/1989 base year inventories, the updating process will likely be split along the lines of point, area, non-road mobile, and on-road mobile sources. EPA plans to issue more direct formal guidance for performing updates (e.g., specific growth factors to use on an individual source category basis) in May 1991. However, for the purposes of this guidance discussion, the following general guidance should be followed.

3.2.7.1 Point Sources

All stationary point sources of VOC, NO_x, or CO with emissions of 100 tons/yr or greater shall be re-inventoried completely and not simply updated. Existing point source guidance in the Procedures Document (revised version to be issued in May 1991) shall be used to inventory the major sources. Sources with emissions less than 100 tons/yr can be adjusted

to the 1990 base year using scaling factors based on industrial growth for the category generally or the plant specifically. The intended approach and source of the growth factors must be fully explained in the IPP. Such an approach negates having to resurvey each small VOC point source; however, States are encouraged to re-inventory these sources if feasible. A new inventory of this type should give more accurate current emissions data than could be obtained by adjusting older data with growth factors. Small VOC sources (i.e., emissions of 10 to 25 tons/yr) that were previously inventoried using sample surveys must be individually inventoried.

In the one to three year span since the previous base year inventories were compiled, it is possible that new point sources could have come into being that need to be added to the 1990 base year inventory. Once new sources are identified, they should be inventoried according to the updated guidance in the revised Procedures Document due to be issued in May 1991. For major sources, additions should be well known to the State/local agencies. Similarly, major plant shutdowns or curtailments should be well documented. Other methods that States should use to identify possible new sources or identify source shutdowns include reviewing current industrial directories, reviewing recent permitting records for new plants and existing plant changes, and reviewing nationally-oriented data bases such as the Toxic Release Inventory System (TRIS) for SARA 313 reporting records.

3.2.7.2 Area and Non-Road Mobile Sources

Practically all of the emission estimates for area and non-road mobile sources are based on the use of an emission factor and some activity/commodity level(s) (e.g., population, employment, equipment counts, etc.) that is a surrogate indicator of emissions. States can perform updates for these source types by examining how the surrogate activity levels have changed over the period to 1990. For most of the source categories, changes over the one to three year span will not have been large. For each area and non-road mobile source category, States must investigate the key emissions surrogate parameters and determine how they have changed since the previous base year inventories were developed. The 87/88/89 inventory should be reviewed to determine what the key emission surrogates are. They will

generally be expressed in the emission factor itself (e.g., lbs VOC/capita) or in a multi-step calculation process (e.g., pieces of equipment x hours of operation per piece x lbs VOC/hr of operation). In some cases, the extrapolation to 1990 will be very easy to perform because the surrogate statistics are readily available (e.g., population). In other cases, the State must determine new data that are very site-specific (e.g., airplane takeoff/landing cycles at an airport) to the point that the category is actually being reinventoried as opposed to being updated.

States are reminded that EPA will be issuing new inventory procedures guidance for some area and off-highway mobile source categories in May 1991 that may significantly affect how emissions are to be determined. For these categories (railroads, aircraft, solvent uses), it will likely not be possible to perform updates from the previous estimates. Instead, new emission estimates shall have to be prepared using the new methodology. Furthermore, updated inventories must meet the requirements for coverage of source categories (Section 3.2.5), data reporting (Section 4.0), and other basic requirements described herein and in the revised Procedures Documents (References 1 and 2) to be issued in May.

3.2.7.3 On-Road Mobile Sources

On-road (highway) mobile source emission estimates must be derived from scratch using a 1990 base year for all areas, including those with 1987/1988/1989 base year inventories that were allowed to update their overall inventory. There are several reasons EPA is adopting this requirement. One relates to the way that mobile source models calculate emission factors. Relatively significant changes occur in the factors with fleet turnover from one model year to the next. Also, with new road construction, VMT patterns change that significantly impact mobile source emissions. These changes may involve not only more roads, but also changes in speeds both higher and lower. For example, in 1990, several interstate roads now have 65 mile per hour speed limits instead of 55. Since the on-road mobile source component of these inventories is often the major contributor to total area emissions, it makes sense to reevaluate its emissions from year to year. The planned release

of a new version of the mobile source emissions estimation model, MOBILE4.1, in May 1991 also provides additional justification for totally reevaluating mobile source emissions as opposed to application of a growth factor. [California shall consult with EPA Region 9 in determining the mobile source model to be used.]

The planned May 1991 release of new guidance for determining VMT further solidifies the need for States to re-calculate on-road mobile source emissions for the purposes of the 1990 base year inventories under the CAAA. States should use the updated version of MOBILE4 and VMT development guidance to be issued in May 1991 to construct their 1990 on-road mobile source inventories. State air agency staff should begin contacting Metropolitan Planning Office (MPO) personnel (or their equivalent) to become familiar with the MPO's VMT estimation methods, base years of data, and overall capabilities, and to explain to the MPOs the CAAA provisions.

3.2.8 Adjustments to Base Year Inventory

The CAAA require States with moderate, serious, severe, and extreme ozone nonattainment areas to submit a plan within three years of the date of enactment (November 15, 1993) to reduce VOC emissions by 15 percent within six years after enactment. A baseline level of emissions, from which the 15 percent reduction is calculated, shall be determined by adjusting the base year inventory to exclude biogenic emissions and anthropogenic sources outside of the nonattainment area, and to exclude certain emission reductions not creditable towards the 15 percent. The adjusted base year inventory represents the inventory that is the basis from which the 15 percent reduction is then calculated. The adjusted base year inventory shall equal the portion of the base year inventory within the nonattainment area boundaries, minus biogenic emissions, emission reductions from Federal Motor Vehicle Control Program (FMVCP) regulations promulgated by January 1, 1990, and emission reductions from RVP rules promulgated by the date of the CAAA enactment or required under CAAA Section 211(h). Emissions from major point sources in the 25-mile outer boundary (Section 3.2.3) should be excluded from the adjusted base year inventory.

Only VOC and NO_x emissions have to be addressed in adjusted inventories [Section 182 (b)(1)(B)].

3.3 Temporal Basis of Emissions

The temporal basis on which emissions must be expressed for 1990 base year inventories under the CAAA is the peak ozone period of the year for each nonattainment area. For ozone inventories, VOC, NO_x, and CO emissions must be determined and expressed on a peak ozone season daily basis. The daily basis should reflect an average daily operation during the peak ozone season months (usually June - August). This is accomplished by considering the peak ozone season and the average or typical operating day. Each of these concepts is discussed below.

States are reminded that for the purpose of photochemical modeling, temporal factors are also required to determine hourly profiles of emissions by category for a summer weekday, Saturday, and/or Sunday, depending on the episode days being modeled.

3.3.1 Peak Ozone Season

Peak ozone season for most nonattainment areas will be the summer months of June through August or July through September. States shall define their peak ozone season to be the three month period when the highest ozone NAAQS exceedance episode days occur. This determination shall be based on ambient data for the last three to four years. Source category activity data must be developed that are correlated with the peak ozone season as defined for each nonattainment area. States should determine their peak ozone season prior to assembling their IPP. The peak ozone season shall be defined in the IPP and a brief documentation given for the period selected.

3.3.2 Typical Operating Day Emissions

The selection of source and other inventory conditions, reflective of those that exist on typical operating days during months of the peak ozone season, shall be accomplished in two primary ways. First, for source categories whose operating rates vary seasonally, typical operating day emissions should be determined using average ozone season operating data obtained from the source. For some point sources, production (throughput) may increase or decrease during the peak ozone period. Highway vehicle traffic, gasoline handling and space heating are examples of source categories whose activities generally vary from season to season (gasoline throughput typically increases during summer months).

Secondly, certain emission factors for some source categories vary as a function of temperature and/or humidity. Most importantly, the emission factors for gasoline-powered vehicles and petroleum product storage and handling operations are a function of temperature. NO_x emissions from light-duty vehicles are a function of absolute humidity. In compiling the emission inventory for 1990 CAAA SIPs, temperature and humidity assumptions shall be consistent throughout the inventory, to the extent possible. Additional requirements for temperature are specified in Section 3.4.

Generally, highway vehicle travel estimates are determined for an average annual weekday by the responsible MPO or State Department of Transportation. To develop an inventory of emissions for a typical ozone season day, travel estimates for the ozone season can be used if available, or a seasonal factor can be applied to average annual estimates to adjust for increases (or decreases, in some cases) in travel occurring during the peak ozone season. Generally, such an adjustment factor can be derived from local traffic counting programs. General guidance for the preparation of mobile source emission inventories is contained in Sections 3.2.6 and 3.8. More detailed specifications can be found in Reference 2.

Emission estimates for point and area sources are frequently maintained on an annual basis in State and local inventories. For area sources, if seasonal activity levels are not available, the inventorying agency will have to apply seasonal and weekday adjustments to

annual area source activity levels, based on local knowledge of the operating patterns of each source. If local operating data are unavailable to make such adjustments, the data presented in Reference 1 may be used for this purpose. Because local practices may vary, the use of local data, when available, is strongly encouraged.

3.4 Temperature

Temperature is an important consideration in determining VOC emissions for several area and mobile source categories. The greatest concern in area sources is for evaporative loss sources such as gasoline storage tanks and dispensing. The MOBILE4.1 model requires that temperature be entered as a key variable to the model's estimation of VOC emission factors for mobile sources. States must determine the temperatures, for calculational purposes, that are appropriate for the peak ozone season they have defined. Guidance concerning temperature determinations will be issued in the updated procedures guidance documents in May 1991.

3.5 Rule Effectiveness (RE) and Rule Penetration

Past inventories have assumed that regulatory programs would be implemented with full effectiveness, achieving all of the required or intended emission reductions and maintaining that level over time. However, experience has shown regulatory programs to be less than 100 percent effective in most source categories in most areas of the country. The concept of applying RE in the SIP emission inventory has evolved from this observation. In short, RE reflects the ability of a regulatory program to achieve all the emission reductions that could be achieved by full compliance with the applicable regulations at all sources at all times.

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).

In the proposed Post-1987 ozone/CO policy, it was stated that a factor of 80 percent should be used to estimate RE in the base year inventories. For the purpose of base year inventories under the CAAA, EPA will allow the use of the 80 percent default value, but will also give States the option to derive local category-specific RE factors according to guidance contained in Reference 11.

In the SIP inventory, the RE determined for the source category shall be applied to all sources in the category (both point and area sources) with the following exceptions: (1) sources not subject to the regulation, (2) sources achieving compliance by means of an irreversible process change that completely eliminates solvent use, and (3) sources for which emissions are directly determined by calculating solvent use over some time period and assuming all solvent was emitted from the source during that time period.

The RE factor shall be applied to the estimated control efficiency in the calculation of emissions from a source. An example of the application is given below.

$$\begin{aligned}
\text{Uncontrolled emissions} &= 50 \text{ lbs/day} \\
\text{Estimated control efficiency} &= 90\% \\
\text{Rule effectiveness} &= 80\% \\
\text{Emissions after control} &= 50 [1 - (0.90)(0.80)] \\
&= 50 [1 - (0.72)] \\
&= 14 \text{ lbs/day}
\end{aligned}$$

Thus, the application of RE results in a total emission reduction of 72 percent.

In addition to RE, another important regulatory consideration is the extent to which a regulation may cover emissions from an area source category. When estimating emissions using area source methodologies for source categories where a rule or regulation applies, agencies shall incorporate an estimate of the amount of rule penetration by means of the following formula:

$$\text{Rule Penetration} = \frac{\text{Uncontrolled emissions covered by the regulation}}{\text{Total uncontrolled emissions}} \times 100 \text{ percent}$$

Once uncontrolled emissions and rule penetration are determined, RE should be applied as discussed above. An example of how to incorporate both penetration and RE in the same source category follows.

$$\begin{aligned}
\text{Uncontrolled emissions} &= 100,000 \text{ tpy} \\
\text{Control efficiency required by the regulation} &= 95 \text{ percent} \\
\text{Rule penetration} &= 60 \text{ percent} \\
\text{Rule effectiveness} &= 80 \text{ percent} \\
\text{Emissions from the category} &= \\
&= (100,000)[1 - (0.60)(0.95)(0.80)] = 54,400 \text{ tpy}
\end{aligned}$$

Further discussions of the use of rule effectiveness and rule penetration are included in Reference 11.

3.6 Point Sources

Although a revised version of the procedures document for ozone is scheduled for release in May of 1991, the guidance for inventorying point sources of VOC, NO_x, and CO has essentially not been changed from what was contained in the document Procedures for the Preparation of Emission Inventories for Precursors of Ozone, Volume 1¹ (EPA 450/4-88-021, December 1988). For this reason, States should immediately begin data gathering for the development of the point source component of their base year inventories. There is no reason to postpone data gathering and development because no new guidance is planned for point sources that will significantly affect States' 1990 base year inventory efforts. Some refinements and enhancements may be issued to the previous guidance for selected source categories, but this information will not affect the basic activity data that States need to be collecting on individual point sources. States are encouraged to submit the point source portion of the inventory to EPA as early as January 1, 1992.

As under the previously proposed Post-1987 Policy, the point source emissions cutoff definition for VOC sources is 10 tons/yr. The point source cutoffs for NO_x and CO will remain at 100 tons/yr. While sources with emissions at these levels and above must be inventoried as individual point sources, States are encouraged to inventory sources below these cutoffs on an individual point source basis as well.

These cutoff levels are, in several cases, not necessarily consistent with the "major source" delineations given in the CAAA for VOC, NO_x, and CO sources. This is because the two types of cutoffs are to be used for different purposes. In several cases, the CAAA have established other major source cutoff definitions for purposes such as the application of RACT (reasonably available control technology), for new source review, and for Emissions Statements. For example, for the purposes of Emissions Statements, NO_x emission sources down to 25 tons/yr must report emissions. In Serious CO nonattainment areas, major sources are defined as those with the potential to emit 50 tons/yr CO. However, because these other

lower cutoffs exist, States should consider the benefits of going ahead and inventorying sources, especially of NO_x and CO, below 100 tons/yr if possible.

One significant change resulting from the CAAA is that for VOC sources in the 10 to 25 tons/yr emissions range, 1990 base year inventory emissions must be determined on an individual facility basis. Emissions cannot be extrapolated from the results of a survey of a representative sample subset, as was previously allowed. At a minimum, stationary sources (facilities) that emit equal to or greater than 10 tons/yr VOC on an actual basis, shall be inventoried as point sources. Existing point source guidance in the Procedures Document (EPA-450/4-88-021) shall be used to inventory the 10 ton/yr sources until the revised procedures document is issued in May 1991.

Detailed process and emissions data shall be collected and reported for each VOC point source that emits equal to or greater than 10 tons per year, and for sources of NO_x and CO that emit at least 100 tons per year.

New point sources that have come into being since the previous base year inventory was compiled need to be included in this base year inventory. For major sources, additions should be obvious and well known to the State/local agencies. Similarly, major plant shutdowns or curtailments should be well documented. Other methods that States may use to identify possible new sources or identify source shutdowns include reviewing current industrial directories, reviewing recent permitting records for new plants and existing plant changes, and reviewing nationally-oriented data bases such as the TRIS for SARA 313 reporting records. Again, the methodologies to be used should be specified in the IPP.

3.6.1 Offshore Point Sources

One type of source that must be included in O₃ SIP inventories is offshore oil and gas facilities. These facilities emit significant amounts of VOC, NO_x, and CO which may contribute to ozone formation onshore. Sources located in the Gulf of Mexico will be needed for the regional modeling to be conducted for the southeastern

United States. Urban modeling in southern California should also include these offshore sources.

States have jurisdiction for facilities located within State waters, usually within 3 to 12 miles of land. Sources beyond this point are operated currently under the authority of the Mineral Management Service (MMS) of the Department of Interior. Title VIII, Section 801, of the CAAA transferred authority to regulate air quality on the Outer Continental Shelf (OCS) everywhere except the Gulf of Mexico, from the Department of Interior to EPA. The intent of Congress was that all offshore sources within 25 miles of State boundaries meet the same requirements as if they were located in the nearest onshore area. These requirements include, but are not limited to emission controls, emission limitations, offsets, permitting, monitoring, testing, and reporting. EPA must delegate this authority to requesting States if the Administrator determines that the State program is adequate. Sources beyond 25 miles from State boundaries will meet requirements determined by EPA to protect onshore air quality, and will be permitted by EPA. It is the responsibility of EPA to assure that as onshore rules change, consistency is maintained between the requirements for onshore and offshore sources.

Congress has given EPA until November 15, 1991, to promulgate regulations to carry out these provisions of the CAAA. As part of the inventory preparation process, States should work with the Department of Interior and with other State agencies involved with offshore sources to obtain emissions and operating data on these sources.

3.6.2 Statewide Point Source Emission Inventories for Regional Modeling

EPA plans to perform regional scale photochemical modeling for domains covering the Eastern United States (east of longitude 99 degrees W) to provide States with a number of critical data bases for use in urban scale modeling required for State Implementation Plan (SIP) demonstrations in certain nonattainment areas. Estimates of future-year air quality concentrations will be provided to States for use in specifying urban

scale boundary conditions (i.e., incoming transported concentrations) and initial conditions. Additional meteorological and geographic data bases available from the regional modeling applications will also be provided to the States by EPA. The future-year concentration estimates quantify the effects of projected growth, Federal/subregional control programs (e.g., Federal Motor Vehicle Control Program (FMVCP) and alternate fuels), and local control measures in upwind areas.

For consistency with urban scale modeling, 1990 emissions are needed for the base case regional inventory. States in EPA Region I through VII are required to develop the point source emissions needed for this inventory. This consists of a statewide 1990 point source inventory for volatile organic compound (VOC), nitrogen oxides (NO_x), and carbon monoxide (CO) for facilities that emit 100 tons per year or more. This inventory is essentially the same as traditionally required for an annual NEDS (National Emissions Data System) submittal (this submittal is now being handled through the AIRS-AFS). Data elements (plant information, stack parameters, emissions data, etc.) required to be reported with this inventory are identified in Section 4.0. These statewide inventories shall be prepared in a manner consistent with those developed for nonattainment areas.

3.7 Area Sources

Area sources include those emissions from stationary and non-road sources that are too small and/or too numerous to be included in the point source inventory, but which can contribute collectively to ozone formation. As such, it is possible for area source emissions to be reported for many of the same source categories as point sources. For source categories such as service stations and commercial dry cleaners in which the bulk of the facilities emit less than 10 tons of VOC per year, all sources may be addressed as area sources in the inventory because of the difficulty in identifying the few operations that emit more than 10 tons.

In a number of previous SIP submittals, emissions from many small sources have been left out of inventories because of a lack of available procedures or lack of emphasis

on this portion of the inventory. Existing methodologies can be used to estimate emissions from the various area source categories. Detailed procedures are discussed in Reference 1. However, some of these techniques are briefly described herein for emphasis.

Large sources may be inventoried by use of questionnaires, plant visits, permit data, etc. In many instances, emissions information for smaller sources (i.e., less than 10 tons per year of VOC, and less than 100 tons per year of NO_x or CO) is developed via the same methods, since there may be no other alternative available to accurately inventory sources in some source categories. For this reason, use of point source methods is recommended, even for determining emissions for source categories below the cutoff levels mentioned above. In such cases, States are encouraged to maintain and report individual point source records for each of the smaller source emissions.

Emissions from certain area source categories, especially those associated with solvent use, may be estimated on a per capita basis. This procedure may be necessary when the availability of other area source estimating methodologies is limited. Population estimates used in making such emission estimates should be documented. Specific information on per capita factors is contained in Reference 1.

Another area source procedure essentially uses nationally derived emissions-per-employee factors to calculate emissions from sources in an area based on areawide employment data. The procedure is best utilized for those source categories where (a) total employment in the source category is known for the area, and (b) where there are numerous sources whose emissions are typically less than the cutoffs mentioned above for point sources, but whose collective emissions represent a significant total.

When compiling their area source inventories, States should also be aware that EPA is preparing new inventory preparation guidance for several solvent use area source categories. This new area source guidance material will be issued in May 1991 as a part of the updated procedures guidance document.

3.8 **Mobile Sources**

Mobile sources consist of two types, on-road (highway) mobile sources (e.g., automobiles, trucks, motorcycles) and non-road mobile sources (e.g., trains, airplanes, agricultural equipment, industrial equipment, construction vehicles, off-road motorcycles, marine vessels, and other site-specific vehicles). Mobile sources shall be evaluated for VOC, NO_x, and CO emissions. Guidance on this issue can be found in Reference 2.

The on-road mobile sources portion of the inventory must include a detailed accounting of vehicle emissions in the designated nonattainment area. Emissions from local traffic, as well as emissions from traffic on major highways, must be included in the analysis. On-road mobile source emissions shall be derived by multiplying VMT by MOBILE4.1 emission factors. The base year for the VMT shall be 1990. Specifications on the required use of MOBILE4.1 variables such as temperature, speed, etc. will be provided in the May 1991 procedures guidance.

States must determine VMT by the procedures specified by EPA. In May 1991, EPA will be issuing new inventory procedures guidance that contains updated methods for determining on-road vehicle VMT. States shall be required to use the new procedures to produce their 1990 base year inventories under the CAAA. The new VMT guidance to be issued in May represents an update to that contained in Reference 2 for deriving highway vehicle VMT.

States shall present on-road mobile source emissions by pollutant (VOC, NO_x, and CO) and by individual county (or other equivalent basis) within the nonattainment area, as well as by vehicle class and by roadway type. States shall also report MOBILE4.1 input and output data and a discussion of how VMT estimates were developed (see Section 4.0 and 5.0).

Emissions from most non-road mobile sources are determined based on a source activity variable that is a surrogate indicator of emissions. Activity levels for each off-

highway category shall be developed using revised guidance to be issued in May 1991 (Reference 2).

In May 1991, as a part of EPA's updated procedures guidance, new inventorying procedures will be presented that States shall use to develop non-road emissions estimates for trains and airplanes. The new procedures for trains and airplanes are required for the 1990 base year inventories.

3.9 Biogenic Sources

Under the CAAA base year emission inventory requirements for ozone nonattainment areas, States shall have to prepare and submit emission estimates for biogenic emissions. Biogenic emissions estimates are required for marginal, moderate, serious, severe, and extreme areas. EPA plans to supply States with the means to estimate biogenic emissions. The Agency has developed a model for estimating biogenic releases known as BEIS (Biogenic Emission Inventory System). EPA will provide the model to States in a PC version along with instructional guidance on its use. States will be able to run the model by inputting meteorological data that should be readily available for all locations. More information and guidance on the use of BEIS will be issued in July 1991. The computer program, PC-BEIS, is also expected to be distributed on an EPA bulletin board at the same time as the guidance is issued.

States are strongly encouraged to use the EPA model to estimate their biogenic emissions but they are not required to do so. If States plan on using an alternative approach to estimate biogenic emissions, this approach must be described in detail in the State's IPP for the nonattainment area and EPA approval granted before the approach is implemented. As with the overall IPP, approval of the basic alternative inventory approach for biogenics does not automatically guarantee EPA acceptance of the estimates in the submitted inventory. They will still be subject to review and comment by the Agency.

3.10 Periodic Inventories

Periodic inventories are required to be compiled under the CAAA by all classifications of ozone nonattainment areas [Section 182 (a)(3)(A)]. Periodic inventories shall be based on actual emissions and shall cover VOC and NO_x emission sources. Like the base year inventory, periodic inventories shall be based on peak ozone season industrial activity, VMT, etc. For purposes of tracking progress, temperature used in the base year inventory should be used in all periodic inventories. Annual activity and/or emissions data must also be provided with the inventory for documentation purposes. The base year for the first periodic inventory is 1993. Thereafter, the base year shall be every third year, e.g., 1996, 1999, etc. The primary function of the periodic inventories is to track emission reductions, particularly relating to RFP requirements (see Section 3.11). For serious areas and above, the CAAA require that 6 years after the date of enactment and every 3 years thereafter, States shall demonstrate that the RFP reduction requirements were met [Section 182 (g)(1)]. This will be accomplished at least in part by comparing the periodic inventories to base year 1990 inventories to ensure that emissions were reduced during the preceding intervals equivalent to the total emission level required to be achieved by the end of the interval.

The final version of each periodic inventory is required to be submitted no later than the end of each 3-year period after submission of the final base year inventory, until the area is redesignated to attainment [Section 182 (a)(3)(A)]. The final version of the first periodic inventory must be submitted to EPA by States no later than November 15, 1995. However, because the periodic inventories will be used in part to demonstrate whether or not the RFP reduction requirements were in fact met, these inventories must be submitted as close to each milestone date as is feasible. More information will be provided to States on periodic inventories in guidance on RFP tracking to be completed in November 1991.

3.11 RFP Projection Inventories

The CAAA of 1990 require that States track and document progress they are making towards reaching attainment by demonstrating emission reductions in periodic inventories. These reductions must meet the minimum required reductions specified in the CAAA. As a result of these provisions, RFP projection inventories are required to be

compiled by States for demonstrating strategies by which the required RFP emission reductions will be achieved.

Under the CAAA, moderate, serious, severe, and extreme ozone nonattainment areas must submit a plan (within three years of enactment) to reduce VOC emissions by 15 percent within six years after enactment (November 15, 1996). The first requirement for RFP projection inventories is to show how the required 15 percent emission reduction over the first six years after enactment will be achieved [Section 182 (b)(1)(A) and (c)(2)(B)]. The basis year for this projection inventory is 1996 and it must be submitted to EPA in final form by November 15, 1993. In addition to the projection for 1996, emission projections shall be summarized for intermediate years (1991 through 1995). More information on the content and format of the 1996 RFP projection inventory and intermediate year projection summaries will be included in projection guidance to be issued by EPA in July 1991.

The 1996 projection inventory shall be based on existing regulated allowable limits that affect emissions such as maximum emission rates, allowable activity levels, etc. for both VOC and NO_x rather than assuming the current rates will be maintained in the future year. These allowables must be determined by what is dictated by instituted regulatory limits. For example, for a SIP regulation limiting a furniture manufacturer to 0.05 lbs of VOC used per gallon of coating applied, the allowable solvent content of the coating shall be used to calculate emissions in year 6, even if the manufacturer is currently using only 0.02 lbs VOC/gallon coating. Because activity levels for this example (gallons coating applied per day or per year) are not limited by regulations, they would be determined by applying base year activity levels against growth factors approved by EPA. For evaporative loss emission sources where temperature is used in the calculation of emissions, the projection inventory shall use the same temperatures used in the base year inventory.

The CAAA further require that serious, severe, and extreme ozone nonattainment areas demonstrate that VOC emissions will be reduced by at least 3 percent per year (in addition to the initial 15 percent reductions) averaged over each 3-year period beginning six years after enactment and lasting until attainment is reached. RFP projection

inventories shall be prepared to demonstrate how these continued reductions will be achieved. As with the initial 15 percent RFP projection inventory, projection summaries are required for years prior to the end of each 3-year interval, and like the 1996 RFP projection inventory, the 3-year 3 percent projection inventories shall be based on allowable emissions, activity levels, etc. where they exist as a result of statutory regulations. If activity levels are limited by regulation, then the upper limit shall be used to project emissions. If not regulated, then the current actual activity level must be multiplied by EPA-approved growth factors to calculate projected activity levels. As was specified for the 1996 projection inventory, evaporative loss emission sources must apply the same temperatures used in the base year inventory for the 3-year 3 percent projection inventories. These projection inventories, in conjunction with periodic inventories, shall be used to plan and track RFP achievement. More information on projection inventories and tracking emission reductions will be provided in projections guidance to be completed in July 1991, and in RFP tracking guidance to be completed in November 1991.

3.12 Modeling Inventories

Modeling inventories must be compiled for ozone nonattainment areas where photochemical grid modeling is required (i.e., serious areas and above and multi-state moderate areas) [Section 182 (c)(2)(A) and 182 (j)(1)(B)] and where modeling is necessary for demonstration of attainment but photochemical grid modeling is not specifically required (i.e., moderate areas within single states) [Section 182 (b)(1)(A)]. Both base year and projected modeling inventories are required for model input. Base inventories are used for evaluating model performance while projected inventories are used as "future base cases" upon which additional control strategies are superimposed in an attainment demonstration.

For the photochemical grid modeling inventories, hourly emission estimates are required that are specific to the designated peak ozone episodic days. The designated days shall be defined using guidance on the application of the Urban Airshed Model (UAM) to be issued in June 1991.¹² Designated day temperatures are required to estimate emissions properly. For areas needing to perform some type of an attainment demonstration but that are not specifically required to perform photochemical grid modeling (i.e., moderate areas in single states), the 1990 base year inventory daily emission rates can be used after conversion to an hourly basis.

For modeling inventories, VOC, NO_x, and CO emissions are to be inventoried from anthropogenic and biogenic sources. Emissions have to be temporally allocated, speciated, and spatially gridded for the purposes of photochemical modeling. Mobile source guidance to be issued in May 1991 will address use of traffic demand models to estimate VMT within geographic grids. The base year modeling inventory shall use actual emission rates. The emission rates shall be consistent with those developed for the 1990 base year inventory unless episode days for years other than 1990 are to be modeled. For those cases, significant adjustments to the inventory shall be reflected (e.g., if 1988 is modeled, 1988 VMT should be used). It should be noted that the geographical area for the modeling inventory shall extend beyond the geographic boundaries of the particular nonattainment area. In addition to sources

located within the nonattainment area, the modeling inventory shall include all point sources located in the 25-mile outer boundary (Section 3.2.3) and any other point, area, or mobile sources located within the modeling domain (see Reference 12).

The projected modeling inventory shall use allowable emission rates dictated by regulatory limits. The rates must be consistent with those found in the RFP tracking projection inventory for the year of attainment. Additional guidance will be forthcoming on how to run the updated MOBILE4 emission factor model to produce hourly mobile source emission estimates needed for photochemical grid modeling. This guidance will be issued in May 1991 with MOBILE4.1.

3.13 Quality Assurance

States are required to design and implement a QA program to enhance the overall reliability and accuracy of the ozone SIP emission inventories prepared in response to the CAAA. States must design a QA program and prepare a QA plan that is consistent with the previously issued guidance document: Guidance for the Preparation of Quality Assurance Plans for O₃/CO SIP Emission Inventories¹³ (EPA 450/4-88-023). States are required to submit QA plans as an initial step in their inventory development work and receive EPA approval on their plans early on in the process. The QA plans must be submitted no later than July 31, 1991, as a part of a State's IPP which is a new requirement for the 1990 base year inventories. The full provisions and requirements of the IPPs are explained in Section 3.1. The content and general form of QA plans must be consistent with the previously issued guidance.

As an aid to States in the preparation and checking of their inventories prior to submittal to EPA, the Agency has been preparing a set of quality review guidelines. These guidelines will contain what is essentially a checklist of items that an inventory must contain or address in order for the inventory to be considered acceptable for review by EPA. The guidelines will address whether inventories meet developed specifications for completeness,

consistency (both internal and with national trends), reasonableness of emission values, and emissions documentation. EPA is projecting to issue the final review guidelines in July 1991.

3.14 References

1. Procedures For The Preparation Of Emission Inventories For Precursors Of Ozone, Volume I, EPA-450/4-88-021, Third Edition, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1988. Revised version to be issued in May 1991 will supersede this guidance.
2. Procedures For Emission Inventory Preparation, Volume IV: Mobile Sources, EPA-450/4-81-026d, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1989. Revised version to be issued May 1991 will supersede this guidance.
3. Federal Register. Volume 42, No. 131. July 8, 1977. page 35314.
4. Federal Register. Volume 45, No. 142. July 22, 1980. page 48941.
5. Federal Register. Volume 54, No. 11. January 18, 1989. page 1987.
6. Federal Register. Volume 56, No. 52. March 18, 1991. page 11418.
7. Compilation of Air Pollutant Emission Factors, Volume I and II and its supplements, Fourth Edition, AP-42, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1985.
8. AIRS Facility Subsystem Source Classification Codes (SCCs) And Emission Factor Listing For Criteria Pollutants, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1989.
9. Surface Impoundment Modeling System (SIMS) Version 2.0 User's Manual, EPA-450/4-90-019a, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1990.
10. Background Document For Surface Impoundment Modeling (SIMS) Version 2.0, EPA-450/4-90-019b, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1990.

11. Procedures For Estimating And Applying Rule Effectiveness In Post-1987 Base Year Emission Inventories For Ozone And Carbon Monoxide State Implementation Plans, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1989.
12. Guidelines for Regulatory Application of the Urban Airshed Model - Draft Report, EPA-450/4-91-013, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1991. (Final version to be issued in June 1991).
13. Guidance For The Preparation Of Quality Assurance Plans For O₃/CO SIP Emission Inventories, EPA-450/4-88-023, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1988.

4.0 COMPUTERIZED DATA MANAGEMENT AND REPORTING

Emission inventory information for base year, periodic, RFP projection, and modeling inventories under the CAAA shall be provided to EPA in both written and computerized formats. Computerized submittals of emissions data and documentation must meet the specifications set forth by EPA's National Air Data Branch (NADB). The computerized submittals are discussed in this Section, while the written reporting/documentation requirements are summarized in Section 5.0.

Computerized submittals must be input to the Aerometric Information Retrieval System (AIRS), with point source data on the AIRS Facility Subsystem (AFS) and area and mobile source data on the Area and Mobile Source Subsystem (AMS). If States do not input State Implementation Plan (SIP) inventory data directly to AIRS, then they must submit data in a computer-readable AIRS-compatible format. Methods for providing AIRS-compatible formats are discussed in this section. AIRS transactions submitted by States will be updated to AIRS by EPA Regional Offices which will then provide the States with printed reports. States will review these reports and correct any errors before final EPA confirmation of inventory completeness is given.

States are advised to establish internal coordination procedures to eliminate potential conflicts between the submittals of their SIP data to AFS and their other regular submittals of compliance and emissions data to AFS. Some SIP data elements will be uniquely "owned" by SIP emission inventory users who submit data to AFS. Other data elements in AFS will be shared in common with other State or local agency users who submit other emissions or compliance data to AFS. The AFS security procedures will permit only authorized users to update the data base. Where data element ownership is shared by SIP emission inventory users, other emissions and compliance users, the updating of a data element by different users is possible at different times. Effective internal coordination by States is necessary to insure that data reported to meet a SIP requirement do not conflict with or inappropriately change data that have been reported to AFS by other State personnel. For emissions data, the data elements contained in the previous National Emissions Data System

(NEDS) can be reported to AFS as batch data updates. States who are direct users of AFS may also perform online updates to the AFS database. The SIP submittals made by States using SAMS (SIP Air Pollutant Inventory Management System) or AFS batch transactions (see following subsection) should not contain transactions that change emissions data values for pollutants not required for the SIP inventory (such as PM₁₀ or SO₂, for example) unless the submittal of such data has been coordinated with and approved by the persons who normally submit such data. Similarly, changes to other shared emissions data elements such as latitude/longitude or UTM coordinates, stack parameters and common point general and segment general level data elements should be coordinated with other emissions inventory personnel to insure that SIP data updates do not improperly change their data.

For compliance data, the only data elements that are shared by SIP inventory and compliance users are the plant name, street address, city code and city name, ZIP code and SIC codes on the plant general level. SIP inventory personnel must coordinate with compliance personnel to insure that inappropriate changes to these data elements do not occur as the result of a SIP inventory data submittal to AFS.

Various submittal mechanisms will be available for the States to fulfill their inventory requirements. The information below addresses inventory data management issues for point, area, and mobile sources.

4.1 Point Source Inventory

States submitting point source inventories can choose one of four basic options to submit their data:

<u>Option</u>	<u>When Available</u>
(1) SAMS Version 3.1 ¹	Now

- | | | |
|-----|--|-------------------|
| (2) | SAMS Version 4.0 ² | Now |
| (3) | AFS Batch Transaction
Format Available ³ | May 17, 1991 |
| (4) | Interactive direct entry
to AFS | December 31, 1991 |

- NOTES:
- (1) SAMS Version 3.1 (used for the Post-87 SIP inventories). If currently using version 3.1, States should update to SAMS Version 4.0 to achieve compatibility of data format with AFS (see discussion below).
 - (2) SAMS Version 4.0 which includes additional data elements (Stack-ID and Segment-ID) and edits to ensure compatibility with AFS. A later version of SAMS, Version 4.1, will include the capability to generate an AFS formatted transaction file (available mid-July 1991).
 - (3) This format must be used by States submitting data electronically from their own computer system directly to EPA's mainframe.

Option (1)

States may have already begun work to update their inventories to 1990 by using SAMS Version 3.1. However, prior to uploading to AFS, reconciliation of SAMS 3.1 data with the AFS data structure at the stack and segment levels of related SAMS/AFS facilities will be required. SAMS Version 4.0 allows entering this additional information thereby reducing to a minimum the data conversion process from SAMS to AFS. Information relative to the required data elements for the inventory is also provided in this guidance document.

If States are currently using SAMS Version 3.1, please contact John Ackermann of NADB at (919) 541-5687 (FTS 629-5687) to discuss the data reconciliation process and issues.

Option (2)

SAMS Version 4.0 can be installed on a PC so that it can be used to update a SAMS data base prepared with an earlier version. By using the new data elements and AFS-edit routine in Version 4.0, the SAMS user can prepare 1990 SIP data on SAMS (PC) that will be consistent with their State's files on AFS (mainframe). The National Air Data Branch has developed AFS computer printout reports that can assist State and local agencies in the identification of AFS stack and segment ID numbers for input to SAMS Version 4.0. These reports (AFS Quick Look reports) may be obtained from EPA Regional Office AFS Emissions Contacts or by contacting Jerry Husketh of NADB at (919) 541-5449 (FTS 629-5449). Names and phone numbers for the Regional Office contacts can be obtained by calling Jerry Husketh at the number above.

There will be a later release of SAMS Version 4.1, available in mid-July 1991. This newer version will provide a capability to generate AFS-acceptable transactions as an output from SAMS. The AFS-formatted transaction data from SAMS will be uploaded to the EPA IBM mainframe and then updated to AFS. EPA will review the submitted inventory prior to updating the AFS files. The updating of AFS will begin in January 1992.

Option (3)

States submitting an AFS formatted transaction file to EPA (format definitions will be provided in May 1991) can either mail a magnetic non-labeled tape or transmit a data set (if State has appropriate connectivity and technical resources) to the National Computer Center. Tape submitted data should be structured in IBM extended binary coded decimal interchange code (EBCDIC). The loading of the transaction files to AFS will begin in January 1992. Contact Jerry Husketh of NADB at (919) 541-5449 (FTS 629-5449) for more information.

Option (4)

In the long-term, the preferred option is to enter the SIP inventory point source data directly into AFS. However, this option will not be available to users until January 1992. Contact John Ackermann at (919) 541-5687 (FTS 629-5687) or Jerry Husketh at (919) 541-5449 (FTS 629-5449), NADB, if States plan to use this approach.

4.2 Point Source Data Elements

Applicable data elements that will be supported by AFS are as follows. Data elements required for the ozone/CO inventories are shaded. These data elements are more explicitly defined in documentation for SAMS Version 4.0 and will be further defined with the specification of AFS batch transaction formats to be provided in May 1991.

List of Data Elements for Plant General Level:

Description

**FIPS state code¹
**FIPS county code¹
*year of record for emissions
**plant ID from AFS (or NEDS)
*plant name
*street address
*city name²
*zip code
local plant ID
*FIPS city code^{1,2}
*plant latitude³
*plant longitude³
*UTM zone³
*UTM easting³
*UTM northing³
township/modeling grid
*primary SIC code
secondary SIC code
tertiary SIC code
principal product
number of employees
plant area
plant contact
contact telephone number

type of inventory
plant comment

- * Mandatory for AFS format, for Adds.
- ** Mandatory for both Adds and Changes to AFS.

¹Note for FIPS codes: While SAMS currently uses SAROAD codes, these will be converted to FIPS codes by SAMS software when AFS transactions are created by SAMS users. States that generate AFS transactions from other software must use FIPS codes.

²Note for city: enter data for either city name or FIPS city code but not both. If city code is reported to AFS, this will be used to generate a city name and the city name field entry will be ignored. SIP inventory users in New England States are requested to report the FIPS city code if possible. This will permit AFS to generate the appropriate Metropolitan Statistical Area (MSA) codes for those States. Except for New England States, the MSA code can be generated from county codes so that city code is not necessary.

³Note for plant location: enter data for either lat/long or UTM, but not both. For cases where both are reported, UTM data will be used to update AFS and lat/long data will be ignored.

List of Data Elements for Point General Level:

Description

**FIPS state code
**FIPS county code
**plant ID from AFS (or NEDS)
**point ID from AFS
local point ID
hours per day
days per week
hours operated per year
start time (each workday)
end time (each workday)
percent throughput - Dec. thru Feb.
percent throughput - March thru May
percent throughput - June thru Aug.
percent throughput - Sept. thru Nov.
boiler capacity
space heat percentage
point comment

** Mandatory for both Adds and Changes to AFS.

List of Data Elements for Point Pollutant Level:

Description

**FIPS state code
**FIPS county code
**plant ID from AFS (or NEDS)
**point ID from AFS
**pollutant code or CAS code
measured emissions at point
emission measurement method code
measured emissions units
SIP regulation in place for point
compliance year for point
emission limitation for point
emission limitation value
emission limitation units

** Mandatory for both Adds and Changes to AFS.

List of Data Elements for Stack Level:

Description

**FIPS state code
**FIPS county code
**plant ID from AFS (or NEDS)
**stack ID from AFS
*stack height (ft)^{1,3}
*stack diameter (ft)^{1,3}
*plume height (vent height, ft)^{1,3}
latitude for stack^{2,3}
longitude for stack^{2,3}
UTM easting for stack^{2,3}
UTM northing for stack^{2,3}
temperature of exit gases (F)
exhaust gas flow rate (ACFM)
exit gas velocity (ft/sec)

* Mandatory for AFS format, for Adds.

** Mandatory for both Adds and Changes to AFS.

¹Note: required either to enter stack height and stack diameter or to enter plume height (vent height).

²Note: for Stack location (if different from Plant), enter either lat/long or UTM, but not both.

³Note: required for AFS only if a stack exists and stack ID has been entered; for SIP inventories, this parameter is not required if no stack exists or if photochemical modeling is not required for an attainment demonstration.

List of Data Elements for Segment General Level:

Description

**FIPS state code
**FIPS county code
**plant ID from AFS (or NEDS)
**point ID from AFS
**segment ID from AFS
*SCC number
sulfur percentage
ash percentage
heat content
confidentiality
process rate units
actual annual process rate²
maximum design rate²
O₃ season process rate (daily)²
CO season process rate (daily)²
stack ID related to this segment¹
segment comment

* Mandatory for AFS format, for Adds.

** Mandatory for both Adds and Changes to AFS.

¹Note: required for AFS only if a stack exists; for SIP inventories, this parameter is not required if no stack exists or if photochemical modeling is not required for attainment demonstration.

²Note: these parameters must be provided unless they are deemed to be confidential or their reporting is prohibited by State law.

List of Data Elements for Segment Pollutant Level:

Description

**FIPS state code **FIPS county code
**plant ID from AFS (or NEDS)
**point ID from AFS
**segment ID from AFS
**pollutant code or CAS code
primary control device code¹
secondary control device code¹
control efficiency¹
SIP regulation in place for segment
compliance year for segment
emission limitation description for segment
emission limitation value
emission limitation units
emission estimation method
emission factor²
seasonal adjustment factor
annual nonbanked emissions (estimated actual)
annual banked emissions
rule effectiveness³
O₃ season emissions (lb/day)
CO season emissions (lb/day)

** Mandatory for both Adds and Changes to AFS.

¹Note: required for SIP inventories only when a control device exists.

²Note: required for SIP inventories only when the emission estimation method code indicates that an emission factor was used (i.e., method codes 3 and 5 for SAMS reporting or method code 9 for AFS batch format reporting). For other method codes, an emission factor does not apply and is not required.

³Note: required for SIP inventories only when rule is in place that affects emissions of the pollutant.

4.3 Area and Mobile Source Inventory

The NADB is developing a new AIRS subsystem to handle the area and mobile source inventories. The new mainframe software is called AMS and will facilitate State data entry, update, and access to area source data. Since AMS will not be able to upload State data in formatted transactions until May 1992 (AMS "National" capability by November 1992), AMS data entry software is being developed on a personal computer (PC).

States have three basic options to submit their area source data. However, please note that option 3 will not be available in time for the draft area and mobile source inventory submittals but could be used for final base year submittals or periodic inventory updates.

<u>Option</u>	<u>When Available</u>
(1) AMS-PC Version 1.0	June 28, 1991
(2) AMS Batch Transaction Format Available	July 31, 1991
(3) AMS Mainframe Interactive Direct Entry	May 29, 1992

Option (1)

The AMS-PC package will be available to the States by June 28, 1991. States may use the AMS-PC package to submit their 1990 base-year inventory for area and mobile sources. The AMS-PC Version 1.0 will be a basic data-entry system for State-prepared emissions values, and will have only minimal calculation capabilities. The AMS-PC package will be compatible with the mainframe AIRS AMS in categories, codes, and edits, and will be consistent with EPA's guidance for SIP 1990 base-year inventories. Note that SAMS Version 4.0 and Version 4.1 will not provide the appropriate categories and formats to develop the

1990 area source or mobile source inventory; therefore, SAMS cannot be used for the purpose of submitting AMS inventory data.

Option (2)

States planning to transmit a computer generated data set or magnetic tape file will need to supply data in EPA's AMS batch transaction format. This format will be defined and distributed to the States in July 1991. Tape submitted data should be structured in IBM EBCDIC.

AMS transactions generated from the AMS-PC and AMS batch transactions generated and submitted from State computers will be updated to the AMS mainframe data base. The capability to update this SIP data to the mainframe is scheduled for May 1992. During the period of January through May, 1992, the Technical Support Division will provide assistance with basic edits and review of draft inventories submitted as AMS batch transactions from State computers. The Regions and the States will receive additional information and guidance regarding area and mobile source procedures in the near future. State personnel should contact John Ackermann or Sue Kimbrough of NADB to indicate what type of approach will be used for their area and mobile source inventories.

Option (3)

The AMS mainframe data entry capability for area and mobile source data will be available in May 1992. States will be able to do corrections, updates or projections interactively to base year data existing or imported into AMS. States planning to use this approach will need AMS training and should coordinate their submittal plan with Sue Kimbrough of NADB, at (919) 541-5457 (FTS 629-5457).

4.4 Area and Mobile Source Data Elements

Area and mobile source data should be reported either using AMS or in a computer readable format compatible with AMS, as stated previously. A tentative list of data elements to be supported by AMS is included below. This list does not cover the bulk of the on-road mobile source data elements (e.g., inputs to and outputs from the MOBILE model) that will be required with the inventory submittal. AMS data elements and formats (including on-road mobile source data) will be defined more explicitly in AMS documentation to be finalized by July 31, 1991. Shaded data elements are required for SIP emission inventories.

List of Data Elements for Source Category Level:

Provider (EPA or State)

Inventory Type (Base Year, RFP Projection, etc)

Base Year

State Code

County Code

City Code

Zone (for City or County Subdivision)

Source Category (from valid EPA AMS Source Classification Codes)

Activity Level (annual quantity consumed, produced, etc. - associated with emissions)

Activity Level Units (units of measure for activity level - e.g., cubic feet, tons, employees, VMT)

Activity Level Process (burned, produced, consumed, etc.)

Activity Level Method (EPA SIP, State, etc.)

Activity Level Origin (Input by user, calculated, etc.)

Activity Level Limit (maximum activity allowed by regulation)¹

Activity Level Limit Units¹

Activity Level Limit Process¹

Ash Content Percent

Sulfur Content Percent

Comment

¹Note: Required for SIP inventories only when the activity level is limited by regulation.

List of Data Elements for Pollutant Level:

Provider
Inventory Type
Base Year
State Code
County Code
City Code
Zone
Source Category
Pollutant Code
Emission Factor
Emission Factor Decimal
Emission Factor Units
Emission Factor Limit (maximum factor allowable by regulation)¹
Emission Factor Limit Decimal¹
Emission Factor Limit Units¹
Emission Factor - QA
Emission Factor - QA Decimal
Emission Factor - QA Units
Percent Reactivity
Days Per Week
Weeks Per Year
SIP Rule in Place
Year Regulated
Year Last Modified
Rule Penetration
Rule Effectiveness
Control Equipment
Control Efficiency
Percent Usage
Comment

¹Note: Required for SIP inventories only when the emission rate is limited by regulation.

List of Data Elements for Period Level:

Provider
Inventory Type
Base Year
State Code
County Code
City Code
Zone

Source Category
Pollutant Code
Period Code (Typical Winter Day, Peak Ozone Season, etc.)
Period Begin Month
Period End Month
Period Throughput
Interval Code (1 HR, 3 HR, 8 HR, etc.)
Hour 00 .. Hour 23 Throughput
Start Hour
Weekday Adjustment Factor
Saturday Adjustment Factor
Sunday Adjustment Factor
Emission Factor
Emission Factor Decimal
Emission Factor Units
Emission Factor Limit
Emission Factor Limit Decimal
Emission Factor Limit Units

List of Data Elements for Emissions Level:

Provider
Inventory Type
Base Year
State Code
County Code
City Code
Zone
Source Category
Pollutant Code
Emissions Type (Actual, Allowable, Uncontrolled)
Annual Emissions
Annual Emissions Decimal
Annual Emissions Units
Period Code
Daily Emissions
Daily Emissions Decimal
Daily Emissions Units
Interval Code
Interval Emissions
Interval Emissions Decimal
Interval Emissions Units

Note: If EPA or State default values are used, the origin (EPA or State) and level (National, State or County) are required to be indicated each time a default is used.

4.5 Format for Area and Mobile Source Data

Previously, the SIP guidance documents and the SAMS system provided for a series of source categories that ranged from the detailed level to a very aggregated level. However, the source category codes developed for use within AMS have been designed to encourage the user to submit data at a more detailed level. Therefore, the AMS source categories are significantly different from the manner in which source categories have been designated in past SIP guidance. A tentative listing of major AMS source categories is included in Appendix B. A detailed listing of the final AMS source category codes and descriptions will be provided in AMS guidance to be issued by July 1991.

5.0 DOCUMENTATION OF THE INVENTORY

Base year emission inventory information under the Clean Air Act Amendments (CAAA) shall be provided to EPA in both written and computerized formats. The written presentation has to contain documentation that is extensive enough for the Agency to reproduce the emission estimates that are submitted in the inventory. Written reporting/documentation requirements are summarized in this section. The use of AIRS may alleviate the need for detailed hard copy data reporting because of the ability of AIRS to generate the necessary reports. However, this does not eliminate the need for certain documentation of the inventory such as the specification of how applicable sources were identified, where activity data were derived, and how rule effectiveness levels were determined. The parallel specifications for computerized submittals are presented in Section 4.0.

Under the CAAA, EPA is requiring that States prepare written inventory documentation reports according to a more standardized set of guidelines. Inventory reports that are not prepared according to the guidelines will be harder for EPA to review and are more likely to be deemed unacceptable by the Agency. This does not mean that every State inventory report must be organized precisely the same and look identical. EPA's primary interest is that all inventories address the crucial elements inherent in a good inventory and provide summary data and documentation that allow the quality of the inventory effort to be effectively judged. Therefore, the emphasis is on the types of data that need to be reported and not the specific format they are reported in. Inventories not meeting the minimum data reporting and documentation standards established in this discussion shall, however, be deemed unacceptable and returned to the States for modification before any further technical quality review will be performed.

EPA has already published a detailed guidance document on this issue that States need to consult before preparing their written reports. This document is entitled Example Emissions Inventory Documentation for Post-1987 Ozone State Implementation Plans (EPA 450/4-89-018). The full reference for the document is given in citation

No. 4 of the Section 6.0 bibliography. If a State does not have the report, copies can be obtained from the Emission Inventory Branch (EIB) of Office of Air Quality Planning and Standards (OAQPS). As the title implies, the guidance document provides a complete example of how an inventory should be compiled and documented. The kinds of summary tables and graphics that States need to provide to EPA for their base year inventories are clearly shown. The examples cover point, area, and mobile sources, and they address quality assurance (QA) aspects of the inventory. It also provides States guidance on how to summarize quality assurance activities that need to be carried out in the compilation of the inventory.

EPA's recommended outline for the organization and content of a State's inventory report is given in Table 5-1. The combination of the Table 5-1 outline with the Example Emissions Inventory Documentation report should provide States with all of the guidance necessary to prepare an inventory documentation report that will satisfy EPA and the intent of the CAAA.

The introduction to an inventory report shall contain a description of the nonattainment area that has been inventoried; a listing of the counties covered; a map of the area including the 25-mile boundary outside of the nonattainment area; an identification of who prepared the inventory and who are the respective contacts for major inventory components; a description of major inventory problems or deficiencies; and a discussion of how the remainder of the report is organized. After the introduction, the report must contain a thorough summary of the emissions data by pollutant, source type (point, area, mobile), and geographic area. The Example Emissions Inventory Documentation report provides several examples of tables and graphics that can be presented for point, area, and mobile sources. At a minimum, the report must include summary emissions tables by pollutant and by source type; summary emissions tables by county; and graphics illustrating the contribution to areawide emissions by source type. States are required to report emissions data both on an annual and ozone season daily basis.

TABLE 5-1. OUTLINE FOR EPA RECOMMENDED FORMAT/CONTENTS FOR
OZONE SIP EMISSION INVENTORY REPORTS

-
-
- I. Cover and Title Page
- A. Title (geographic area, type of inventories, pollutants, base year)
 - B. Responsible agency [e.g., NC Dept of Health and Natural Resources]
 - 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

[For example, In response to letter from ____ to ____, dated ____ requesting preparation of a SIP for demonstration of attainment of ozone NAAQS in (geographic area), beginning with an emission inventory for base year 1990. Base year emission inventory serves as the basis for emissions modeling and projections for future years.]
 - B. Geographic area covered, base year, type of inventory (O₃ SIP, CO SIP), pollutants included (VOC, NO_x, CO)
 - C. Brief discussion of contents of report

[Note: Include a paragraph or less describing each major report section. For example, Section 2 summarizes stationary point, area and mobile source emissions by county. Section 3 describes stationary point source emissions and includes a discussion of methods used to gather data, calculate annual and seasonal emissions, and presents a summary of emissions by plant. Detailed point source emissions data are presented in Appendix F. Section 4 discusses...]
 - D. Discussion of automated data systems used (SAMS, AIR AFS, AMS-PC, State system)

TABLE 5-1. Continued

-
-
- E. Major problems, deficiencies, portions of inventory not included
 - F. List of primary guidance documents and references used (EPA guidance 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 (point, area, mobile - broken down by non-road sources and on-road vehicles; brief discussion in footnote, etc. to clarify what each includes - point sources above cutoff, area sources excluding non-road mobile sources?, non-road sources include aircraft, trains,...)
 - 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. detailed data for each plant (can put in appendix instead)
 - 5. point source emissions summary
 - 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. Non-road Mobile Sources

TABLE 5-1. Continued

	a.	same information as for stationary area sources
2.		On-Road Vehicles
	a.	mobile model inputs and outputs
	b.	VMT estimates
	c.	emission estimates
	d.	documentation (can put all or part in Appendices)
	e.	mobile source emissions summary
	f.	discussion of procedures and methodologies
VI.		Quality Assurance/Quality Checking (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
VII.		Appendices
	A.	Lengthy data, calculations, documentation of methodologies/models

Notes: Both annual and seasonal emissions (O_3 - summertime daily emissions), should be presented in the summary and sections describing emissions.

All pages in the report (including appendices) should be numbered. Sources of information should be referenced throughout. Include complete list(s) of references within body of report (preferably at end of each section).

Margins of report should be adequate so that copying of report will not lose text, page numbers, or other important information.

* In addition to hard copy reporting requirements for emissions data, data must be reported in a computerized AIRS compatible format (Section 4.0). To the extent that data have been successfully loaded onto AIRS and reports can be generated from AIRS for nonattainment areas, this may alleviate transmittal of portions of the hard copy inventory that contain the detailed emissions data.

Separate discussions must be presented to describe inventory development procedures and results for point, area, non-road mobile, and on-road mobile sources. In addition to the specific parameters germane to point, area, and mobile source types, each source type discussion needs to explain how emissions were temporally allocated to a daily basis and how rule effectiveness was incorporated into each emission estimate.

The point source discussion shall include a description of how the list of sources to be inventoried was identified. The discussion shall address the issue of completeness of source coverage (i.e., how did you ensure that all 10 ton/yr sources were identified). Data collection methods and tools shall be thoroughly explained and documented. All information surveys that may have been conducted must be discussed and the results provided (probably in an appendix). All sources inventoried shall be listed according to their source category type (e.g., refinery, graphic arts, SOCOMI plant, etc.). The methodology by which activity levels and emissions were determined for each plant or source category (when applicable) shall be succinctly but explicitly explained. Large volumes of detailed data shall be put into appendices but clearly linked to the text discussion in terms of how they were used to determine emissions. Summary tables and graphics shall be prepared to address just point source emissions (e.g., summary table on volatile organic compound (VOC) point source emissions ranked by source category type).

The area source discussion shall cover stationary area sources, with non-road mobile sources included in the mobile source discussion. The report must state if any source categories were not considered in the inventory and why. All of the source categories covered shall be listed and the method used to determine emissions identified. If the EPA-recommended approach in the Procedures Document (EPA-450/4-88-021) was used, but a different emission factor was used, this must be noted. For all approaches used (EPA or otherwise), the derivation of activity/commodity level data shall be thoroughly discussed. As needed, supporting data can be put into appendices but the appendices shall be fully explained and clearly linkable back to the text discussion and emission estimates. Like point sources, emission summaries shall be developed for area sources. The summaries must reflect

emissions by county and for the entire nonattainment area. Examples for these types of sources are found in the Example Emission Inventory Documentation report.

In the mobile sources section of the inventory report, States shall clearly describe how non-road mobile emissions were calculated, how on-road vehicle emission factors were determined, and how vehicle miles traveled (VMT) estimates were determined. For on-road vehicle emission factors, the States must fully report how they used the updated MOBILE4 model to help determine emissions. The values used for all input parameters required by the model shall be presented and their basis discussed. The emission factors produced by the model shall be presented by vehicle class. For VMT, the State must describe the methodology employed to generate VMT data, key assumptions and inputs to the process, and the group responsible for the estimates. The VMT data determined shall be presented by road type classification and by vehicle class. States must explicitly describe the derivation of VMT. It is not acceptable to simply state that the Department of Transportation ran a transportation planning model and provided the air agency with VMT numbers. Simply providing a computer printout of a transportation modeling run, without any explanation, is also not acceptable. The agency that is responsible for the overall inventory must ensure that sufficient documentation is provided to fully explain how VMT and mobile source emission factors were derived.

The report shall fully describe how the VMT data were combined with the emission factors to produce mobile source emission estimates. The calculated estimates must be provided in summary form by vehicle class, by pollutant, and by county. Simple examples of how these summaries can be provided are given in the Example Emissions Inventory Documentation report referenced previously.

The inventory report shall have a separate section that describes the implementation of the State's QA plan and the results achieved by the QA program. For all source category types, the QA discussion shall address the completeness of the inventory (e.g., are all of the EPA-recommended area source categories accounted for), reasonableness of the emission estimates (e.g., are estimates for a category consistent with some other related

parameter for the area), and relative accuracy of the data (e.g., do all of the individual county emission figures total to the sums given for the whole area). The QA discussion must show the range of quality review that was performed and how this review benefitted the inventory. The EIB will be issuing additional quality review guidance in July 1991 to help States perform many of these quality checks and provide the kinds of QA feedback deemed necessary by EPA.

6.0 BIBLIOGRAPHY

The purpose of this section is to identify and provide bibliographic citations of currently existing EPA guidance materials for the development of ozone emission inventories. The list of existing guidance is divided into four categories: ozone inventory guidance/requirements, quality assurance/inventory review guidance, emission factors/models, and general inventory guidance. If updates to an existing document are planned in response to the Clean Air Act Amendment (CAAA), this is indicated in the guidance citation.

Ozone Inventory Guidance/Requirements

1. Procedures For The Preparation Of Emission Inventories For Precursors Of Ozone, Volume I, EPA-450/4-88-021, Third Edition, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1988. [Revised version to be completed in May 1991.]
2. Procedures For The Preparation Of Emission Inventories For Volatile Organic Compounds, Volume II: Emission Inventory Requirements For Photochemical Air Quality Simulation Models, EPA-450/4-79-018, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1979. [Revised version to be completed in May 1991.]
3. Procedures For Emission Inventory Preparation, Volume IV: Mobile Sources, EPA-450/4-81-026d, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle, Park, NC, July 1989 (also listed below under General Inventory Guidance). [Revised version to be completed in May 1991.]
4. Example Emission Inventory Documentation For Post-1987 Ozone State Implementation Plans (SIPs), EPA-450/4-89-018, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1989.
5. Procedures For Estimating And Applying Rule Effectiveness In Post-1987 Base Year Emission Inventories For Ozone And Carbon Monoxide State Implementation Plans, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 1989.

6. SIP Air Pollutant Inventory Management System (SAMS) Version 4.0 and SAMS User's Manual, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1991.

Quality Assurance/Inventory Review Guidance

7. Guidance For The Preparation Of Quality Assurance Plans For O₃/CO SIP Emission Inventories, EPA-450/4-88-023, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1988.
8. Quality Assurance Program For Post-1987 Ozone And Carbon Monoxide State Implementation Plan Emission Inventories, EPA-450/4-89-004, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1989.
9. Quality Review Guidelines For Post-1987 State Implementation Plan (SIP) Base Year Emission Inventories (Draft), U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 1990. [Final version to be completed in July 1991.]
10. Guidelines For Review Of Highway Source Emission Inventories For 1982 State Implementation Plans, EPA-450/12-80-002, U. S. Environmental Protection Agency, Research Triangle Park, NC, December 1980. [This document will be superseded by the Quality Review Guidelines document above, to be completed in July 1991.]

General Inventory Guidance

11. Procedures For Emission Inventory Preparation, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle, Park, NC:
 - a. Volume I: Emission Inventory Fundamentals, EPA-450/4-81-026a, September 1981.
 - b. Volume II: Point Sources, EPA-450/4-81-026b, September 1981.
 - c. Volume III: Area Sources, EPA-450/4-81-026c, September 1981.

- d. Volume IV: Mobile Sources, EPA-450/4-81-026d (Revised), July 1989. [Updated version to be completed in May 1991.]
- e. Volume V: Bibliography, EPA-450/4-81-026e, September 1981.

Emission Factors/Models

- 12. Compilation of Air Pollutant Emission Factors, Volumes I and II and its supplements, Fourth Edition, AP-42, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1985.
- 13. AIRS Facility Subsystem Source Classification Codes (SCCs) And Emission Factor Listing For Criteria Pollutants, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1989.
- 14. User's Guide to MOBILE4 (Mobile Source Emission Factor Model), EPA-AA-TEB-89-01, U. S. Environmental Protection Agency, Office of Mobile Sources, Ann Arbor, MI, February 1989. [Revised version of MOBILE4 and documentation to be completed in May 1991.]
- 15. Surface Impoundment Modeling System (SIMS) Version 2.0 User's Manual, EPA-450/4-90-019a, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1990.
- 16. Background Document For Surface Impoundment Modeling System (SIMS) Version 2.0, EPA-450/4-90-019b, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1990.

To obtain copies of any of these documents, contact Mary Ann Stewart at (919) 541-4340 or FTS 629-4340.

APPENDIX A

**SUMMARY OF REQUIRED OZONE SIP INVENTORIES
BY NONATTAINMENT AREA CLASSIFICATION**

The type of inventories that are required (either explicitly or implicitly) to be compiled under the Clean Air Act Amendments (CAAA) of 1990 for each different ozone nonattainment classification are delineated below. The timing of each inventory is also denoted.

Ozone Nonattainment Areas

Marginal Areas:

- a) Base Year Inventory -- Required by November 15, 1992, base year is 1990, includes actual emissions of VOC, NO_x, and CO. An adjusted base year inventory is also required by November 15, 1992, and serves as the starting point for emission reduction calculations. The adjusted base year inventory equals the 1990 base year inventory less biogenic emissions and specific exclusions for emission reductions achieved from RVP regulations promulgated prior to enactment and the FMVCP prior to January 1, 1990.
- b) Periodic Inventory -- Required no later than November 15, 1995, however, must be submitted as soon after the end of the base year as is feasible. Base year for inventory is 1993. (If attainment is not demonstrated by 1993, the area is bumped up to the Moderate classification level and must comply with all of the inventory requirements of that classification.)

Moderate Areas:

- a) Base Year Inventory -- Same requirements as Marginal Area
- b) Periodic Inventory -- Same requirements as Marginal Area except a periodic inventory is due every three years after the initial submittal until the area is redesignated to attainment (base years are 1993 and 1996).
- c) RFP Projected Inventory for Year 6 (1996) -- Inventory takes the adjusted base year inventory and projects it into the future to 1996 to demonstrate that the required 15 percent reduction will be achieved. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. The base year for the projection inventory is 1996 and it has to be submitted in final form by November 15, 1993. In addition, inventory projections must be summarized for intermediate years (1991-1995) and submitted with the 1996 projection.

- d) Modeling Inventory -- By November 15, 1993, the State must make a demonstration that its plan provides for attainment by the applicable date. To make the Attainment Demonstration, base year and projected modeling inventories are needed. The base year modeling inventory will be derived from the 1990 base year inventory but must reflect significant changes in conditions and activities of the episode days, while the projected modeling inventory will have a 1996 base year. The projected modeling inventory will be used to determine if the proposed SIP control strategies are adequate to reach attainment by the designated date.

Serious Areas:

- a) Base Year Inventory -- Same requirements as Moderate Area
- b) Periodic Inventory -- Same requirements as Moderate Area (base years are 1993, 1996, and 1999)
- c) RFP Projected Inventory for Year 6 (1996) -- Same requirements as Moderate Areas
- d) RFP Projected Inventory for Year 9 (1999) -- By November 15, 1994 the State must submit an inventory that projects how the 3 percent per year RFP reduction requirement over 3 years (years 1996-1999) will be achieved. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. Projections must be summarized for intermediate years (1997-1999).
- e) Modeling Inventory -- By November 15, 1994, the State must make a demonstration that its plan provides for attainment by the applicable date. To make the Attainment Demonstration, base year and projected modeling inventories are needed since the CAAA require that photochemical grid modeling or EPA-approved alternative be used. The base year modeling inventory will be derived from the 1990 base year inventory but must reflect significant changes in conditions and activities of the episode days, while the projected modeling inventory will have a 1999 base year. Both inventories will require considerably more detailed data than either the 1990 base year or the projected base year inventory. The projected modeling inventory will be used to determine if the proposed SIP control strategies are adequate to reach attainment by the designated date.

Severe Areas:

- a) Base Year Inventory -- Same requirements as Serious Area
- b) Periodic Inventory -- Same requirements as Serious Area (base years are 1993, 1996, 1999, 2002, and 2005. For areas over 0.190 ppm, an additional inventory for 2007 would be required.)
- c) RFP Projected Inventory for Year 6 (1996) -- Same requirements as Serious Areas
- d) RFP Projected Inventory for Year 9 (1999) -- Same requirements as Serious Area
- e) RFP Projected Inventory for Year 12 (2002) -- By November 15, 1994 the State must submit an inventory that projects how the 3 percent per year RFP reduction requirement over 3 years (years 1999-2002) will be achieved. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. Projections must be summarized for intermediate years.
- f) RFP Projected Inventory for Year 15 (2005) -- By November 15, 1994 the State must submit an inventory that projects how the 3 percent per year RFP reduction requirement over 3 years (years 2002-2005) will be achieved. [An exception to this requirements is: for severe areas with a design day value over 0.190 ppm, the period of attainment is extended out to 2007]. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. Projections must be summarized for intermediate years.
- g) Modeling Inventory -- By November 15, 1994, the State must make a demonstration that its plan provides for attainment by the applicable date. To make the Attainment Demonstration, base year and projected modeling inventories are needed since the CAAA require that photochemical grid modeling or EPA-approved alternative be used. The base year modeling inventory will be derived from the 1990 base year inventory but must reflect significant changes in conditions and activities of the episode days, while the projected modeling inventory will have a 2005 (or 2007 for areas over 0.190 ppm) base year. Both inventories will require considerably more detailed data than either the 1990 base year or the projected base year inventory. The projected modeling inventory will be used to determine if the proposed SIP control strategies are adequate to reach attainment by the designated date.

Extreme Areas:

- a) Base Year Inventory -- Same requirements as Severe Areas
- b) Periodic Inventory -- Same requirements as Severe Areas (base years are 1993, 1996, 1999, 2002, 2005, 2008, and 2010)
- c) RFP Projected Inventory for Year 6 (1996) -- Same requirements as Severe Areas
- d) RFP Projected Inventory for Year 9 (1999) -- Same requirements as Severe Areas
- e) RFP Projected Inventory for Year 12 (2002) -- Same requirements as Severe Areas
- f) RFP Projected Inventory for Year 15 (2005) -- By November 15, 1994 the State must submit an inventory that projects how the 3 percent per year RFP reduction requirement over 3 years (years 2002-2005) will be achieved. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. Projections must be summarized for intermediate years.
- g) RFP Projected Inventory for Year 18 (2008) -- By November 15, 1994 the State must submit an inventory that projects how the 3 percent per year RFP reduction requirement over 3 years (years 2005-2008) will be achieved. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. Projections must be summarized for intermediate years.
- h) RFP Projected Inventory for Year 20 (2010) -- By November 15, 1994 the State must submit an inventory that projects how the 3 percent per year RFP reduction requirement over years 2008 to 2010 will be achieved. The inventory includes VOC and NO_x emissions, and is based on allowable emissions dictated by regulatory limits. Projections must be summarized for intermediate years.
- i) Modeling Inventory -- By November 15, 1994, the State must make a demonstration that its plan provides for attainment by the applicable date. To make the Attainment Demonstration, base year and projected modeling inventories are needed since the CAAA require that photochemical grid modeling or EPA-approved alternative be used. The base year modeling

inventory will be derived from the 1990 base year inventory but must reflect significant changes in conditions and activities of the episode days, while the projected modeling inventory will have a 2010 base year. Both inventories will require considerably more detailed data than either the 1990 base year or the projected base year inventory. The projected modeling inventory will be used to determine if the proposed SIP control strategies are adequate to reach attainment by the designated date.

APPENDIX B

**POINT, AREA, AND MOBILE SOURCE CATEGORIES
NECESSARY FOR CONSIDERATION IN OZONE SIP INVENTORIES**

TABLE B-1. INDIVIDUAL POINT SOURCE CATEGORIES

Storage, Transportation And Marketing Of Petroleum Products and Volatile Organic Liquids (VOL)

Oil And Gas Production

Storage

Fugitives

Other Process Units (specify)

Natural Gas And Gasoline Processing

Storage

Fugitives

Other Process Units (specify)

Oil Processing

Storage

Fugitives

Other Process Units (specify)

Tank Farms (specify material stored)

Fixed Roof Tanks

External Floating Roof Tanks

Primary Seals

Secondary Seals

Internal Floating Roof Tanks

Bulk Gasoline And VOL Terminals

Leaks From Valves, Flanges Meters, Pumps

Vapor Collection Losses

Vapor Control Unit Losses

Filling Losses From Uncontrolled Loading Racks

Tank Truck Vapor Leaks From Loading Of Gasoline

Non-tank Farm Storage

Gasoline Bulk Plants

Gasoline Bulk Storage

Loading And Unloading Racks (Controlled And Uncontrolled)

Tank Truck Vapor Leaks From Loading And Unloading Of Gasoline

Leaks From Valves, Flanges, Meters, Pumps

TABLE B-1. Continued

Barge And Tanker Transfer
Gasoline Loading/Barge
Crude Oil Ballasting/Tanker

Barge And Tanker Cleaning

Industrial Processes

Petroleum Refineries

Process Drains And Wastewater Separators
Vacuum Producing Systems
Process Unit Turnarounds
Fugitive Leaks From Seals, Valves, Flanges,
Pressure Relief Devices, Drains
Other Process Emissions Such As Heaters, Boilers,
Cat Cracker Regenerators (specify)

Lube Oil Manufacture

Pharmaceutical Manufacture

Process Units Such As Vacuum Dryers, Reactors,
Distillation Units, Filters, Extractors,
Centrifuges, Crystallizers
Major Production Equipment Such As Exhaust Systems And
Air Dryers
Storage And Transfer
Other Process Units (specify)

Rubber Tire Manufacture

Undertread And Sidewall Cementing
Bead Dipping
Bead Swabbing
Tire Building
Tread End Cementing
Green Tire Spraying
Tire Curing

TABLE B-1. Continued

Solvent Mixing
Solvent Storage
Other Process Units (specify)

Styrene Butadiene Rubber Manufacture
Blowdown Tanks
Steam Stripper
Prestorage Tanks
Other Process Units (specify)

Vegetable Oil
Oil Extraction And Desolventization
Meal Preparation
Oil Refining
Fugitive Leaks
Solvent Storage
Other Process Units (specify)

Organic Chemical Manufacture (specify major chemicals)
Fugitive Leaks From Seals, Valves, Flanges,
Pressure Relief Devices, Drains
Air Oxidation Units
Waste Water Separators
Storage And Transfer
Other Process Units (specify)

Polymer And Resin Manufacture
Catalyst Preparation
Reactor Vents
Separation of Reactants, Solvents And
Diluents From Product
Raw Material Storage
Solvent Storage
Other Process Units (specify)

Plastic Products Manufacture
Mold Release
Solvent Consumption

TABLE B-1. Continued

Adhesives Consumption
Other Process Units (specify)

Inorganic Chemical Manufacture
Fugitive Leaks From Seals, Valves, Flanges,
Pressure Relief Devices, Drains
Storage And Transfer
Other Process Units (specify)

Fermentation Processes
Fermentation Tank Venting
Aging/Wine or Whiskey
Other Process Units (specify)

Iron And Steel Manufacture
Coke Production
Coke Pushing
Coke Oven Doors
Coke Byproduct Plant
Coke Charging
Coal Preheater
Topside Leaks
Quenching
Battery Stacks
Sintering
Electric Arc Furnaces
Other Process Units (specify)

Synthetic Fiber Manufacture
Dope Preparation
Filtration
Fiber Extrusion - Solvent Recovery
Takeup Stretching, Washing, Drying, Crimping, Finishing
Fiber Storage - Residual Solvent Evaporation
Equipment Cleanup
Solvent Storage
Other Process Units (specify)

TABLE B-1. Continued

Chemical Manufacturing

Adipic Acid

Nitric Acid

Other

Mineral Products

Cement

Glass

Other

Industrial Surface Coating

Large Appliances

Cleaning And Pretreatment

Prime Spray, Flow, Or Dip Coating Operations

Topcoat Spray

Coating Mixing

Coating And Solvent Storage

Equipment Cleanup

Other Process Emissions (specify)

Magnet Wire

Cleaning And Pretreatment

Coating Application And Curing

Coating Mixing

Coating And Solvent Storage

Equipment Cleanup

Other Process Emissions (specify)

Automobiles And Light Duty Trucks

Cleaning And Pretreatment

Prime Application, Electrodeposition, Dip Or Spray

Prime Surfacing Operations

Topcoat Operation

Repair Topcoat Application Area

Coating Mixing

Coating And Solvent Storage

Equipment Cleanup

Other Process Emissions (specify)

TABLE B-1. Continued

Cans

Cleaning And Pretreatment
Two Piece And Exterior Base Coating
Interior Spray Coating
Sheet Basecoating (Interior)
Sheet Basecoating (Exterior)
Side Seam Spray Coating
End Sealing Compound
Lithography
Over Varnish
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Paper

Coating Operations
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Coil Coating

Prime Coating
Finish Coating
Solvent Mixing
Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Fabric

Coating Operations
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Metal And Wood Furniture

Cleaning And Pretreatment

TABLE B-1. Continued

Coating Operations
Coating Mixing
Coating And Solvent Mixing
Equipment Cleanup
Other Process Emissions (specify)

Flatwood Products

Filter
Sealer
Basecoat
Topcoat
Inks
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Plastic Products

Cleaning And Pretreatment
Coating Operations, Flow, Dip, Spray
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Large Ships

Cleaning And Pretreatment
Prime Coat Operation
Topcoat Operation
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Large Aircraft

Cleaning And Pretreatment
Prime Coat Operation
Topcoat Operation
Coating And Solvent Storage

TABLE B-1. Continued

Equipment Cleanup
Other Process Emissions (specify)

Miscellaneous Metal Parts And Products

Cleaning And Pretreatment
Coating Operations, Flow, Dip, Spray
Coating Mixing
Coating And Solvent Storage
Equipment Cleanup
Other Process Emissions (specify)

Other Solvent Use

Dry Cleaning
Perchloroethylene
Petroleum
Other

Degreasing
Open Top Vapor Degreasing
Conveyorized Degreasing - Vapor
Conveyorized Degreasing - Cold Cleaning

Solvent Extraction Processes

Adhesives
Adhesive Application
Solvent Mixing
Solvent Storage
Other Process Emissions (specify)

Graphic Arts
Letter Press
Rotogravure
Offset Lithography
Ink Mixing
Solvent Storage

TABLE B-1. Continued

Waste Disposal

Municipal Waste

Combustion

Refuse Derived Fuel (RDF)

Mass Burn

Co-fired

Other

Landfills

Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)

Lagoons

Tanks

Mixing

Aeration

Landfills

Other

Publicly Owned Treatment Works (POTWs)

Tanks

Lagoons

Aeration

Mixing

Digestion

Other

Industrial Wastewater Treatment

Tanks

Lagoons

Aeration

Mixing

Digestion

Other

Industrial Boilers

Co-firing (specify major substances and co-firing fuels,
such as oil, gas, coal, etc.)

TABLE B-1. Continued

External Fuel Combustion

Utility Boilers
Industrial Boilers
Commercial/Institutional Boilers
Other External Fuel Combustion

Stationary Internal Combustion

Reciprocating Engines
Gas Turbines

TABLE B-2. AREA AND MOBILE SOURCE CATEGORIES

Stationary Source Fuel Combustion

Electric Utility

Industrial

Commercial/Institutional

Residential

Industrial Processes

Chemical Manufacturing: SIC 28

Food & Kindred Products: SIC 20

Meat Products

Grain Mill Products

Bakery Products

Fermentation/Beverages

Misc. Food/Kindred Products

Primary Metal: SIC 33

Secondary Metal: SIC 33

Mineral Processes: SIC 32

Concrete, Gypsum, Plaster Products

Cut Stone & Stone Products

Petroleum Refining: SIC 29

Asphalt Paving/Roofing Materials

Wood Products: SIC 24

Logging Operations

Sawmills/Planing Mills

Millwork, Plywood, & Structural Members

Miscellaneous Wood Products

TABLE B-2. Continued

Rubber/Plastics: SIC 30

Fabricated Metals: SIC 34

Coating, Engraving, & Allied Services

Oil & Gas Production: SIC 13

Crude Petroleum

Natural Gas

Natural Gas Liquids

Construction: SIC 15 - 17

General Building Construction

Heavy Construction

Road Construction

Special Trade Construction

Machinery: SIC 35

Metalworking Machinery: Tool & Die Makers

Mining & Quarrying: SIC 14

Mining & Quarrying: Dimension Stone

Mining & Quarrying: Crushed & Broken Stone

Mining & Quarrying: Sand & Gravel

Mining & Quarrying: Clay, Ceramic, & Refractory

Mining & Quarrying: Chemical & Fertilizer Minerals

In-Process Fuel Use

All Industrial Processes

Solvent Utilization

Surface Coating

Architectural Coatings: All Solvent Types

Auto Refinishing: All Solvent Types

Textile Products (SIC 22): All Solvent Types

Flatwood Products (SIC 243 + 244): All Solvent Types

Wood Furniture (SIC 25): All Solvent Types

Metal Furniture (SIC 25): All Solvent Types

TABLE B-2. Continued

Paper (SIC 26): All Solvent Types
Plastic Products (SIC 308): All Solvent Types
Cans (SIC 341): All Solvent Types
Metal Coils (SIC 3498): All Solvent Types
Misc. Finished Metals [SIC 34-(341 + 3498)]: All Solvent Types
Electrical (SIC 35): All Solvent Types
Large Appliances (SIC 363): All Solvent Types
Magnet Wire (SIC 36 - 363): All Solvent Types
Motor Vehicles (SIC 371) : All Solvent Types
Aircraft (SIC 372): All Solvent Types
Marine (SIC 373): All Solvent Types
Railroad (SIC 374): All Solvent Types
Miscellaneous Manufacturing: All Solvent Types

Degreasing

Open Top Degreasing: All Solvent Types
Conveyorized Degreasing: All Solvent Types
Cold Cleaning Degreasing: All Solvent Types

Dry Cleaning

Perchloroethylene
Petroleum

Graphic Arts

Lithography: All Solvent Types
Letterpress: All Solvent Types
Rotogravure: All Solvent Types
Flexography: All Solvent Types

Rubber/Plastics

Miscellaneous Industrial

Miscellaneous Non-Industrial/All Solvent Types
Film Roofing: All Solvent Types

Adhesive Application

TABLE B-2. Continued

Commercial/Consumer

Pesticide Application

Asphalt Application

Cutback Asphalt: All Solvent Types

Emulsified Asphalt: All Solvent Types

Asphalt Roofing: All Solvent Types

Asphalt Pipe Coating: All Solvent Types

Solvent Reclamation

Tank/Drum Cleaning

All Solvent User Categories: All Solvent Types

Storage & Transport

Gasoline Marketing (Service Stations & Outlets)

Stage I (Underground Tank Filling)

Splash Fill

Submerged Fill

Balanced Submerged Fill

Stage II (Vehicle Refueling)

Displacement Losses

Spillage

Underground Tank: Breathing & Emptying

Petroleum & Petroleum Product Storage

Commercial/Industrial - All Products

Bulk Stations/Terminals - All Products

Petroleum & Petroleum Product Transport

Rail Tank Car - All Products

Marine Vessel - All Products

Truck - All Products

Pipeline - All Products

TABLE B-2. Continued

Organic Chemical Storage

Commercial/Industrial - All Products

Bulk Stations/Terminals - All Products

Organic Chemical Transport

Rail Tank Car - All Products

Marine Vessel - All Products

Truck - All Products

Pipeline - All Products

Inorganic Chemical Storage

Commercial/Industrial - All Products

Bulk Stations/Terminals - All Products

Inorganic Chemical Transport

Rail Tank Car - All Products

Marine Vessel - All Products

Truck - All Products

Pipeline - All Products

Bulk Materials Storage

Commercial/Industrial - All Products

Bulk Stations/Terminals - All Products

Bulk Materials Transport

Rail Car - All Products

Marine Vessel - All Products

Truck - All Products

Waste Disposal, Treatment & Recovery

On-Site Incineration

Industrial On-Site Incineration

Commercial/Institutional On-Site Incineration

Residential On-Site Incineration

Open Burning

Industrial

Commercial/Institutional

Residential

TABLE B-2. Continued

Landfills

Industrial Landfills
Commercial/Institutional Landfills
Municipal Landfills

Wastewater Treatment

Industrial Treatment Works (TWs)
Public Owned TWs
Residential/Sub-division Owned TWs

Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)

Industrial TSDFs
Commercial/Institutional TSDFs

Scrap & Waste Materials

Natural Sources

Biogenic

Forests
Vegetation
Soil

Geogenic

Volcanos
Geysers/Geothermal
Wind Erosion

Miscellaneous Natural Sources

Lightning
Fresh Water
Salt Water

Miscellaneous Area Sources

Agriculture Production - Crops
Agricultural Field Burning

TABLE B-2. Continued

Orchard Heaters
Country Grain Elevators

Agriculture Production - Livestock

Beef Cattle Feedlots
Poultry Operations
Dairy Operations
Hog Operations

Other Combustion

Forest Wildfires
Managed (Slash/Prescribed) Burning
Charcoal Grilling
Structure Fires
Firefighting Training
Aircraft/Rocket Engine Firing & Testing

Cooling Towers

Cooling Towers
Process Cooling Towers
Comfort Cooling Towers

Catastrophic/Accidental Releases

Industrial Accidents
Transportation Accidents

Automotive Repair Shops

Auto Top & Body Repair
Automotive Exhaust Repair Shops
Tire Retreading & Repair Shops

Miscellaneous Repair Shops

Welding Repair Shops

Health Services

Hospitals

TABLE B-2. Continued

Mobile Sources

On-Road Vehicles

Light Duty Gasoline Vehicles	(LDGV)
Light Duty Gasoline Trucks 1	(LDGT 1)
Light Duty Gasoline Trucks 2	(LDGT 2)
Heavy Duty Gasoline Vehicles	(HDGV)
Motorcycles	(MC)
Light Duty Diesel Vehicles	(LDDV)
Light Duty Diesel Trucks	(LDDT)
Heavy Duty Diesel Vehicles	(HDDV)

Non-Road Vehicle Gasoline

- Recreational Vehicles
- Construction Equipment
- Industrial/Commercial Equipment
- Lawn & Garden Equipment
- Farm Equipment

Non-Road Vehicle Diesel

- Construction Equipment
- Industrial/Commercial Equipment
- Farm Equipment

Aircraft

- Military Aircraft
- Commercial Aircraft
- Civil Aircraft
- Unpaved Airstrips

Marine Vessels

- Coal
- Diesel Fuel
- Residual Oil
- Gasoline

Railroads

- Coal
 - Diesel
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