EPA-450/4-91-011

EMISSION INVENTORY

REQUIREMENTS FOR

CARBON MONOXIDE

STATE IMPLEMENTATION PLANS

By

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PREFACE

This document describes the emission inventory requirements related to the preparation and submission of carbon monoxide (CO) 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 Carbon Monoxide State Implementation Plans (EPA-450/4-88-020) 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. Other CO SIP inventories required or necessitated by the CAAA, including periodic and modeling inventories, are also identified and requirements for these inventories are briefly discussed. Because both base year inventories and attainment demonstrations for CO nonattainment areas above 12.7 ppm are due in final form by November 15, 1992, the importance of early submittal of base year inventories and preparation of modeling inventories is emphasized. More detailed guidance on these inventories will be issued by the U. S. Environmental Protection Agency (EPA) in subsequent guidance documents (see Section 6.0).

Guidance herein provides details of the 1990 CAAA CO 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 change concerns the temporal basis for CO emissions reporting. In the base year and periodic inventories, States will be required to report CO emissions on a

daily basis, rather than an 8 hour basis, as was discussed in the February guidance.

Another change concerns the schedule for submittal of Inventory Preparation Plans, which describe how and when the inventories will be prepared and reported to EPA. 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. 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 proposed 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. 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 CO SIP inventory for which there is not an approved IPP.

- The MOBILE4 model, required under the proposed Post-1987 Policy guidance for estimating on-road 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 vehicle 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 CO 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 Office of Mobile Sources (OMS) is actively engaged in research to develop new methodologies for estimating CO emissions from several mobile source categories. Interim research results which have been provided and which are recommended for States' use in CO SIP inventory development are discussed. The source categories principally affected are non-road mobile sources such as airplanes and trains. Work has also been performed on revising the methods for deriving vehicle-miles-traveled (VMT) estimates for on-road mobile sources emissions.

- 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.

- CO SIP revisions under the CAAA must include certain inventories that go beyond requirements in

the proposed Post-1987 Policy. States shall prepare periodic 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.

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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 carbon monoxide (CO). 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 CO SIP emission inventory requirements under the CAAA. It summarizes the different CO 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, 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 and spatial allocation of emissions, the selection of ambient temperatures, the application of rule effectiveness, and the definitions of point, area, and mobile sources are discussed. Section 3.0 also addresses requirements relating to periodic 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 CO SIP inventories. The list of guidance is divided into four categories: CO 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 carbon monoxide (CO) 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 types and their requirements are specified in greater detail in Section 3.0.

2.1 Nonattainment Classifications

Two classifications are contained in the CAAA for CO nonattainment areas. These two groupings, known as moderate and serious, are defined as follows [Section 186(a)(1)].

CO Nonattainment Classifications

Area Class	Design Value (ppm)	Attainment Date
Moderate	9.1 to 16.4	December 31, 1995
Serious	16.5 and above	December 31, 2000

Even though they are classified as moderate areas, CO nonattainment areas with design values greater than 12.7 ppm have more stringent overall requirements than do moderate areas with values in the 9.1 up to 12.7 range (Section 187). The extra requirements include compiling additional vehicle miles travelled (VMT) projections [187 (a)(2)(A)], preparing contingency plans if projected VMT levels are not met and attainment is not achieved [187 (a)(2)(B)(3)], establishing enhanced vehicle inspection and maintenance (I/M) programs [187 (a)(2)(B)(6)], and preparing

specific plans to demonstrate that attainment and necessary annual emission reductions will be met [187 (a)(2)(B)(7)].

Specifically, States that have serious CO areas or moderate CO areas with a design value greater than 12.7 ppm must comply with the following additional requirements per the CAAA (unless a waiver is granted through Section 187(c)).

1. The SIP revision shall contain a forecast of VMT for each year before the year in which the plan projects attainment will be reached. The forecast must be based on guidance to be issued by the EPA Administrator. Annual updates of the forecasts have to be submitted together with annual reports regarding the extent to which such forecasts proved to be accurate. The annual reports must contain estimates of actual VMT in each year for which a forecast was required [Section 187 (a)(2)(A)].

2. The SIP revision plan must provide for the implementation of specific measures to be undertaken if any estimate of VMT submitted in an annual report (as required in No. 1 above) exceeds the number predicted in the most recent prior forecast, or if the area fails to attain the NAAQS by the specified date. The measures shall be included in the plan as contingency measures to take effect without further action by the State or the Administrator if the prior forecast has been exceeded by an updated forecast or if the NAAQS is not attained by the deadline [Section 187 (a)(2)(B)(3)].

3. The SIP revision plan must contain provisions for an enhanced vehicle I/M program as required under CAAA

Section 182 (c)(3) as it pertains to CO [Section 187 (a)(2)(B)(6)].

4. The SIP revision must demonstrate that attainment will be met by the applicable date and that required annual emission reductions will be met [Section 187 (a)(2)(B)(7)].

Two 1-year extensions for reaching CO 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 CO NAAQS occurred in the year preceding the extension year [Section 181 (a)(5) and Section 186 (a)(4)].

2.2 Summary of Inventory Types

For CO nonattainment areas, States must generally compile three types of inventories. The exception to this requirement would be moderate CO areas with a design value equal to or less than 12.7 ppm. These areas are required to compile only two types of inventories, a base year inventory and periodic inventories. Moderate areas above 12.7 ppm and serious areas are required to develop a base year inventory, periodic inventories, and modeling inventories to comply with CAAA provisions [Section 187 (a)(1), (a)(5), (a)(7), and 187 (d)(1)].

The base year inventory is the primary inventory from which all other CO inventories are derived. Thus, all inventories should be consistent with data provided in the base year inventory. It establishes the basis for determining rate of progress requirements, and is used as the basis for periodic inventories and attainment demonstrations. The base year inventory must reflect actual CO emissions during the 1990 base

year. More details on the requirements States must meet for the base year inventory are provided in Section 3.2.

Periodic CO inventories essentially require the same information as the base inventories. The primary difference between them is the basis year for the emissions. Modeling inventories are required for moderate areas above 12.7 ppm and serious areas because CAAA provisions require such areas to make attainment demonstrations using air quality dispersion models [Section 187 (a)(7) and 187 (d)(1)]. Base year and projected modeling inventories must be developed. The base year modeling inventory shall address actual emissions, while the projected modeling inventory shall be based on allowable emissions, where they exist.

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

3.0 EMISSION INVENTORY REQUIREMENTS

As discussed in Section 2.0, revised carbon monoxide (CO) SIPs under the CAAA shall include base year, periodic, 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 I[1], is recommended for inventorying base year CO emissions from stationary sources. A revised and updated version of this document is scheduled to be issued by EPA in May 1991 and will address issues specific to CO inventories. Another reference, Procedures for Emission Inventory Preparation, Volumes IV: Mobile Sources[2] should be referred to for inventorying base year 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, and modeling inventories in Section 3.11. 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 3.12.

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. Multi-State nonattainment areas shall define how they will coordinate preparation and submittal of the inventories.

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 CO for CO nonattainment areas. Separate discussions shall be used to address stationary point, stationary area, on-road mobile, and non-road mobile 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 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), individual State EIS (Emissions Inventory System), 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 on-road 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, and inspection/maintenance (I/M) and anti-tampering programs that are in place.

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 3.12 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 Emission Inventories

The base year inventory is the primary inventory from which other CO inventories are derived. It establishes the basis for determining rate of progress requirements, and is used as the basis for periodic inventories and attainment demonstrations. The base year CO inventory is defined in the 1990 CAAA to be a "current inventory." EPA interprets this to mean an inventory for 1990 (year of enactment). The inventory shall address actual CO emissions during the peak CO season for the area. All stationary point and area sources and on-road/non-road mobile sources are to be included in the compilation. Peak CO season shall reflect the three consecutive months when peak CO air quality concentrations occur. For many, but not all, areas of the country, the peak CO season will be in the wintertime months. For areas where winter is the peak CO season, the 1990 base year inventory shall include the winter months beginning in 1989 and extending into 1990 (e.g., December 1989 and January-February 1990). Emissions shall be determined for a typical operating day during the designated peak CO season.

States are required to submit the final base year inventory for each of their CO nonattainment areas to EPA no later than November 15, 1992. Attainment demonstrations for areas above 12.7 ppm are also due by 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 should be submitted as soon after January 1, 1992 as is feasible, but no later than to May 1, 1992.

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 CO only, or both CO and O_3, 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

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

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), pollutants to be inventoried (3.2.3), source categories to be inventoried (3.2.4), an updated version of MOBILE4 (3.2.5), and inventory updates from 1987/88/89 to 1990 (3.2.6).

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 (see Section 4.0). 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 CO 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 CO (or affirming existing designations) and describing their boundaries. The designations will be published in Part 81 of the Code of Federal Regulations. All point, area and mobile sources of CO within the designated nonattainment area shall be included in the base year emission inventory as well as the periodic and modeling inventories.

Modeling demonstrations need to be performed in designated nonattainment areas with a CO design value that exceeds 12.7 ppm. This modeling demonstration shall include both areawide and hot spot modeling. The areawide model shall be either the RAM or the UAM (Urban Airshed Model). The model currently proposed for hot spot demonstrations is CAL3QHC. The hot spot model and its use are described in detail in References 3 and 4.

3.2.3 Pollutants to be Inventoried

Carbon monoxide (CO) is the only pollutant that needs to be included in the CO SIP emission inventories compiled under the 1990 CAAA. The inventory shall contain CO emission estimates and other required data (see Section 4.0) from stationary point and area, on-road mobile, and non-road mobile sources.

3.2.4 Applicable Source Categories

The types of sources to be included in base year inventories under the CAAA are essentially the same as those found in the proposed Post-1987 Policy. Base year inventories are required to address all stationary point and area sources, non-road mobile sources, and on-road mobile sources. A tentative listing of 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. Area and mobile source categories are listed in Table B-2. A final listing will be included in the revised version of the Procedures Document.[1]

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.

3.2.5 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.

3.2.6 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 O_3/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 from their EPA Regional Office as soon as possible 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.

3.2.6.1 Point Sources

All stationary point sources of 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 CO 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.

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.

3.2.6.2 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 CO/capita) or in a multi-step calculation process (e.g., pieces of equipment x hours of operation per piece x lbs CO/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 non-road 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 be prepared using the new methodology. Furthermore, updated inventories must meet the requirements for coverage of source categories (Section 3.2.4), 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.

3.2.6.3 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.

3.3 Temporal Basis of Emissions

The temporal basis on which CO emissions must be expressed for 1990 base year inventories under the CAAA is the peak CO period of the year for each nonattainment area. Generally, emissions must be reflective of a typical operating day during the peak CO season. More specific guidance is provided below for determining peak CO season and typical daily emissions.

3.3.1 Peak CO Season

Peak CO season should reflect the months when peak CO air quality concentrations occur. States shall define their peak CO season to be the three contiguous months when the highest CO NAAQS exceedance episode days occur. This determination shall be based on ambient data for the last three to four years. For many, but not all, areas of the country, the peak CO season will be in the wintertime months. For areas where winter is the peak CO season, the 1990 base year inventory will include the winter months beginning in 1989 and extending into 1990 (e.g., December 1989 and January-February 1990).

Source category activity data must be developed that are correlated with the peak CO season as defined for each nonattainment area. States should determine their peak CO season prior to assembling their IPP. The peak CO season shall be defined in the IPP and a brief documentation given for the period selected.

3.3.2 Typical Operating Day Emissions

For CO nonattainment area base year inventories, emissions must be determined and expressed on the basis of an average operating day during the peak CO season. A typical operating day shall consist of a 24-hour period. Additional procedural guidance on how to determine operating day emissions will be provided in the updated procedures document guidance to be issued in May 1991. For those CO nonattainment areas required to do modeling, operating day emissions must be further allocated to an hourly basis, as discussed below.

If the CO design value for the nonattainment area is less than 12.7 ppm CO, a 24-hour daily CO emissions estimate is acceptable. However, if the design value is greater than 12.7 ppm, hourly CO emission estimates are required for modeling purposes. The required techniques for control strategy demonstrations for areas exceeding the 12.7 ppm design value are the RAM Model[5] or the UAM.[6] Guidance on deriving hourly emission estimates for the representative operating day in the peak CO season can be obtained from the dispersion modeling guidance document Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume II: Emission Inventory Requirements for Photochemical Air Quality Simulation Models.[7] Although this document was prepared specifically for temporally allocating VOC emissions, this is generally applicable to CO emission sources as well. The revised version to be issued in May 1991 will address CO modeling specific issues.

3.4 Spatial Allocation of Emissions

If the nonattainment area has a design value less than or equal to 12.7 ppm CO, a countywide emissions inventory is acceptable. If the design value of the area is greater than 12.7

ppm CO, then the control strategy demonstration must be performed with the RAM Model or the UAM. If the RAM Model is used for control strategy demonstrations, mobile and area sources need to be allocated to square grid cells within the modeling domain that covers the geographic area of the inventory discussed in Section 3.2.2 of this document. The size of the grid cells used in the RAM Model can vary over the modeling domain. The recommended grid square sizes are from 1 to 5 kilometers (km), with a 1 km grid square recommended for the central business district (CBD) of urban areas and larger grid squares recommended for areas outside the CBD. Dispersion models such as the RAM model require that point sources be allocated to the exact location in Universal Transverse Mercator (UTM) coordinates and that stack parameters (e.g., height, diameter, exit velocity, and exit temperature) be specified for input.

Guidance on preparing a spatially resolved emissions inventory for dispersion modeling is contained in Procedures For The Preparation Of Emission Inventories For Volatile Organic Compounds, Volume II: Emission Inventory Requirements For Photochemical Air Quality Simulation Models.[7] Again, although this document was prepared specifically for spatial allocation of VOC emissions, the guidance is generally applicable to CO emissions.

The spatial allocation requirements for the UAM are the same as those for the RAM Model with one difference. The difference is that the grid square size for allocation of mobile and area sources needs to remain constant over the modeling domain for the UAM. The recommended grid square size for UAM is from 2 to 5 kilometers. The choice of grid square size depends on the size of the area being modeled, the resources available for modeling, and the degree of resolution needed to determine the effects of a particular control strategy.

3.5 Temperature

The MOBILE4.1 model requires that temperature be entered as a key variable to the model's estimation of CO emission factors for mobile sources. States must determine the temperatures, for calculational purposes, that are appropriate for the peak CO season they have defined. Furthermore, hourly temperatures are required for input to the UAM for episode day modeling. Guidance concerning temperature determinations will be issued in the updated procedures guidance documents in May 1991.

3.6 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 for most source categories in most areas of the country. The concept of applying rule effectiveness 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).

Rule effectiveness shall be applied for stationary sources that are affected by a regulation and for which emissions are determined by means of emission factors and control efficiency estimates. No rule effectiveness factor is needed in cases where no control is applied or there is no applicable regulation.

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 most point and area sources. For the purpose of base year CO 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 8.

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.

Uncontrolled emissions = 50 lbs/day
Estimated control efficiency = 90%
Rule effectiveness = 80%
Emissions after control = 50 [1 - (0.90)(0.80)]
= 50 [1 - (0.72)]
= 14 lbs/day

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

Fuels programs, such as local controls on volatility, should be adjusted for effectiveness because of a number of assumptions regarding market penetration, compliance, etc. associated with implementation of such programs. States should contact their EPA Regional Office for guidance on how to adjust the base year inventory for the effectiveness of these programs.

In addition to RE, another important regulatory consideration is the extent to which a regulation may cover emissions from a source category. When estimating emissions using 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.

Uncontrolled emissions = 100,000 tpy
Control efficiency required by the regulation = 95 percent
Rule penetration = 60 percent
Rule effectiveness = 80 percent

Emissions from the category =
(100,000)[1 - (0.60)(0.95)(0.80)] = 54,400 tpy

Further discussions of the use of rule effectiveness and rule penetration are included in Reference 8.

3.7 Point Sources

Although a revised version of the procedures document for CO is scheduled for release in May of 1991, the guidance for inventorying point sources of 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 1[1] (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 CO sources is 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. Smaller CO sources may either be inventoried as individual point sources or aggregated in the area source component of the base year inventory. Detailed process and emissions data shall be collected and reported for each CO point source that emits 100 tons per year or more. A summary listing of plant names, locations and total plant emissions (tons/day) is required for sources of CO that emit at least 100 tons per year.

The 100 ton/yr cutoff level is not necessarily consistent with the "major source" delineations given in the CAAA for 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, 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 do exist, States should consider the benefits of going ahead and inventorying sources of CO below 100 tons/yr if possible.

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.

3.8 Area Sources

Area sources include those emissions from stationary and non-highway sources that are too small and/or too numerous to be included in the point source inventory, but which can contribute collectively to CO nonattainment. One such source category is residential fuel combustion, including woodstoves and fireplaces. For source categories such as this, all sources may be addressed as area sources in the inventory because of the difficulty in identifying the few operations that may be major emitters.

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.

Emissions from certain area source categories 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's JEIOG has identified some new area source categories that were previously uninventoried for CO emissions. These area sources must be addressed in the 1990 base year inventories. The new area source guidance material will be issued in May 1991 as a part of the updated procedures guidance document.

3.9 Mobile Sources

Mobile sources consist of two types, on-road 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). 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 on-road vehicle VMT.

States shall present on-road mobile source CO emissions 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). For modeling inventories, mobile source data (as well as point and area source data) such as VMT, temperature and emissions, must be developed on a gridded, hourly basis.

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 non-road 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.

3.10 Periodic Emission Inventories

As identified in Section 2.0, States are required to develop and submit to EPA periodic CO emission inventories. Periodic CO inventories shall require essentially the same information as the base year CO inventory. The primary difference between them is the basis year for the inventory. The first periodic inventory must be based on 1993 emission rate and

activity level information [Section 187 (a)]. It is due in final form to EPA no later than September 30, 1995, and subsequent ones no later than the end of each 3-year period thereafter, until the area is redesignated to attainment [Section 187 (a)(5)]. Periodic CO inventories must address actual CO emissions during the CO season on a typical daily basis. Emission estimates shall be prepared according to the general procedures for base year inventories outlined in Section 3.2.

3.11 Modeling Inventories

Modeling inventories are necessary for CO because of CAAA provisions that require Attainment Demonstrations to be made for certain CO nonattainment areas [Section 187 (a)(7) and 187(d)(1)]. Moderate areas exceeding a design value of 12.7 ppm must submit an attainment plan before November 15, 1992 that projects how attainment will be achieved by December 31, 1995. The same requirement exists for serious areas except that attainment must be demonstrated by December 31, 2000. Base year and projected modeling inventories will be needed. 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.

This modeling demonstration shall include both areawide and hot spot modeling. The areawide model should be either the RAM or the UAM. The model currently proposed for hot spot demonstrations is CAL3QHC. The hot spot model and its use are described in detail in References 3 and 4. EPA will provide more direction to States on areawide modeling in the near future.

The CO base year modeling inventory shall represent actual emissions representative of the base year episodes selected for modeling. Emissions would be determined for an average 24-hour operating day during the peak CO season. See Sections 3.3 and 3.4 for a discussion of temporal and spatial reporting of emissions for modeling inventories. All stationary point and area sources and all mobile source types must be included in the inventory. Activity levels and production data used to calculate emissions should represent actual data. Conversely, the projection modeling inventory would be based on allowable emissions dictated by regulatory limits, and not actual

emissions. The emission levels in effect will represent the results that State expects from its SIP control strategies. Activity levels used to estimate emissions should be those expected in the future attainment year (i.e., 1995 for moderate areas or 2000 for serious areas).

3.12 Quality Assurance

States are required to design and implement a quality assurance (QA) program to enhance the overall reliability and accuracy of the CO 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 O_3/CO SIP Emission Inventories[9] (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 planning to issue the final review guidelines in July 1991.

3.13 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 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. User's Guide to CAL3QHC - A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections. Parsons Brinckerhoff Quade and Douglas, Inc., New York, NY. September 1990.

4. Guideline for Modeling Carbon Monoxide from Roadway Intersections (Draft Report). Schewe, G. J., et al. PEI Associates, Cincinnati, Ohio. October 1990.

5. User's Guide for RAM - Second Edition. EPA-600/8-87-046. U. S. Environmental Protection Agency, Research Triangle Park, NC. October 1987.

6. User's Guide for the Urban Airshed Model - Volume I: User's Manual for UAM (CB-IV). EPA-450/4-90-007a. Systems Applications, Inc., San Rafael, CA, and U. S. Environmental Protection Agency, Research Triangle Park, NC. June 1990.

7. 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, Research Triangle Park, NC, September 1979. Revised version to be issued May 1991, will supersede this guidance and will address CO specific issues.

8. 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.

9. Guidance For The Preparation Of Quality Assurance Plans For O_3/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, 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, and 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 PM_{10} or SO_2, 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:

	Option	When Available
(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 code[1]
**FIPS county code[1]
*year of record for emissions
**plant ID from AFS (or NEDS)
*plant name
*street address
*city name[2]
*zip code
local plant ID
*FIPS city code[1,2]

*plant latitude[3]
*plant longitude[3]
*UTM zone[3]
*UTM easting[3]
*UTM northing[3]
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.

[1]Note 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.

[2]Note for city: enter data for <u>either</u> city name <u>or</u> 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.

[3]Note for plant location: enter data for <u>either</u> lat/long <u>or</u> 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 <u>Point General</u> Level:

<u>Description</u>

**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.

[1]Note: required <u>either</u> to enter stack height and stack diameter <u>or</u> to enter plume height (vent height).

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

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

List of Data Elements for <u>Segment General</u> Level:

<u>Description</u>

**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 rate[2]
maximum design rate[2]
O_3 season process rate (daily)[2]
CO season process rate (daily)[2]
stack ID related to this segment[1]
segment comment

* Mandatory for AFS format, for Adds.

** Mandatory for both Adds and Changes to AFS.

[1]Note: 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.

[2]Note: 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 code[1]
secondary control device code[1]
control efficiency[1]
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 factor[2]
seasonal adjustment factor
annual nonbanked emissions (estimated actual)
annual banked emissions
rule effectiveness[3]
O_3 season emissions (lb/day)
CO season emissions (lb/day)

** Mandatory for both Adds and Changes to AFS.

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

[2]Note: 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.

[3]Note: 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.

	Option	When Available
(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 Units[1]

Activity Level Limit Process[1]
Ash Content Percent
Sulfur Content Percent
Comment

[1]Note: 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 Decimal[1]
Emission Factor Limit Units[1]
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

[1]Note: 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 of 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 aspects of the inventory. Even though the guidance was prepared for ozone inventories, the examples are equally applicable and transferrable to CO inventories. 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

TABLE 5-1. OUTLINE FOR EPA RECOMMENDED FORMAT/CONTENTS FOR CO 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 (O_3 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*

TABLE 5-1. Continued

1. Non-Road Mobile Sources
   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 (except for on-road mobile sources) and seasonal emissions (CO - CO season typical weekday emissions) should be presented in the summary and sections describing emissions.

All pages in the report (including appendices) should be numbered. All reports shall be bound except computer printouts. 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.

county; and graphics illustrating the contribution to areawide emissions by source type. States are required to report emissions data both on an annual (except on-road mobile sources) and CO season daily basis. 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 100 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, power plant,
steel mill, 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 CO point source emissions ranked by source category type).

The area source discussion shall cover stationary area sources, with off-highway 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 Emission Inventory Branch 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 CO emission inventories. The list of existing guidance is divided into four categories: CO 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.

CO 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 and will specifically address CO issues in addition to ozone.]

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 and will specifically address CO issues in addition to ozone.]

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 O_3/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.]

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 CARBON MONOXIDE 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 carbon monoxide nonattainment classification are delineated below. The timing of each inventory is also denoted.

CO Nonattainment Areas

Moderate Areas:

a) Base Year Inventory -- Required by November 15, 1992, base year is 1990, only pollutant inventoried is CO, represents actual emissions on a typical daily period basis in the peak CO season

b) Periodic Inventory -- A revised base year inventory is required to be submitted no later than September 30, 1995, and every 3 years thereafter until the area is redesignated to attainment, represents actual emissions.

c) Modeling Inventory -- Areas exceeding a design value of 12.7 must submit an attainment demonstration plan by November 15, 1992 that demonstrates attainment by December 31, 1995. To make the Attainment Demonstration, base year and projected modeling inventories are needed. The level of inventory detail is dictated by whether proportional rollback or gridded dispersion modeling is required. The base year modeling inventory will have a base year consistent with the CO season, while the projected modeling inventory will have a 1995 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 Areas

b) Periodic Inventory -- Same requirements as Moderate Areas

c) Modeling Inventory -- Serious areas must submit an attainment demonstration plan by November 15, 1992 that demonstrates attainment by December 31, 2000. To make the Attainment Demonstration, base year and projected modeling inventories are needed. The level of inventory detail is dictated by whether proportional rollback or gridded dispersion modeling is required. The base year modeling inventory will have a base year consistent with the CO season, while the projected modeling inventory will have a 2000 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.

APPENDIX B

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

TABLE B-1. INDIVIDUAL POINT SOURCE CATEGORIES

External Fuel Combustion

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

Stationary Internal Combustion

- Reciprocating Engines
- Gas Turbines

Waste Disposal

- Municipal Waste Combustion
  - Refuse Derived Fuel
  - Mass Burn
  - Co-fired
  - Other

Industrial Processes

- Iron And Steel Manufacture
  - Coke Production
    - Coke Pushing
    - Coke Oven Doors
    - Coke Byproduct Plant
    - Coke Charging
    - Coal Preheater
    - Topside Leaks
    - Quenching
    - Battery Stacks

TABLE B-1. Continued

Sintering
Electric Arc Furnaces
Other Process Units (specify)
Petroleum Refineries
Mineral Products
Cement
Glass
Other

TABLE B-2. AREA AND MOBILE SOURCE CATEGORIES

Stationary Source Fuel Combustion

- Electric Utility
- Industrial
- Commercial/Institutional
- Residential

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

Miscellaneous Area Sources

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

Mobile Sources

- On-Road Vehicles
  - Light Duty Gasoline Vehicles (LDGV)
  - Light Duty Gasoline Trucks 1 (LDGT 1)

TABLE B-2. Continued

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