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1. INTRODUCTION

1.1 OVERVIEW OF THE MANUAL

The Sulfur Dioxide (SO_2) Guideline is an integration and clarification of policy and guidance information available for SO_2 programs. The Guideline is divided into nine chapters as follows:

1. Introduction,
2. Determining Air Quality Status,
3. Ambient Air Quality Monitoring and Data Usage,
4. Air Quality Modeling,
5. Stack Height Regulations,
6. General Provisions,
7. Permits,
8. Compliance and Enforcement, and,
9. New Source Performance Standards.

Emissions inventory guidance is discussed primarily in conjunction with the air quality modeling guidance, which is presented in Chapter 4.

Each chapter summarizes relevant policy and guidance and provides detailed references to guide the user to more complete sources. References include statutory and regulatory sources [Clean Air Act and Code of Federal Regulations (CFR)], Federal Register notices, U.S. Environmental Protection Agency (EPA) guideline documents, EPA policy, questions and answers (Q & A's), and guidance memoranda. Where appropriate, quotations are provided from the applicable reference materials to be used as a quick reference. Citations to the CFR should be checked regularly as it is updated annually, which may not be reflected in

this document.

This guideline is intended to provide a guide to policy and guidance in effect at the time of its preparation. **The SO_2 guideline should not be cited in regulatory actions because any regulatory decisions should be based on the original sources, rather than the summaries in each chapter.** In addition, in some instances, it is possible that only part of a document still represents current EPA policy. Therefore, before citing a document section excerpted in the references at the end of each chapter, please consult EPA to assure the information is still current.

Appendix A contains a checklist for preparing and reviewing SO_2 SIP revisions. Appendix B to this document contains copies of the memoranda cited in the reference sections.

1.2 PROVISIONS FOR UPDATING THE MANUAL

The guideline will be updated periodically by adding new pages or replacing existing pages. Revised pages will be dated and copies will be provided by the EPA's Office of Air Quality Planning and Standards (OAQPS) to the EPA Regional Office SO_2 contacts. Citations of the CFR are to the most current version at the time of preparation of this guideline. Users of the guideline should refer to later versions of the CFR since it is updated on a regular basis. The CFR is published annually including changes for that year. However, new/revised regulations can be promulgated at any time and States should be aware of those prior to publication in the bound CFR.

1.3 ADDITIONAL INFORMATION SOURCES

This guideline is intended to be used in conjunction with other guidance documents and policy statements including the following:

- General Preamble (see 57 FR 13598, April 16, 1992 and

57 FR 18070, April 29, 1992).

- Air Programs Policy and Guidance Notebook. Many references cited in this guideline are found in this notebook and are cross referenced by PN number from the notebook.

- New Source Review/Prevention of Significant Deterioration and Nonattainment Area Guidance Notebook: contains comprehensive NSR/PSD guidance.

- New Source Review Workshop Manual: describes in general terms, and illustrates by examples, the requirements of the NSR regulations and existing policies.

- Clean Air Act Compliance/Enforcement Policy Compendium: contains comprehensive compliance guidance.

- Guideline for Review of State implementation plan (SIP) Revisions by EPA Regional Offices: contains references on SIP processing.

- Processing procedures for SIP revisions for part 52, part 62-III(d) Plans, and part 82 Redesignations.

- Guideline on Air Quality Models: contains comprehensive modeling guidance.

Where existing guidance is insufficient, State and local agencies should seek clarification from their Regional Office contact. Regional Offices are encouraged to solicit additional guidance when needed from EPA Headquarters personnel. Contact the SO_2/Particulate Matter Programs Branch, AQMD, OAQPS at 919/541-5628.

2. DETERMINING AIR QUALITY STATUS

2.1 SECTION 107 ATTAINMENT DEMONSTRATION AND REDESIGNATIONS

2.1.1 General. Section 107 of the Clean Air Act requires the EPA to identify the air quality status for every air quality control region (AQCR) within each State. Current attainment status of section 107 areas for SO_2 is listed under subpart C of 40 CFR part 81 as either attainment, nonattainment, or unclassifiable. The EPA considers revisions to this list upon request from the State, and was also given authority under the CAA amendments of 1990 to initiate and promulgate designations itself.[1]

An assessment of the attainment status of an area should involve a review of all available information. Typically, such information would include the most recent eight quarters of ambient monitoring data, air quality modeling results, and evidence of an implemented control strategy that meets EPA requirements.[2] Attainment determinations for SO_2 will generally not rely on ambient monitoring data alone, but instead will be supported by an acceptable modeling analysis which quantifies that the SIP strategy is sound and that enforceable emission limits are responsible for attainment.[3] An area may be designated nonattainment based on two or more exceedances of the National Ambient Air Quality Standards (NAAQS), either modeled at the same receptor or measured at the same monitor (i.e., two exceedances per year equal one violation).[4]

2.1.2 Designating Areas as Nonattainment. The amended Act, in accordance with section 107(d)(3)(A), authorizes EPA to promulgate the designation of new areas as nonattainment for SO_2 on the basis of air quality data, planning and control considerations, or any other air quality-related consideration that the Administrator deems appropriate. As

part of the designation process, EPA notifies the governors of those States with areas that EPA believes should be redesignated as nonattainment [section 107(d)(3)(A)]. Governors of affected States must then submit to EPA the designation they consider appropriate for each area in question within 120 days. No later than 120 days [section 107(d)(3)(B)] after a Governor's response, if any, EPA must promulgate those redesignations which EPA deems necessary and appropriate [section 107(d)(3)(C)].[5]

2.1.3 Redesignating Areas to Attainment. The 1990 amendments to the CAA included specific criteria which govern the redesignation of an area from nonattainment to attainment, including: (1) EPA determines that the area has attained the NAAQS; (2) the area has a fully-approved implementation plan; (3) EPA determines that the improvement in air quality is attributable to permanent and enforceable emissions reductions; (4) the area has a fully-approved maintenance plan meeting the requirements of section 175A; and (5) the area meets all applicable requirements of section 110 and part D.[6]

The following is an expanded discussion of the criteria which must be met before an area can be redesignated from nonattainment to attainment. It is suggested that the reader refer to the memorandum dated September 4, 1992 from John Calcagni to the Regional Air Divisions Directors entitled *Procedures for Processing Requests to Redesignate Areas to Attainment* for an extended discussion of these criteria.[7]

- Attainment of the NAAQS:
  The State must show that the area is attaining the SO_2 NAAQS. There are two components involved in making this demonstration which should be considered interdependently. The first component relies on air quality data. For SO_2, the area may be considered

attaining the NAAQS if, according to 40 CFR 50.4, an area shows no more than one exceedance annually.[8] The second component relies on supplemental air quality modeling. Modeling may be necessary to determine the representativeness of the monitored data. For SO_2, dispersion modeling will generally be necessary to evaluate comprehensively a source's impacts and to determine the areas of expected high concentrations based upon current conditions. Regions should consult with OAQPS for further guidance addressing the need for modeling in specific circumstances.[9]

- Approved 110(k) SIP for the area
  The SIP for the area must be fully approved under section 110(k) of the Act and must satisfy all requirements that apply to the area. "An area cannot be redesignated if a required element of its plan is the subject of a disapproval; a finding of failure to submit or to implement the SIP; or partial, conditional, or limited approval. However, this does not mean that earlier issues with regard to the SIP will be reopened."[10]
- Permanent and enforceable improvement in air quality
  The State must be able to reasonably attribute the improvement in air quality to emission reductions which are permanent and enforceable. In making this showing, the State should estimate the percent reduction achieved from Federal measures.[11]
- Section 110 and Part D Requirements
  For the purposes of redesignation, a State must meet all requirements of section 110 and title I, part D of the Act that were applicable prior to submittal of the complete redesignation request. Section 110(a)(2) contains general requirements for nonattainment plans. part D consists of general requirements applicable to all areas designated nonattainment and specific

requirements applicable to certain NAAQS.[12]

- Fully approved maintenance plan

  Before an area can be redesignated to attainment, EPA must approve a maintenance plan which meets the requirements of section 175A.[13] The maintenance plan will constitute a SIP revision and must provide for maintenance of the SO_2 NAAQS in the area for at least 10 years after redesignation.[14] In addition, the maintenance plan shall contain such contingency measures necessary to ensure prompt correction of any violation of the SO_2 NAAQS. At a minimum, these measures must include a requirement that the State will implement all measures contained in the nonattainment SIP prior to redesignation.[15]

The following is a list of the provisions that should be included in a maintenance plan:

Attainment inventory: The State should develop an attainment emissions inventory to identify the level of emissions in the area which is sufficient to attain the SO_2 NAAQS.[16]

Maintenance demonstration: A State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of SO_2 will not exceed the level of the attainment inventory, or by modeling to show that the future mix of sources and emission rates will not cause a violation of the SO_2 NAAQS.[17] In either case, the State should project emissions for the 10-year period following redesignation.[18]

Monitoring network: Once an area has been redesignated, the State should continue to operate an appropriate air quality monitoring network to verify the attainment status of the area.[19]

Verification of continued attainment: Each State should ensure that it has the legal authority to

implement and enforce all measures necessary to attain and to maintain the SO_2 NAAQS. The State submittal should indicate how the State will track the progress of the maintenance plan.[20]

Contingency plan: The maintenance plan must contain contingency provisions that will promptly correct any violation of the SO_2 NAAQS that occurs after redesignation. For the purposes of section 175A, a State is not required to have fully adopted contingency measures that will take effect without further action by the State in order for the maintenance plan to be approved. However, the contingency plan is considered to be an enforceable part of the SIP and should ensure that contingency measures are adopted expediently once they are triggered. The plan should clearly identify the measures to be adopted, a schedule and procedure for adoption and implementation, and a specific time limit for action by the State.[21] The EPA will review what constitutes a contingency plan on a case-by-case basis. At a minimum, it must require that the State will implement all measures contained in the part D nonattainment plan for the area prior to redesignation. This language suggests that a State may submit a SIP revision at the time of its redesignation request to remove or reduce the stringency of control measures. The EPA can approve such a revision if it provides for compensating equivalent reductions. Alternatively, a State might be able to demonstrate that the measures are not necessary for maintenance of its standard.[22]

2.1.4 Monitoring Data and Modeling Results. For SO_2 attainment demonstrations, monitoring data alone will generally not be adequate. A small number of ambient SO_2 monitors usually is not representative of the air quality for an entire area. Typically, modeling estimates of

maximum ambient concentration are based on a fairly infrequent combination of meteorological and source operating conditions. To capture such results on a monitor would normally require a prohibitively large and expensive network. Therefore, dispersion modeling will generally be necessary to evaluate comprehensively a source's impacts and to determine the areas of expected high concentrations.[23] Air quality modeling results would be especially important if sources were not emitting at their maximum level during the monitoring period or if the monitoring period did not coincide with potentially worst-case meteorological conditions. Further, monitoring data is not adequate if sources are using stacks with heights greater than good engineering practice or other prohibited dispersion techniques.

Ambient monitoring data and air quality modeling data for a particular area can sometimes appear to conflict. This is primarily due to the fact that modeling results may predict maximum SO_2 concentrations at receptors where no monitors are located. Where ambient monitoring data are determined to be "adequate", the ambient monitoring data should be used in designating an area.[24] Ambient monitors should be located in areas of expected maximum air quality concentrations.[25]

With respect to receptor locations for modeling and ambient air purposes, the EPA does not consider whether such sites could meet standard siting criteria for monitors. Although siting criteria may preclude the placement of ambient monitors at certain locations, this does not preclude the placement of model receptors at these sites. The placement of the receptor at such sites will enhance the basis for the attainment demonstration.[26]

2.1.5 Control Strategy Demonstration. A control strategy that has not been approved by EPA as part of the SIP cannot

be used to support a redesignation unless physical circumstances and/or long term economic factors with the same weight as a SIP have occurred. For example, the permanent closing of the main sources contributing to nonattainment could be used to support a redesignation if new permits were required prior to any reopening of the sources.[27]

The General Preamble for the implementation of Title I of the Clean Air Act Amendments provided that States seeking to establish such sources as permanently closed must: (1) demonstrate that the source has been inoperative for at least the preceding 2 years; (2) that the source is precluded from resuming operations and has been withdrawn from the State's emissions inventory; and (3) have fully-approved NSR and PSD programs in place.[28]

Redesignations can have an effect on the overall stringency of the SIP. If there is one set of control requirements for nonattainment areas and a less stringent set for attainment areas, then a redesignation could lead to a relaxation of the SIP. In such cases, the redesignation should also be treated as a SIP revision and the Agency should respond with criteria on the requirements for SIP relaxation and attainment demonstrations.[29]

2.1.6 Future SIP Violations. Projected future violations of the SO_2 NAAQS can provide the basis for continuing nonattainment designations. For example, a period of attainment that is attributable to a temporary economic downturn cannot be used to support a redesignation. Therefore, information used to support any attainment determination must reflect anticipated future operating rates.[30] Modeling using maximum allowable emission rates can satisfy this criterion.

2.1.7 Area Boundaries. Section 107 areas for SO_2 may be

established according to political boundaries such as cities or counties.[31]

REFERENCES FOR SECTION 2.1

1. "Although State Governors continue to have authority to initiate the designation process [section 107(d)(3)(D)], the 1990 CAAA also give EPA the authority to initiate and to promulgate designations [sections 107(d)(1)(3)]." General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990. Federal Register 57:13545. April 16, 1992.

2. "In general, all available information relative to the attainment status of an area should be reviewed. These data include the most recent eight quarters of quality-assured, representative ambient air quality data plus evidence of an implemented control strategy EPA had fully approved. Supplemental information, including air quality modeling data, etc., should be used to determine if the monitoring data accurately characterize the worst case air quality in the area." Memorandum from Myers, S., OAQPS, to Director of Air and Waste Management Division, Regions II-IV, VI-VIII, X, and Director of Air Management Division, Regions I, V, IX. April 21, 1983. PN 107-83-04-21-008.

3. "Where only the most recent four quarters of data showing attainment are available, a state-of-the-art modeling analysis must be provided which quantifies that the SIP strategy is sound and that actual enforceable emission reductions are responsible for the air quality improvement." Memorandum from Helms, G.T., OAQPS, to Air Branch Chief, Regions I-X. December 23, 1983.

4. U. S. Environmental Protection Agency. Guideline on Air Quality Models (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, N.C. EPA Publication No. EPA-450/12-78-027R. July 1986. p. 11-7.

5. Federal Register 56:16274-7, Volume 56, No. 77. April 22, 1991. Preparation, Adoption, and Submittal of State Implementation Plans; PM-10, Sulfur Dioxide, and Lead Nonattainment and Unclassifiable Area Designations; Background for PM-10.

6. Reference 1. "The particular criteria for redesignating nonattainment areas to attainment [section 107(d)(3)(E)] include the following: The area has attained the NAAQS, the area has a fully approved [section 110(k)] implementation plan, the improvement in air quality is due to permanent and enforceable

emissions reductions, the area has a maintenance plan meeting the requirements of section 175A, and the area meets all applicable requirements under section 110 and part D."

7. Memorandum from Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, NC, to Director, Air, Pesticides and Toxics Management Division, Regions I and IV; Director, Air and Waste Management Division, Region II; Director, Air, Radiation and Toxics Division, Region III; Director, Air and Radiation Division, Region V; Director, Air, Pesticides, and Toxics Division, Region VI; and Director, Air and Toxics Division, Regions VII, VIII, IX, and X. Procedures for Processing Requests to Redesignate Areas to Attainment. September 4, 1992.

8. Reference 7. "The State must show that the area is attaining the applicable NAAQS. There are two components involved in making this demonstration which should be considered interdependently. The first component relies on air quality data. The data that are used to demonstrate attainment should be the product of ambient monitoring that is representative of the area of highest concentration. These monitors should remain at the same location for the duration of the monitoring period required for demonstrating attainment . . . For SO_2, according to 40 CFR 50.9, an area must show no more than one exceedence annually..."

9. Reference 7. "The second component relies on supplemental EPA-approved air quality modeling. Modeling may be necessary to determine the representativeness of the monitored data. When dealing with SO_2, Pb, PM-10 (except for a limited number of initial moderate nonattainment areas), dispersion modeling will generally be necessary to evaluate comprehensively sources' impacts and to determine the areas of expected high concentrations based upon current conditions. Areas which were designated nonattainment based on modeling will generally not be redesignated to attainment unless an acceptable modeling analysis indicates attainment. Regions should consult with OAQPS for further guidance addressing the need for modeling in specific circumstances."

10. Reference 7. "The SIP for the area must be fully approved under section 110(k), and must satisfy all requirements that apply to the area. It should be noted that approval action on SIP elements and the redesignation request may occur simultaneously. An

area cannot be redesignated if a required element of its plan is the subject of a disapproval; a finding of failure to submit or to implement the SIP; or partial, conditional, or limited approval. However, this does not mean that earlier issues with regard to the SIP will be reopened. Regions should not reconsider those things that have already been approved and for which the Clean Air Act Amendments did not alter what is required. In contrast, to the extent the amendments add a requirement or alter an existing requirement so that it adds something more, Regions should consider those issues. In addition, requests from areas known to be affected by dispersion techniques which are inconsistent with EPA guidance will continue to be considered unapprovable under section 110 and will not qualify for redesignation."

11. Reference 7. "The State must be able to reasonably attribute the improvement in air quality to emission reductions which are permanent and enforceable. Attainment resulting from temporary reductions in emission rates or usually favorable meteorology would not qualify as an air quality improvement due to permanent and enforceable emission reductions. In making this showing, the State would estimate the percent reduction achieved from Federal measures."

12. Reference 7. "For the purposes of redesignation, a State must meet all requirements of section 110 and part D of the Act that were applicable prior to submittal of the complete redesignation request. When evaluating a redesignation request Regions should not consider whether the State has met requirements that come due under the Act after submittal of a complete redesignation request. However, any requirements that came due prior to submittal of the redesignation request must be fully approved into the plan at or before the time EPA redesignates the area. Section 110(a)(2) contains general requirements for nonattainment plans. Most of the provisions of this section are the same as those contained in the pre-amended Act. Part D consists of general requirements applicable to all areas which are designated nonattainment based on a violation of the NAAQS. The general requirements are followed by a series of subparts specific to each pollutant. The general requirements appear in subpart 1. The requirements relating to O_3, CO, PM-10, SO_2, NO_2, and Pb appear in subparts 2 through 5. In those instances where an area is subject to both the general nonattainment provisions in subpart 1 as well as one of the pollutant-specific subparts, the general provisions may be subsumed

within, or superseded by, the more specific requirements [that] are found in subpart 5."

13. Reference 7. "Section 107(d)(3)(E) of the amended Act stipulates that for an area to be redesignated, EPA must fully approve a maintenance plan which meets the requirements of section 175A. A State may submit both the redesignation request and the maintenance plan at the same time and rulemaking on both may proceed on a parallel track. Maintenance plans may, of course, be submitted and approved by EPA before a redesignation is requested. However, according to section 175A(c), pending approval of the maintenance plan and redesignation request, all applicable nonattainment area requirements shall remain in place."

14. Reference 7. "Section 175A defines the general framework of a maintenance plan. The maintenance plan will constitute a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least 10 years after redesignation. Section 175A further states that the plan shall contain such additional measures, if any, as may be necessary to ensure such maintenance. Because the Act requires a demonstration of maintenance for 10 years after an area is redesignated, the State should plan for some lead time for EPA action on the request...In determining the amount of lead time to allow, States should consider that section 170(d)(3)(D) grants the Administrator up to 18 months from receipt of a complete submittal to process a redesignation request."

15. Reference 7. "In addition, the maintenance plan shall contain such contingency measures necessary to ensure prompt correction of any violation of the NAAQS [see section 175A(d)]. The Act provides that, at a minimum, the contingency measures must include a requirement that the State will implement all measures contained in the nonattainment SIP prior to redesignation. Failure to maintain the NAAQS and triggering of the contingency plan will not necessitate a revision of the SIP unless required by the Administrator, as stated in section 175A(d)."

16. Reference 7. "The State should develop an attainment emissions inventory to identify the level of emissions in the area which is sufficient to attain the NAAQS. This inventory should be consistent with EPA's most recent guidance on emission inventories for nonattainment areas available at the time and should include the emissions during the time period associated with the monitoring data showing attainment. Source

size thresholds are 100 tons/year for SO_2, NO_2, and PM-10 areas, and 5 tons/year for Pb based upon 40 CFR 51.100(k) and 51.322, as well as established practice for AIRS data. The source size threshold for serious PM-10 areas is 70 tons/year according to Clean Air Act section 189(b)(3)."

17. Reference 7. "A State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show that the future mix of sources and emission rates will not cause a violation of the NAAQS. Under the Clean Air Act, many areas are required to submit modeled attainment demonstrations to show that proposed reductions in emissions will be sufficient to attain the applicable NAAQS. For these areas, the maintenance demonstration should be based upon the same level of modeling. In areas where no such modeling was required, the State should be able to rely on the attainment inventory approach. In both instances, the demonstration should be for a period of 10 years following the redesignation."

18. Reference 7. "In either case, to satisfy the demonstration requirement the State should project emissions for the 10-year period following redesignation, either for the purpose of showing that emissions will not increase over the attainment inventory or for conducting modeling. The projected inventory should consider future growth, including population and industry, should be consistent with the attainment inventory, and should document data inputs and assumptions. All elements of the demonstration should be consistent with current EPA modeling guidance."

19. Reference 7. "Once an area has been redesignated, the State should continue to operate an appropriate air quality monitoring network, in accordance with 40 CFR part 58, to verify the attainment status of the area. The maintenance plan should contain provisions for continued operation of air quality monitors that will provide such verification. In cases where measured mobile source parameters have changed over time, the State may also need to perform a saturation monitoring study to determine the need for, and location of, additional permanent monitors."

20. Reference 7. "Each State should ensure that it has the legal authority to implement and enforce all measures necessary to attain and to maintain the NAAQS. Section

110(a)(2)(b) and (F) of the Clean Air Act, as amended, and regulations promulgated at 40 CFR 51.110(k), suggest that one such measure is the acquisition of ambient and source emission data to demonstrate attainment and maintenance. Regardless of whether the maintenance demonstration is based on a showing that future emission inventories will not exceed the attainment inventory or on modeling, the State submittal should indicate how the State will track the progress of the maintenance plan. This is necessary due to the fact that the emission projections made for the maintenance demonstration depend on assumptions of point and area source growth."

21. Reference 7. "Section 175A of the Act also requires that a maintenance plan include contingency provisions, as necessary, to promptly correct any violation of the NAAQS that occurs after redesignation of the area. For the purposes of section 175A, a State is not required to have fully adopted contingency measures that will take effect without further action by the State in order for the maintenance plan to be approved. However, the contingency plan is considered to be an enforceable part of the SIP and should ensure that the contingency measures are adopted expediently once they are triggered. The plan should clearly identify the measures to be adopted, a schedule and procedure for adoption and implementation, and a specific time limit for action by the State. As a necessary part of the plan, the State should also identify specific indicators, or triggers, which will be used to determine when the contingency measures need to be implemented."

22. Reference 7. "The EPA will review what constitutes a contingency plan on a case-by-case basis. At a minimum, it must require that the State will implement all measures contained in the part D nonattainment plan for the area prior to redesignation [see section 175A(d)]. This language suggests that a State may submit a SIP revision at the time of its redesignation request to remove or reduce the stringency of control measures. Such a revision can be approved by EPA if it provides for compensating equivalent reductions. A demonstration that measures are equivalent would have to include appropriate modeling or an adequate justification. Alternatively, a State might be able to demonstrate (through EPA-approved modeling) that the measures are not necessary for maintenance of the standard. In either case, the contingency plan would have to provide for implementation of any measures that were reduced or removed after redesignation of the

area."

23. Reference 2. "In most SO_2 cases, monitoring data alone will not be sufficient for areas dominated by point sources. A small number of ambient monitors usually is not representative of the air quality for the entire area. Dispersion modeling employing legally enforceable SO_2 SIP limits will generally be necessary to evaluate comprehensively the source's impacts as well as identify the areas of highest concentrations."

24. "I am in agreement with your position that, when available, adequate ambient monitoring data should be given preference over modeling results in designating areas as attainment/nonattainment under section 107 of the Clean Air Act (CAA)." Memorandum from Barber, W.C., OAQPS, to R.C. Pickard, Indiana Air Pollution Control Board. September 3, 1981.

25. Memorandum from Myers, S., OAQPS, to D. Kee, Air Management Division, Region V. September 16, 1982. PN 107-82-09-16-007.

26. "All receptor locations that may affect control strategy requirements, and meet the definition of 'ambient air,' must be included in regulatory modeling applications. ambient air is defined in 40 CFR part 50.1(e) as 'that portion of the atmosphere, external to buildings, to which the general public has access.' Receptor points 180 and 197 are adjacent to a roadway to which the public clearly has access; thus, they must be included in the SIP modeling analysis. Although siting criteria may preclude placement of ambient monitors at these receptors, as was discussed by Asarco, this does <u>not</u> preclude the placement of model receptors at these sites." Letter from Skie, D.M., Region VIII, to Jeffrey T. Chaffee, Montana Department of Health and Environmental Sciences. March 13, 1992.

27. Reference 3. "However, an exception will be made if the physical circumstances and long-term economic factors are such that the implemented measures have the same weight as a SIP; for example, the permanent closing of the major emitting sources, road paving to eliminate fugitive emissions, or other irreversible measures."

28. Reference 1. "A minimum of two actions are required for States wishing to establish that these areas are inoperative for SIP purposes.

The first action is that the State must provide EPA with sufficient evidence to establish that the source has in fact been permanently shut down. Three criteria exist for establishing permanent source shutdown. These criteria require proof that the source has been inoperative for at least the 2 preceding years, that the source is precluded from resuming operations, and that the source has been withdrawn from the State's emissions inventory.

The second action is that the State must establish that fully-approved NSR and PSD programs are in place so that the source would be required to undergo NSR prior to start-up if it were reactivated." Page 13547.

29. "The redesignation would have relaxed the relevant SIP because the SIP specified one set of control requirements for nonattainment areas and a less stringent set for attainment areas." Memorandum from Tyler, D.D.,OAQPS, to P.H. Wyckoff, Office of General Counsel (OGC). February 2, 1985.

30. Reference 2. "Projections of future violations can provide the basis for continuing nonattainment designations. This concept is particularly important because of the current economic downturn. Information submitted to support attainment redesignations must adequately and accurately reflect anticipated operating rates."

31. Reference 2. "Current policies on appropriate boundaries for designation of nonattainment areas by EPA remain in effect, i.e., generally political boundaries such as city or county for TSP and SO_2..."

2.2 AMBIENT AIR

2.2.1 General. Ambient air is defined at 40 CFR 50.1(e) as "that portion of the atmosphere, external to buildings, to which the general public has access." Generally, this definition signifies that ambient air would constitute any air to which the public could be exposed, even for a short period of time. The only exemption from the ambient air provision is the atmosphere over land that is owned or controlled by the source and to which public access (and, therefore, exposure) is precluded by a fence or other physical barrier.[1] It should be noted that for sources operating on leased property, ambient air is considered to exclude only the atmosphere over that land leased and controlled by the source.[2]

2.2.2 Location Aspects. Ambient air includes such areas as elevated building sites and parking lots for public arenas. Although it may not be practical to analyze the air quality at every such location, the State should evaluate the air quality impact at these sites if it deems this necessary to protect health and welfare.[3,4]

For modeling purposes, ambient air is considered to be air everywhere outside of contiguous plant property to which public access is precluded by an effective physical barrier. Therefore, modeling receptors should be placed anywhere outside of inaccessible plant property, including over bodies of water, unfenced plant property, on buildings, over roadways, and over property owned by other sources.[5,6] As discussed in section 2.1.4, although siting criteria may preclude the placement of ambient monitors at certain locations, modeling receptors should be placed at areas of anticipated worst-case impacts.[7]

A few examples should clarify potential uncertainties regarding receptor location. In the case of waterways,

receptors should be placed over any body of water not privately owned or which allow public access. Even where public recreational traffic is limited, the air above a body of water should be considered ambient air as long as the potential for public exposure exists.[8] With respect to roadways dividing plant property, the air above the road should have a receptor, even if the road separates otherwise inaccessible private property owned by a single source.[9,10] Regarding property owned by other sources, current policy requires that receptors be placed over neighboring property regardless of public accessibility. In other words, the atmosphere above neighboring property is considered "ambient air" in relation to emissions from a given source.[11]

2.2.3 Time Aspects. Even if public access to a given site is time-limited, the site should not be excluded from the ambient air definition as long as the other conditions apply. Regardless of the period of exposure at a given site (or receptor), ambient air is defined in terms of public access not frequency of access, length of stay, age of the person or other factors.[12]

2.2.4 Public Access. If an area is owned or leased by the source and public access is prevented, the area is not ambient air with respect to the source's own emissions. However, there should be sufficient barriers to prevent public access. Barriers considered sufficient to prevent public access are generally limited to fences. However, a clearly posted area alongside a river that is regularly patrolled by security guards would qualify as sufficient protection.[13] The EPA has accepted other equally effective means of preventing access where the use of a fence or other physical barrier is impractical.[14]

2.2.5 PSD Considerations. Unlike the NAAQS, PSD increments

do not apply to building rooftops, but only to the ground level. The PSD system, unlike the NAAQS system, does not aim at achieving one single goal. Rather, it represents a balance determined by Congress between economic growth and deterioration of air quality. If building rooftops were included in PSD permitting strategy, the PSD system would be appreciably more stringent than Congress had contemplated.[15]

Because air over neighboring property is considered ambient air regardless of public accessibility (see section 2.2.2), receptors should be placed over neighboring property when modeling PSD increments. However, the SO_2 concentration contributed by the neighboring property can be subtracted from the total concentrations.[16]

2.2.6 Land Acquisition. Land acquisition and removal of the area from ambient air is not automatically considered a dispersion technique prohibited by section 123; this situation is reviewed on a case-by-case basis. (Also see discussion on stack height regulations, section 5.) In only a few instances has the EPA tolerated land acquisition to contain modeled violations of the NAAQS.[17]

REFERENCES FOR SECTION 2.2

1. "We are retaining the policy that the exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which public access is precluded by a fence or other physical barriers." Letter from Costle, D.M., EPA Administrator to Honorable J. Randolph, U.S. Senate. December 19, 1980. PN 123-80-12-19-001.

2. "We agree with your position that all property outside of the property leased and controlled by EFRI would be considered ambient air." Memorandum from Helms, G.T., OAQPS, to W.S. Baker, Air Branch Chief, Region II. July 27, 1987.

3. "While EPA considers ambient air to include elevated building receptor sites, it is not practical to analyze the air quality at every such existing location." Letter from Bennett, K.M., Office of Air Noise and Radiation (OANR), to H. Hovey, New York Department of Environmental Conservation. March 18, 1983. PN 110-83-03-18-063.

4. "There is no basis for excluding ambient air above a public parking lot from coverage by the SIP." Memorandum from James, M.A., OGC, to C. Simon, Air Programs Branch Chief, Region II. September 27, 1972.

5. "The Regional Meteorologists propose that for modeling purposes the air everywhere outside of contiguous plant property to which public access is precluded by a fence or other effective physical barrier should be considered in locating receptors. Specifically, for stationary source modeling, receptors should be placed anywhere outside inaccessible plant property. For example, receptors should be included over bodies of water, over unfenced plant property, on buildings, over roadways, and over property owned by other sources." Memorandum from Koerber, M., Region V, to J. Tikvart, OAQPS. May 16, 1985.

6. "The Regional Meteorologists' memorandum to which you refer does not imply any change in [the] national policy and simply harmonizes modeling procedures with our long-standing policy. It is intended to ensure consistent Regional implementation of that policy and to dispel any questions about pollutant concentrations at locations where the general public has access." Letter from Emison, G.A., OAQPS, to W.F. O'Keefe, American Petroleum Institute, January 22, 1986.

7. "All receptor locations that may affect control strategy requirements, and meet the definition of 'ambient air,' must be included in regulatory modeling applications. Ambient air is defined in 40 CFR part 50.1(e) as 'that portion of the atmosphere, external to buildings, to which the general public has access.' Receptor points 180 and 197 are adjacent to a roadway to which the public clearly has access; thus, they must be included in the SIP modeling analysis. Although siting criteria may preclude placement of ambient monitors at these receptors, as was discussed by Asarco, this does not preclude the placement of model receptors at these sites." Letter from Skie, D.M., Region VIII, to Jeffrey T. Chaffee, Montana Department of Health and Environmental Sciences. March 13, 1992.

8. "Case 3 (Wayne County, MI): This case involves the air over the Detroit River, the Rouge River, and the Short-cut Canal. We agree that the air over all three of these is ambient air, since none of the companies owns them or controls public access to them." Memorandum from Helms, G.T., OAQPS, to S. Rothblatt, Region V. April 30, 1987. PN 110-87-04-30-083.

9. Reference 7. "Case 1 (Dakota County, MN): This case involves two noncontiguous pieces of fenced property owned by the same source, divided by a public road. We agree that the road is clearly ambient air and that both fenced pieces of plant property are not."

10. "Scenario One: We agree with you that the road and the unfenced property are ambient air and could be locations for the controlling receptor." Memorandum from Helms, G.T., OAQPS, to B. Miller, Air Programs Branch, Region IV. April 30, 1987. PN 110-87-04-30-082.

11. Reference 7. "Case 5 (involves the placement of receptors on another source's fenced property): As mentioned in Case 2, we feel that present policy does require that receptors be placed over another source's property to measure the contribution of the outside source to its neighbor's ambient air."

12. "Regardless of whether any member of the public is expected to remain at a particular place for a specific period of time, ambient air is defined in terms of public access, not frequency of access, length of stay, age of the person or other limitations." Memorandum from Tyler, D.D., OAQPS, to A. Davis, Region VI. May 26, 1983.

13. Reference 9. "We do not think that any of the barriers mentioned are sufficient to preclude public access so as to allow the source to dispense with a fence. An example of an unfenced boundary that would qualify is a property line along a river that is clearly posted and regularly patrolled by security guards."

14. "In summary, if ARCO can certify to EPA that an exclusionary safety zone exists and that reasonable and routine measures are undertaken to control the boundary of this zone, EPA will consider it to be the area controlled by the source and therefore, excluded from being considered ambient air." Memorandum from Phil Millam, Air and Radiation Branch, Region X to Randy Poteet, ARCO, Alaska, Inc. March 1, 1993.

15. "However, the PSD system, unlike the NAAQS system, does not aim at achieving one single goal." Memorandum from Cannon, J.A., OAR, to C.R. Jeter, Region IV. June 11, 1984. PN 165-84-06-11-014.

16. "3. Where a receptor is located on Plant B's nonambient air property, the contribution from Plant B (only) may be subtracted from the total concentration." Memorandum from Bauman, R. D., OAQPS, to G. Fontenot, Air Programs Branch, Region VI, October 17, 1989.

17. "We have never either flatly stated that land acquisition in general is acceptable or unacceptable under section 123 of the Clear Air Act...we will review individual situations on a case-by-case basis." Memorandum from Tyler, D., OAQPS, to I. Dickstein, Region VIII. April 7, 1987.

submission specifically excludes SO_2, the SIP must provide the necessary information on SO_2 monitoring.[2] Further information on what the SIP itself must contain is provided in *Guidelines for Implementation of the Ambient Air Monitoring Regulations*, EPA-450/4-79-038.

Any ambient air quality station other than a SLAMS or PSD station from which a State intends to use data for demonstrating attainment or nonattainment or for computing a design value for control purposes must meet the requirements for SLAMS as described in 40 CFR parts 58.13 and 58.22 as well as the requirements of appendices A and E of part 58.[3] In addition, any ambient air quality station other than a SLAMS or PSD station from which a State intends to use data for SIP-related functions other than as part of an attainment or nonattainment demonstration or for computing a design value for NAAQS control purposes, need not necessarily satisfy the requirements for a SLAMS station, but must be operated in accordance with specifications approved by the Regional Administrator.[4]

Measurement of meteorological variables at the location of an air quality monitoring station provides a basis for correlating air pollutant levels with local weather patterns. Meteorological monitoring data are also required for the purposes of air quality modeling. Meteorological inputs to modeling are discussed in section 4.4 of this document.[5]

Finally, guidelines for sources required to monitor ambient air quality under PSD regulations are contained in the *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)* and general considerations for requiring ambient air monitoring under PSD regulations are contained in the *New Source Review Workshop Manual (draft)*. Section 165(e)(2) of the Clean Air Act (CAA) requires conducting preconstruction air quality monitoring to determine whether emissions of new sources or source

3. AMBIENT AIR QUALITY MONITORING AND DATA USAGE

3.1 GENERAL

According to the regulations established in 40 CFR part 58, States are required to establish and maintain an air quality surveillance system for the purpose of measuring ambient air concentrations of those pollutants for which national ambient air quality standards (NAAQS) have been defined. The network of monitoring stations that is to be provided for in State implementation plans is designated as the State and Local Air Monitoring Stations (SLAMS) network. The general SIP monitoring requirements are contained in 40 CFR 58.20 and include the following:[1]

1. Requirements in appendices A, C, D, and E of 40 CFR part 58 which pertain to quality assurance for monitoring stations, monitoring methodology, monitoring network design, and probe siting criteria, respectively.
2. An annual review of the monitoring network to assure that the monitoring objectives as defined in appendix D of part 58 are satisfied.
3. Operate at least one station of the SLAMS network per pollutant during any stage of an air pollution episode.
4. Provide a SLAMS network description for public review and submission to the EPA Administrator.

The SIP itself does not have to contain the network description; however, these must be kept on file at the State agency's office, made available for public inspection, and submitted to the Administrator upon request. A State's prior SIP submission that covers air quality monitoring in general may meet the requirements for SO_2 SIP's. The Regional Office should determine whether the State's prior monitoring submission includes SO_2. If the monitoring

modifications located in attainment or unclassifiable areas will result in exceedance of the NAAQS.[6] Section 165(a)(7) of the CAA gives EPA the discretion to require postconstruction air quality monitoring to determine the ambient air quality impacts from emissions of new sources or source modifications on such areas.[7]

Under PSD regulations, source applicants are generally required to collect ambient air quality data for 1 year, but EPA has the discretion to allow a shorter collecting period (not less than 4 months) if the resulting data can demonstrate a complete analysis of the ambient air quality impacts the source will have on the area. Source applicants must also use quality assurance procedures pursuant to appendix B of 40 CFR part 58 in order to ensure accuracy and precision of the data collected.[8] EPA requirements for incorporating PSD provisions in SIP's are contained in 40 CFR part 51.166.

REFERENCES FOR SECTION 3.1

1. U.S. Environmental Protection Agency. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58.20.

2. "The State shall adopt and submit to the Administrator a revision to the plan which will: . . . (e) Provide having a SLAMS network description available for public inspection and submission to the Administrator upon request." U.S. EPA. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58.20(e).

3. "Any ambient air quality monitoring station other than a SLAMS or PSD station from which the State intends to use the data as part of a demonstration of attainment or nonattainment or in computing a design value for control purposes of the National Ambient Air Quality Standards (NAAQS) must meet the requirements for SLAMS described in section 58.22 and, after January 1, 1983, must also meet the requirements for SLAMS as described in section 58.13 and appendices A and E to this part." U.S. EPA. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58.14 (a).

4. "Any ambient air quality monitoring station other than a SLAMS or PSD station from which the State intends to use data for SIP-related functions other than described in paragraph (a) of this section in not necessarily required to comply with the requirements of a SLAMS station under paragraph (a) but must be operated in accordance with a monitoring schedule, methodology, quality assurance procedures, and probe or instrument-siting specifications approved by the Regional Administrator." U.S. EPA. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58.14 (b).

5. U.S. Environmental Protection Agency. *On-site Meteorological Program Guidance for Regulatory Modeling Applications*. PB87-227542. June 1987.

6. "The court ruled that section 165(e)(2) of the Clean Air Act requires that continuous preconstruction air quality monitoring data must be collected to determine whether emissions from a source will result in exceeding the National Ambient Air Quality Standards (NAAQS) . . ." U.S. EPA. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)*. Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-007. May 1987. page 3.

7. U.S. Environmental Protection Agency. *New Source Review Workshop Manual*. Draft document. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. October 1990. page C.21.

8. "(m)(1)(iv) The plan shall provide that, in general, the continuous air monitoring data that is required shall have been gathered over a period of one year . . . except that, if the reviewing authority determines that a complete and adequate analysis can be accomplished with monitoring data gathered over a period shorter than one year (but not to be less than four months) . . . (m)(3) The plan shall provide that the owner or operator of a major stationary source or major modification shall meet the requirements of appendix B to part 58 of this chapter . . ." U.S. EPA, *Code of Federal Regulations*. Title 40 chapter I, subchapter C, part 51.166.

3.2 QUALITY ASSURANCE

Quality Assurance requirements for SLAMS networks are contained in appendix A of 40 CFR part 58, and requirements for PSD monitoring are contained in appendix B of 40 CFR part 58. The requirements in appendix A are general in nature in order to allow each State the opportunity to develop the most efficient and effective quality assurance system for its specific circumstances.[1] Accuracy and precision tests for SO_2 sampling are the essence of the quality assurance system established. The results of all valid precision and accuracy tests must be reported on a quarterly basis to the Atmospheric Research and Exposure Assessment Laboratory (AREAL) (formerly the Environmental Monitoring Systems Laboratory (EMSL)). A list of all SO_2 monitoring sites and their Aerometric Information Retrieval System (AIRS) site identification codes shall be kept updated and on file with the appropriate EPA Regional Office and with AREAL.[2] AIRS was formerly known as the Storage and Retrieval of Aerometric Data (SAROAD) system.

Primary guidance for developing the quality assurance program for ambient air monitoring is provided in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume I - Principles* (EPA-600/9-76-005), and in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II - Ambient Air Specific Methods* (EPA-600/4-77-027a). These documents contain suggested procedures, checks, and control specifications. As a minimum, each quality assurance program must include operational procedures for the following activities:[3]

1. Selection of methods, analyzers, or samplers.
2. Training.
3. Equipment installation.
4. Selection and control of calibration standards.
5. Calibration procedures and frequency.
6. Zero/span checks and adjustments of automated

analyzers.

7. Control checks and their frequency.
8. Control limits for zero, span, and other control checks, and respective corrective actions when such limits are surpassed.
9. Calibration and zero/span checks for multiple range analyzers.
10. Preventive and remedial maintenance.
11. Quality control procedures for air pollution episode monitoring.
12. Recording and validating data.
13. Data quality assessment (precision and accuracy).
14. Documentation of quality control information.

Generally, standards used for ambient air monitoring quality assurance must be traceable to standards or devices certified by the National Institute of Standards Technology (NIST), or other approved reference material. Gaseous pollutant concentration standards used to obtain test concentrations for SO_2 must be traceable to the NIST.[4] NIST was formerly the National Bureau of Standards (NBS).

Agencies operating SLAMS network stations are subject to annual EPA systems audits of their ambient air monitoring program and are required to participate in EPA's National Performance Audit Program.[5] Audit procedures are described in section 1.4.16 of the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume I - Principles* (EPA-600/9-76-005). The EPA's National Performance Audit Program is described in section 2.0.10 of the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II - Ambient Air Specific Method.* Systems audit criteria and procedures are given in section 2.0.11 of the same document.

REFERENCES FOR SECTION 3.2

1. "General Information...The selection and extent of the quality control activities - as well as additional quality assessment activities - used by a monitoring agency depend on a number of local factors such as the field and laboratory conditions, the objectives of the monitoring, the level of the data quality needed, the expertise of assigned personnel, the cost of control procedures, pollutant concentration levels, etc. Therefore, the quality assurance requirements, in section 2 of this appendix, are specified in general terms to allow each State to develop a quality assurance system that is most efficient and effective for its own circumstances." U.S. Environmental Protection Agency. Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS) Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix A. Washington, D.C. Office of the Federal Register.

2. "4. Reporting Requirements...For each pollutant, prepare a list of all monitoring sites and their SAROAD site identification codes in each reporting organization and submit the list to the appropriate EPA Regional Office, with a copy to the Environmental Monitoring Systems Laboratory (MD-75), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711 (AREAL/RTP). Whenever there is a change in this list of monitoring sites in a reporting organization, report this change to the Regional Office and to AREAL/RTP." U.S. Environmental Protection Agency. Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS) Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix A. Washington, D.C. Office of the Federal Register.

3. U.S. Environmental Protection Agency. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58, appendix A. Section 2.2.

4. U.S. Environmental Protection Agency. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58, appendix A. Section 2.3.

5. U.S. Environmental Protection Agency. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58, appendix A. Section 2.4.

3.3 AMBIENT MONITORING METHODOLOGY

3.3.1 General. Monitoring methods used in SLAMS networks must be reference or equivalent methods as defined in 40 CFR 50.1. The reference method used for measuring ambient levels of sulfur dioxide to determine compliance with the primary and secondary NAAQS is the pararosaniline method.[1]

The air quality monitoring regulations allow the use, for a period of time determined by the Administrator, of any manual method or analyzer purchased prior to cancellation of its reference or equivalent method designation in 40 CFR 53.11 or 40 CFR 53.16.[2] NAMS sites must use continuous analyzers.[5] Certain allowances are also made for use, in specific geographical areas, of methods with higher, nonconforming measurement ranges.[3] No reference or equivalent method that has been modified in a manner that will, or might, significantly alter the performance characteristics of the method, may be used in a SLAMS without prior approval of the Administrator.[4]

3.3.2 Sampling Interval. Sulfur dioxide data collected at any SLAMS must be consecutive hourly averages, for continuous analyzers and at least one 24-hour sample every 6 days, for manual methods. NAMS sites must use continuous analyzers.[5] Certain periods or seasons may be exempted from sampling by the Regional Administrator (e.g., in the case of continuous analyzers, periods of routine maintenance and instrument calibration are exempt).[6]

3.3.3 Data Completeness. A minimum of 75 percent of the individual hourly values for continuous analyzers should be reported in any sampling period for monitors in the SLAMS/NAMS network.[5] A minimum of 80 percent of the individual hourly values for continuous analyzers should be reported for monitors in the PSD network.[7]

REFERENCES FOR SECTION 3.3

1. "1.1 This method provides a measurement of the concentration of sulfur dioxide (SO2) in ambient air for determining compliance with the primary and secondary national ambient air quality standards for sulfur oxides (sulfur dioxide) as specified in 50.4 and 50.5 of this chapter." U.S. Environmental Protection Agency. Reference Method for the Determination of Sulfur Dioxide in the Atmosphere (Pararosaniline Method). Code of Federal Regulations. Title 40, chapter I, subchapter C, part 50, appendix A. Washington, D.C. Office of the Federal Register.

2. "2.3 Any manual method or analyzer purchased prior to cancellation of its reference or equivalent method designation under 53.11 or 53.16 of this chapter may be used in a SLAMS following cancellation for a reasonable period of time to be determined by the Administrator." U.S. Environmental Protection Agency. Ambient Air Quality Monitoring Methodology. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix A. Washington, D.C. Office of the Federal Register.

3. "2.6 Use of Methods With Higher, Nonconforming Ranges in Certain Geographical Areas ... 2.6.2 Nonconforming ranges. An analyzer may be used (indefinitely) on a range which extends to concentration higher than two times the upper limit specified in Table B-1 of part 53 of this chapter if ..." U.S. Environmental Protection Agency. Ambient Air Quality Monitoring Methodology. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix A. Washington, D.C. Office of the Federal Register.

4. "2.8 Modifications of Methods by Users. 2.8.1 Except as otherwise provided in this section (2.8), no reference method, equivalent method, or alternative method may be used in a SLAMS if it has been modified in a manner that will, or might, significantly alter the performance characteristics of the method without prior approval by the Administrator." U.S. Environmental Protection Agency. Ambient Air Quality Monitoring Methodology. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix A. Washington, D.C. Office of the Federal Register.

5. "Methods used in those SLAMS which are also designated as NAMS to measure SO_2, CO, NO_2, or O_3 must be automated reference or equivalent methods (continuous

analyzers)." U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter B, part 58, appendix C, section 3.0 National Ambient Monitoring Stations (NAMS).

6. "Ambient air quality data collected at any SLAMS must be collected as follows: (a) For continuous analyzers-consecutive hourly averages except during: (1) Periods of routine maintenance, (2) Periods of instrument calibration, or (3) Periods or seasons exempted by the Regional Administrator. (b) For manual methods (excluding PM-10 samplers)-at least one 24 hour sample every six days except during periods or seasons exempted by the Regional Administrator." U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter B, part 58.13. Washington, D.C. Office of the Federal Register.

7. "For continuous analyzers, at least 80 percent of the individual hourly values should be reported by the source in any sampling period." U.S. Environmental Protection Agency. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-007. May 1987.

3.4 NETWORK DESIGN

General criteria for the establishment of the SLAMS network and for the selection of new monitoring stations is provided in appendix D of 40 CFR 58.[1] These criteria are employed by EPA in evaluating the adequacy of SLAMS networks.

A network of SLAMS should be designed to comply with four basic monitoring objectives:[2]

- to determine the highest concentrations expected to occur in the area encompassed by the network;
- to determine representative concentrations in areas of high population density;
- to determine the impact on ambient pollution levels of significant sources or source categories; and
- to determine general background concentration levels.

Proper siting of a monitoring station requires exact specification of the monitoring objective and commonly involves a definition of a spatial scale of representativeness.[3] As stated in appendix D, the goal in siting stations is to correctly match the spatial scale that the sample of monitored air represents with the spatial scale most appropriate for the monitoring objective of the station.[4] The spatial scales designated for SO2 SLAMS monitoring are the middle, neighborhood, urban and regional scales, the definitions of which are provided in appendix D.

Additional information on monitoring network design may be found in the documents "Optimum Site Exposure Criteria for SO_2 Monitoring" and "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)."[5,6]

In designing ambient monitoring networks under PSD regulations, such factors as topography, climatology, population, and existing emission sources must be considered; therefore, the ultimate design of the network

will be determined on a case-by-case basis by the permitting authority.[7] In general, ambient networks under PSD are designed during a preconstruction phase and a post-construction phase. For both the preconstruction phase and the post-construction phase, the number and location of monitors will be determined through appropriate dispersion modeling techniques. In addition, the number of monitors will depend on the expected spatial variability of the pollutant in the area being studied (*i.e.*, the higher the spatial variability of the pollutant under study, the greater the number of monitors needed in that area).[8]

During the preconstruction phase, the monitors should be (1) located in the area of maximum concentration increase expected from the proposed source or modification; (2) located in the area of the maximum expected concentrations from emissions of existing sources; and (3) located in the area of maximum impact of the pollutant from the combination effect of existing sources and the proposed source or modification. In most multisource settings, one to four sites would be sufficient. For remote settings (*i.e.*, in areas with no significant existing sources), a minimum number of monitors would need to be located (*i.e.*, one or two at the most).[9]

For the postconstruction phase, two or three sites would probably be sufficient for most situations involving multi-source areas. For remote areas, one or two sites would be sufficient.[10]

REFERENCES FOR SECTION 3.4

1. U.S. Environmental Protection Agency. Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS). Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix D. Washington, D.C. Office of the Federal Register.

2. Reference 1. "The network of stations which comprise SLAMS should be designed to meet a minimum of four basic monitoring objectives. These basic monitoring objectives are: (1) To determine highest concentrations expected to occur in the area covered by the network; (2) to determine representative concentrations in areas of high population density; (3) to determine the impact on ambient pollution levels of significant sources or source categories; and (4) to determine general background concentration levels."

3. "Proper siting of a monitoring station requires precise specification of the monitoring objective which usually includes a desired spatial scale of representativeness." U.S. Environmental Protection Agency. Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS). Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix D. Washington, D.C. Office of the Federal Register.

4. "The goal in siting stations is to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring objective of the station." U.S. Environmental Protection Agency. Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS). Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix D. Washington, D.C. Office of the Federal Register.

5. U.S. Environmental Protection Agency. Optimum Site Exposure Criteria for SO_2 Monitoring. Research Triangle Park, NC. EPA Publication No. EPA-450/3-77-013. April 1977.

6. U.S. Environmental Protection Agency. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Office of Air Quality Planning and Standards. Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-007. May 1987.

7. Reference 6. "3.1 Network Design. The design of a network for criteria and noncriteria pollutants will be affected by many factors such as topography, climatology, population, and existing sources. Therefore, the ultimate design of a network for PSD purposes must be decided on a case-by-case basis by the permit granting authority."

8. Reference 6. "3.2.2. As discussed above for preconstruction monitoring, appropriate dispersion modeling techniques are used to estimate the location of the air quality impact of the new source or modification. Monitors should then be placed at (a) the expected area of the maximum concentrations from the new source or modification, and (b) the maximum impact area(s), *i.e.*, where the maximum pollutant concentration will occur based on the combined effect of existing sources and the new source or modification . . . 3.2 Number and Location of Monitors . . . Generally, the number of monitors will be higher where the expected spatial variability of the pollutant in the area(s) of study is higher."

9. Reference 6. "3.2.1 Preconstruction Phase . . . This would provide sufficient information for the applicant to place a monitor at (a) the location(s) of the maximum concentration increase expected from the proposed source or modification, (b) the location(s) of the maximum air pollutant concentration from existing sources of emissions, and (c) the location(s) of the maximum impact area, *i.e.*, where the maximum pollutant concentration would hypothetically occur based on the combination effect of existing sources and the proposed new source or modification . . . Generally, one to four sites would cover most situations in multisource settings. For remote areas in which the permit granting authority has determined that there are no significant existing sources, a minimum number of monitors would be needed, *i.e.*, one or probably two at the most . . . When industrial process fugitive particulate emissions are involved, the applicant should locate a monitor at the proposed source site. If stack emissions are also involved, a downwind location should also be selected."

10. Reference 6. "3.2.2 Postconstruction Phase . . . Generally, two or three sites would be sufficient for most situations in multisource areas. In remote areas where there are no significant existing sources, one or two sites would be sufficient."

3.5 PROBE SITING CRITERIA

Criteria for determining the correct siting of SO_2 samplers is provided in appendix E of 40 CFR 58 and in the "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)."[1] These criteria must be adhered to as strictly as possible. In the event that the siting criteria cannot be met, a written request must be made justifying the differences in the proposed siting criteria.[2]

REFERENCES FOR SECTION 3.5

1. U.S. Environmental Protection Agency. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-007. May 1987.

2. "The probe siting criteria as discussed below must be followed to the maximum extent possible. It is recognized that there may be situations when the probe siting criteria cannot be followed. If the siting criteria cannot be met, this must be thoroughly documented with a written request for a waiver which describes how and why the siting criteria differ." U.S. Environmental Protection Agency. Probe Siting Criteria for Ambient Air Quality Monitoring. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58, appendix E. Washington, D.C. Office of the Federal Register.

3.7 AMBIENT AIR QUALITY DATA REPORTING

3.7.1 General. On an annual basis States shall submit a summary report of all the ambient air quality monitoring data from their SLAMS (40 CFR 58.26). These annual summaries must contain the following statistics:[1]

- the annual arithmetic mean (ppm);
- the highest and second highest 24-hour averages and dates of occurrence;
- the highest and second highest 3-hour averages and dates and ending hours of occurrence;
- the number of exceedances of the 24-hour primary NAAQS;
- the number of exceedances of the 3-hour secondary NAAQS;
- the number of 24-hour average concentrations in the ranges as specified in appendix F;
- the location, date, pollution source and duration of each air pollution incident during which ambient SO_2 levels reached or exceeded the significant harm level specified by 40 CFR 51.151; and
- a certification of accuracy by the State's senior air pollution control officer or that officer's designee.

It is important to note that EPA policy permits the use of block averages in implementing the 3-hour and 24-hour NAAQS.[2] This policy does not preclude States from developing more stringent requirements such as requiring running averages.[3] Part 58.26 requires that the annual report be submitted by July 1 of each year for data collected from January 1 to December 31 of the previous year. In addition, the States are required to submit, upon Regional Administrator request, all or part of SLAMS data.[4] As a subset of the SLAMS network, NAMS data are required,

3.6 EPISODE MONITORING

Classification of regions required to have air pollution episode contingency plans is provided in 40 CFR 51 subpart H. The definition of an air pollution emergency and the level of sulfur dioxide associated with it are defined in 40 CFR 51 appendix L. As stated in 40 CFR 51.152, each State contingency plan must satisfy the following:

- specify two or more stages of episode criteria, as set forth in appendix L, or their equivalent;
- provide for public announcement whenever any episode stage has been determined to exist; and
- specify adequate emission control actions to implement at each episode stage.

under part 58.35, to be reported quarterly and within 120 days of the end of a quarter.[5]

In addition to the annual SLAMS reporting requirements, section 4.1 of appendix A of 40 CFR part 58 requires that the results of all valid precision and accuracy tests be reported to AIRS via the appropriate EPA Regional Office within 120 calendar days after the end of each calendar quarter. The report should include the results of all collocated measurements including those falling below 45 $\mu g/m^3$ for SO_2 as specified in section 5.3.1 of appendix A. Data from invalid tests, from tests performed during a period of time for which ambient data immediately prior or subsequent to the tests were invalidated for appropriate reasons, and from tests of methods or analyzers not approved for SLAMS network use under appendix C of part 58, should not be reported.[6]

3.7.2 Air Pollution Index. States are required to report to the public, through a prominent notice (such as radio, television, newspapers), an air quality index in accordance with the requirements outlined in appendix G of 40 CFR 58. This index provides the general public with an idea of how healthy the ambient air is on a particular day. Reporting of the air quality index is required for all urban areas with populations exceeding 200,000 (based on the most current decennial U.S. Census of Population Report).[7]

REFERENCES FOR SECTION 3.7

1. "The annual summary report must contain: (1) The information specified in appendix F, (2) The location, date, pollution source, and duration of each incident of air pollution during which ambient levels of a pollutant reached or exceeded the level specified by 51.16(a) [redesignated as 51.151] of this chapter as a level which could cause significant harm to the health of persons. (c) The senior air pollution control officer in the State or his designee shall certify that the annual summary report is accurate to the best of his knowledge." U.S. Environmental Protection Agency. Code of Federal Regulations title 40, chapter I, subchapter C, part 58.26(b) and (c). Washington, D.C. Office of the Federal Register.

2. Memorandum from Bauman, R.D., OAQPS to Air Branch Chief, Regions I-X. Boilerplates for Block Averaging and Grandfathering Modeling Analyses. July 12, 1989.

3. "The question has arisen whether block averages are indeed the proper interpretation of the NAAQS. We have investigated this issue, and concluded that block averages are the proper interpretation. Thus, we will continue to use block averages in actions implementing the 3-hour and 24-hour NAAQS." Memorandum from Emison, G.A., to Director, Air Divisions, Regions I-X. March 28, 1986. Block Averages in Implementing SO_2 NAAQS.

4. "The State shall submit all or a portion of the SLAMS data to the Regional Administrator upon his request. U.S. EPA. *Code of Federal Regulations*. Title 40. part 58.28. "Regional Office SLAMS data Acquisition."

5. "(b) The State shall report quarterly to the Administrator (through the appropriate Regional Office) all ambient air quality data and information...(c) The quarterly report must: (1) Be received by the National Aerometric Data Bank within 120 days of the end of each reporting period, after being submitted by the States to the Regional Offices for review; (2) Contain all data and information gathered during the reporting period." U.S. EPA. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58.35. "NAMS Data Submittal."

6. U.S. Environmental Protection Agency. *Code of Federal Regulations*. Title 40, chapter I, subchapter C, part 58, appendix A 4.1.

7. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 58,

subpart E. Washington, D.C. Office of the Federal Register.

3.8 AMBIENT AIR MONITORING NETWORK FOR MODEL EVALUATION

While it is generally not feasible to base point source emission limits solely on monitoring data, such data may be used to determine, through an evaluation study, the best available model for a particular application.[1] A difficult aspect of implementing this approach is the determination of the appropriate network size. A network too small would provide inadequate data and hence an invalid evaluation. A network too large would be prohibitively expensive to operate.[2] Based on experience with previously conducted model evaluation studies, the operation of approximately 15 monitors for a period of one year is considered the minimum network size to obtain a valid data base under normal (e.g., not complex terrain) circumstances.[3,4] The protocol and data base requirements for conducting a model performance evaluation study are described in the EPA report "Interim Procedures for Evaluating Air Quality Models (Revised)."[5]

4. AIR QUALITY MODELING

4.1 GENERAL

Air quality modeling analyses are performed to demonstrate that a proposed control strategy can adequately attain and maintain the National Ambient Air Quality Standards (NAAQS) (40 CFR 51.112) and protect the Prevention of Significant Deterioration (PSD) increments. State Implementation Plan (SIP) submittals must include a description of how the modeling analysis was conducted by providing, in a Technical Support Document, information on: the models used; the justification of model selection; the modes of models used; assumptions involved in model application; the meteorological data; ambient monitoring data used; the justification of off-site data, if used; the model input data; and the model output data.[1]

4.2 GUIDANCE ON AIR QUALITY MODELS

Air quality modeling techniques appropriate for use in SIP, New Source Review (NSR) and PSD analyses are specified in the "Guideline on Air Quality Models (Revised)" ("Guideline"), Supplement A[2,3], and Supplement B[4] which was promulgated on July 20, 1993 (58 FR 38816). The Guideline is a primary source of information on the proper selection and regulatory application of air quality models. Recommendations are made in the Guideline concerning air quality models, data bases, requirements for concentration estimates, the use of measured data in lieu of model estimates and model evaluation procedures.

The Federal Register notice in which Supplement B was promulgated did several things. It added new models and improved existing models to the Guideline, it gave regulatory status to long-standing EPA policy regarding the

REFERENCES FOR SECTION 3.8

1. "It is generally not feasible to establish emission limits for point sources based solely on monitoring data. [A]n alternative approach is to establish a monitoring network of reasonable size, use the resulting monitored data to evaluate the models for applicability to those particular conditions, and to use the resulting 'best available' model to establish the emission limitation." Memorandum from Rhoads, R.G., OAQPS, to R.C. Campbell, OAQPS. September 1, 1981.

2. Reference 1. "One problem with this approach is defining the "network of reasonably size" which would be used to evaluate the models. If the network is too small, the data would be inadequate to distinguish between models and the evaluation would have no validity. If the network is too large, the cost would be excessive."

3. Reference 1. "Based on our experience with these programs (all of which were reasonable successful, but with the exception of EPRI, none of which were 'data rich'), I believe that approximately 15 monitors operating for one year is probably the minimum network size to obtain a valid data base under normal circumstances."

4. "Although our experience with networks for this purpose is limited, we believe that an appropriate balance between the technical requirements of the analyses and the costs would result in approximately 15 monitors, depending upon the type of terrain, meteorological conditions, prior knowledge of air quality in the area, etc." Memorandum from Rhoads, R.G., OAQPS, to D. Kee, Region V. August 7, 1981.

5. U.S. Environmental Protection Agency. Interim Procedures for Evaluating Air Quality Models (Revised). Monitoring and Data Analysis Division, Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-84-023. September 1984.

use of air quality models for other regulatory programs, and it codified the Guideline by adding Appendix W to 40 CFR part 51. Appendix W will be published in the 1993 edition of the CFR, which is updated each July. However, CFR volumes are not generally available until at least the following December. Therefore, the reader is advised to refer to the Federal Register (*op. cit.*) in the interim.

As was done with Supplement B, announcements of proposed and final revisions to the Guideline are made in the Federal Register as needed. Clarifications and interpretations of modeling procedures become official EPA guidance through several courses of action: 1) the procedures are published as regulations or guidelines; 2) the procedures are formally transmitted as guidance to Regional Office managers; 3) the procedures are formally transmitted as guidance to Regional Modeling Contacts as a result of a Regional consensus on technical issues; or 4) the procedures are a result of decisions by the Model Clearinghouse that effectively establish a national precedent.[5] Formally located in the Source Receptor Analysis Branch (SRAB) of the OAQPS, the Model Clearinghouse is the single EPA focal point for the review of criteria pollutant modeling techniques for specific regulatory applications.[6] The Clearinghouse serves a major role in promoting fairness and consistency in modeling decisions that deviate from the established modeling guidance.[7] Model Clearinghouse memoranda involving significant decisions with respect to interpretation of modeling guidance are available on the Support Center for Regulatory Air Models Electronic Bulletin Board.[8]

The time at which changes in modeling guidance affect modeling analyses in progress will depend on the type of agreement under which those analyses are being conducted.[9] Normally, on-going analyses will be grandfathered if there is a written protocol with a legal or regulatory basis or if

the analysis is complete and regulatory action is imminent or underway.[10]

applications." Memorandum from Tikvart, J.A., OAQPS, to Regional Chiefs, Air Branch Region VII, Technical Support Branch Region I, Air and Radiation Branch Region V, Air Programs Branch Regions II, III, IV, VI, VIII, IX, X. June 7, 1988.

7. Reference 5. "However, there is also a need to provide for a mechanism that promotes fairness and consistency in modeling decisions among the various Regional Offices and the States."

8. The Support Center for Regulatory Air Models (SCRAM) Electronic Bulletin Board, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

9. Reference 4. "(T)he time at which changes in modeling guidance affect on-going modeling analyses is a function of the type of agreement under which those analyses are being conducted."

10. Reference 4. "On-going analyses should normally be "grandfathered" if (1) there is a written protocol with a legal or regulatory basis (such as the Lovett Power Plant) or (2) the analysis is complete and regulatory action is imminent or underway."

REFERENCES FOR SECTIONS 4.1 and 4.2

1. "(e) Modeling information required to support the proposed revision, including input data, output data, models used, justification of model selections, ambient monitoring data used, meteorological data used, justification for use of offsite data (where used), modes of models used, assumptions, and other information relevant to the determination of adequacy of the modeling analysis." Appendix V - Criteria for Determining the Completeness of Plan Submissions. Proposed Amendment to 40 CFR Part 51. Federal Register 54:2141. January 19, 1989.

2. "This guideline recommends air quality modeling techniques that should be applied to State Implementation Plan (SIP) revisions for existing sources and to new source reviews, including prevention of significant deterioration (PSD)." U.S. Environmental Protection Agency. Guideline on Air Quality Models (Revised), Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/2-78-027R. July 1986. p. 1-1.

3. U.S. Environmental Protection Agency. Supplement A to the Guideline on Air Quality Models (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/2-78-027R-A. July 1987.

4. U.S. Environmental Protection Agency. Supplement B to the Guideline on Air Quality Models (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/2-78-027R-B. February 1993.

5. "(C)hanges in EPA modeling procedures become official Agency guidance when: (1) they are published as regulations or guidelines, (2) they are formally transmitted as guidance to Regional Office managers, (3) they are formally transmitted as guidance to Regional Modeling Contacts as the result of a Regional consensus on technical issues, or (4) they are a result of decisions by the Model Clearinghouse that effectively establish a national precedent." Attachment 2 of memorandum from Tikvart, J.A., OAQPS, to Regional Modeling Contacts. January 2, 1985. PN 110-85-01-02-070.

6. "The Model Clearinghouse is the single EPA focal point for reviewing the use of modeling techniques for criteria pollutants in specific regulatory

4.3 MODEL SELECTION

Air quality modeling techniques recommended for application to SIP revisions for existing sources and to new source reviews, including PSD are provided in the Guideline.[1,2] Each SIP revision must identify and describe the air quality model selected.[3]

The model selected for application should in all situations be the one which most accurately represents atmospheric transport, dispersion, and chemical transformations in the area under analysis.[4] For example, models have been developed for both simple and complex terrain situations; some are designed for urban applications while others are designed for rural applications.

The acceptability of using an alternative model for a given regulatory application may be justified in certain situations.[5] Procedures for objectively evaluating alternative techniques are discussed in the EPA documents: "Interim Procedures for Evaluation Air Quality Models (Revised)" and "Interim Procedures for Evaluating Air Quality Models: Experience with Implementation."[6,7] A third document to refer to when evaluating an alternative model, is the "Protocol for Determining the Best Performing Model."[8]

Two levels of model sophistication exist: screening and refined. Screening techniques are used initially to eliminate more extensive modeling if it is clearly established, through their application, that the proposed source or control strategy will not cause or contribute to ambient concentrations in excess of either the NAAQS or the allowable PSD increments.[9] Refined air quality models require more detailed and precise input data and consequently provide more accurate estimates of source impact. These refined models are used if a screening technique indicates that a concentration resulting from the

source causes or contributes to an exceedance of the PSD increment or the NAAQS.[10]

As noted above, the Guideline should be consulted on specific requirements for model selection. The most current versions of regulatory, air quality model computer code may be obtained from the Support Center for Regulatory Air Models Electronic Bulletin Board.[11]

REFERENCES FOR SECTION 4.3

1. "This guideline recommends air quality modeling techniques that should be applied to State Implementation Plan (SIP) revisions for existing sources and to new source reviews, including prevention of significant deterioration (PSD)." Introduction; Guideline on Air Quality Models (Revised) and its Supplements (see section 4.2), codified as appendix W of title 40, part 51, Code of Federal Regulations. Office of the Federal Register.

2. "(1) All applications of air quality modeling involved in this subpart shall be based on the applicable models, data bases, and other requirements specified in the appendix W of this part ('Guideline on Air Quality Models (Revised)' (1986), supplement A (1987) and supplement B (1993))." Federal Register 58:38822. July 20, 1993.

3. "(4) A description of the dispersion models used to project air quality and to evaluate control strategies." U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.112(b). Washington, D.C. Office of the Federal Register.

4. Reference 1. "In all cases, the model applied to a given situation should be the one that provides the most accurate representation of atmospheric transport, dispersion, and chemical transformations in the area of interest."

5. Reference 1, section 3.2 Use of Alternative Models. "An EPA document, 'Interim Procedures for Evaluation Air Quality Models,' has been prepared to assist in developing a consistent approach when justifying the use of other than the preferred modeling techniques recommended in this guide."

6. U.S. Environmental Protection Agency. Interim Procedures for Evaluating Air Quality Models (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-84-023. September 1984.

7. U.S. Environmental Protection Agency. Interim Procedures for Evaluating Air Quality Models: Experience with Implementation. Office of Air Quality Planning and Standards. Research Triangle Park, EPA Publication No. EPA-450/4-85-006. July 1985.

8. Environmental Protection Agency, 1992. Protocol for Determining the Best Performing Model. EPA Publication No. EPA-454/R-92-025. U.S. Environmental Protection Agency, Research Triangle Park, NC.

9. Reference 1, Section 2.3 Levels of Sophistication of Models. "The purpose of such techniques is to eliminate the need of further more detailed modeling for those sources that clearly will not cause or contribute to ambient concentrations in excess of either the National Ambient Air Quality Standards or the allowable prevention of significant deterioration concentration increments."

10. Reference 9. "If a screening technique indicates that the concentration contributed by the source exceeds the PSD increment or the increment remaining to just meet the NAAQS, then the second level of more sophisticated models should be applied."

11. The Support Center for Regulatory Air Models (SCRAM) Electronic Bulletin Board. Access through the Technology Transfer Network (TTN) Bulletin Board System, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. Communications Software Parameters: 8-N-1; 1200-2400 baude, (919)541-5742; 9600 baude, (919)541-1447. SYSOP (919)541-5384.

4.4 METEOROLOGICAL INPUT

Meteorological data utilized in air quality modeling should be spatially and climatolcgically (temporally) representative of the area of interest.[1] Use of site-specific data is preferred for air quality analyses provided one year or more of quality-assured data are available.[2] Suggestions for the collection and use of on-site data are provided in the Guideline and in the EPA documents: "On-Site Meteorological Program Guidance for Regulatory Modeling Applications," "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)" and "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV. Meteorological Measurements."[3-5]

If one year of site-specific data is not available, five years of other representative meteorological data can be used in the modeling analysis. These five years should be the most recent, readily available consecutive five years of data.[6] The five year period is defined to ensure that the model results adequately represent meteorological conditions conducive to the prediction of maximum ambient concentrations. Potential sources of representative meteorological data include the National Weather Service, local universities, the Federal Aviation Administration, military stations and air pollution control agencies. Meteorological data collected by the National Weather Service may be obtained from the Support Center for Regulatory Air Models Electronic Bulletin Board.[7]

When modeling previously permitted sources whose emission limitations are based on a specific year of meteorological data, that year of data should be added to any longer period involved in the modeling analysis.[7]

Hours of calm wind should not be included in Gaussian model calculations of ambient concentrations.[8] Proper procedures for calculating average concentrations during

calm wind conditions are provided in the Guideline. Some air quality models recommended in the Guideline include algorithms to automatically recalculate concentrations during periods of calm wind.

As mentioned earlier, meteorological data collected on-site must be quality-assured prior to its application in air quality modeling analyses. At sites with collocated, continuous air quality monitors, the inspection, maintenance and calibration of each meteorological instrument operated must be conducted to guarantee a minimum of 90 percent data retrieval (80 percent for remote sites).[9] At the initiation of the monitoring program and at least every six months thereafter, routine system calibrations and audits should be performed.[10]

Meteorological audits, performed independently of the organization responsible for data collection and system maintenance, should be scheduled on a semiannual basis.[11] Aside from providing for on-site calibration of instruments, these independent evaluations should address network installation; inspection, maintenance and calibration procedures; data reduction procedures; and data logging and tabulation procedures.[12]

As recommended in the Quality Assurance Handbook, meteorological data validation can be conducted using a three-fold approach of initial hardcopy audit of the data followed by screening of the data through a program designed to note and flag questionable values and finally passing of the data through a comparison program which evaluates how well the data fit the synoptic conditions prevalent in the area of on-site measurement.

REFERENCES FOR SECTION 4.4

1. "The meteorological data used as input to a dispersion model should be selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the individual parameters selected to characterize the transport and dispersion conditions in the area of concern." Section 9.3 Meteorological Input Data; Guideline on Air Quality Models (Revised) and its Supplements (see section 4.2), codified as appendix W of title 40, part 51, Code of Federal Regulations. Office of the Federal Register.

2. Reference 1, Section 9.3.1.2 Recommendations. "If one year or more, up to five years, of site-specific data is available, these data are preferred for use in air quality analyses."

3. U.S. Environmental Protection Agency. On-Site Meteorological Program Guidance for Regulatory Modeling Applications. Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-013. June 1987.

4. U.S. Environmental Protection Agency. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-007. May 1987.

5. U.S. Environmental Protection Agency. Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV. Meteorological Measurements. Environmental Monitoring Systems Laboratory, Research Triangle Park, NC. EPA Publication No. EPA-600/4-90-003. August 1989.

6. Reference 2. "Five years of representative meteorological data should be used when estimating concentrations with an air quality model. Consecutive years from the most recent, readily available 5-year period are preferred."

7. The Support Center for Regulatory Air Models (SCRAM) Electronic Bulletin Board, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

8. Reference 2. "For permitted sources whose emission limitations are based on a specific year of meteorological data that year should be added to any longer period being used (e.g., 5 years of NWS data) when modeling the facility at a later time."

9. Reference 1, Section 9.3.4.2 Recommendations. "Hourly concentrations calculated with Gaussian models using calms should not be considered valid; the wind and concentration estimates for these hours should be disregarded and considered to be missing."

10. Reference 4, p. 55. "Inspection, servicing, and calibration of equipment must be scheduled throughout the measurement program at appropriate intervals to assure at least 90 percent data retrieval for each variable measured at sites where continuous air quality monitors are being operated. At remote sites, data retrieval for measured variables should not fall below 80 percent."

11. Reference 3, p. 8-38. "Routine system calibrations and system audits should be performed at the initiation of a monitoring program and at least every six months thereafter. More frequent calibrations and audits may be needed in the early stages of the program if problems are encountered, or if valid data retrieval rates are unacceptably low."

12. Reference 4, p. 55. "An independent meteorological audit (by other than one who conducts the routine calibration and operation of the network) should be performed to provide an on-site calibration of instruments as well as an evaluation of (a) the network installation, (b) inspection, maintenance, and calibration procedures, and logging thereof, (c) data reduction procedures, including spot checking of data, and (d) data logging and tabulation procedures. [S]uch independent meteorological audit-evaluations should be performed about each 6 months."

4.5 SOURCE INPUT

4.5.1 General. Emission input data to be used to evaluate SIPs and PSD analyses for compliance with both the annual and short-term ambient standards are described in Table 9-1 of the "Guideline On Air Quality Models (Revised)."[1] The model input data requirements in this table apply to stationary point source control strategies.[2] Other model input criteria may apply with regard to emissions trading or new source review. Determination of emission limits for these purposes is discussed in section 7.

4.5.2 Allowable Versus Actual Emissions. Annual and short-term average concentrations estimated from stationary point sources undergoing a SIP emission limit review must reflect the maximum allowable emission limit or federally enforceable permit limit of the source.[3] A source's total emissions reflected in modeling analyses are determined as the product of the source's emission limit, operating level and operating factor. The operating level used must be the actual or design capacity (whichever is greater) or the federally enforceable permit condition. Operating levels less than 100 percent of capacity should also be modeled for those cases in which the source operates at a capacity substantially less than design and in which changes in stack parameters associated with the operating conditions could result in higher ground level concentrations.[4] In the case of large power plants, for example, loads such as 50 and 75 percent of capacity should also be modeled. If a source operates at greater than 100 percent load for periods during normal operation that could result in violations of the NAAQS or PSD increments, this load should be modeled.

The operating factor (e.g., hours/year or hours/day) to be used in the case of annual averages should be the actual operating factor averaged over the most recent two years

(unless it is determined that this period is not representative).[5] In the case of short-term averages, operation should be assumed to occur for all hours of the time period under consideration (i.e, continuous operation). Appropriate adjustment of the modeled emission rate may be made if operation does not occur continuously and the operation is constrained by a federally enforceable permit condition (i.e., modeling may only be performed for those hours during which the source is operating).[6]

Identical input requirements apply to sources defined as "nearby" background sources (here the term "nearby" refers to those sources expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration).[7] If other background sources are modeled, the maximum allowable emission limit or federally enforceable permit limit should be used in estimating both annual and short-term average concentrations. The operating level used for estimating both annual and short-term concentrations from these sources should be the annual level when actually operating, averaged over the most recent two years (unless this period is deemed unrepresentative). The operating factors used for other background sources are identical to those indicated previously in this section.

4.5.3 Background Concentration. Background concentrations are an essential element of the total air quality concentration to be considered in the determination of source impacts for State Implementation Plans.[8] These concentrations may include contributions from natural sources, nearby sources other than those currently under consideration, and unidentified sources. Recommendations for determining background concentrations are provided in the Guideline.[9]

In the case of isolated sources, air quality data

monitored in the vicinity of the source(s) under consideration should be used to determine the background concentration for the averaging times of concern.[10] Concentrations recorded while the source in question is impacting the monitor should not be used in determining the background concentration.[11] Use of monitored air quality data is recommended for determining that portion of the background attributable to sources other than those nearby (e.g., natural sources, minor sources, and distant major sources).[12]

In multi-source areas, nearby sources that are anticipated to cause a concentration gradient in the vicinity of the source or sources under consideration for emission limit(s) should be explicitly modeled.[13,14] The impact of nearby sources should be examined at those locations where interaction exists between the plume of the source under consideration and those of the nearby sources (including natural background).

4.5.4 Stack Height Input to Air Quality Modeling. Specification of stack height is an important consideration in the development of source input for an air quality modeling analysis. Generally, the lesser of the actual stack height or Good Engineering Practice (GEP) stack height is used for air quality modeling (refer to section 5 for definition of GEP). Guidance on a number of particular modeling questions has been provided by EPA, as follows:[15]

- If the actual stack height is greater than GEP height and where it is necessary to reduce stack height credit below that which exists:
  - Use existing stack gas exit parameters--temperature, flow rate and stack top diameter --and model the stack at GEP height.
- If the actual stack height is less than GEP height and dispersion techniques are employed:

- Two cases should be modeled in order to establish an appropriate emission limitation for the situation in which it is desired to construct a source at less than GEP height and use dispersion techniques to make up the difference in plume rise. First conduct a modeling analysis using the GEP stack height without enhanced dispersion parameters. Secondly, conduct a modeling analysis using the less than GEP stack height with the increased plume rise. The more stringent emission limitation resulting from each of the two model runs should be the one specified as the enforceable limitation.

o Stack height input for point sources modeled for the purpose of demonstrating protection of the NAAQS or PSD increments:

  - The GEP stack height should be used as input. If a source is operating at a height less than GEP, then the actual stack height should be input to the model.

o Stack height for background sources:

  - The GEP stack height should be used for each background source. If a background source is operating with less than a GEP stack height, then the actual stack height should be input to the model.

o Excluding the effects of prohibited dispersion techniques for modeling purposes:

  - Modeling to exclude the effects of prohibited dispersion techniques on the emission limitations will be accomplished by using the temperature and flow rates as the gas stream enters the stack, and recalculating stack parameters to exclude the use of prohibited techniques.

o If single flued, merged stacks or multiflued stacks are involved in a modeling analysis refer to section 5.7 to determine if this merging is creditable.

o If plume merging from multiflued stacks is not allowed, then each flue/liner must be modeled as a separate source and the combined impact determined. For single flued, merged stacks where

credit is not allowed, each unit should be modeled as a separate stack located at the same point. The stack exit velocity and temperature would be the same as for the existing merged stack conditions and the volume flow rate based on an apportionment of the flow from the individual units.

4.5.5 Stack Downwash and Building Wake Effects. Air quality modeling of sources with stacks which are less than GEP should consider the impacts associated with building wake effects both for the source in question and for nearby sources.[16] In determining which background sources constitute "nearby" sources, the reviewing agency must exercise judgement. Exercising judgement in these cases can minimize the resource burden associated with collecting building dimension data.[17]

REFERENCES FOR SECTION 4.5

1. Table 9-1 (section 9.1.2); Guideline on Air Quality Models (Revised) and its Supplements (see section 4.2), codified as appendix W of title 40, part 51, Code of Federal Regulations. Office of the Federal Register.

2. "The EPA's policy for demonstrating stationary point source compliance with the NAAQS for SIP purposes clearly requires the use of emissions which are more closely tied to allowable emissions. The model emission input data requirements for such SIP demonstrations are contained in Table 9-1 of the 'Guideline for Air Quality Models (Revised)' ..." Memorandum from Calcagni, J., and Laxton, W., OAQPS, to T.J. Maslany, Air Management Division, Region III, and W.B. Hathaway, Air Pesticides, and Toxics Division Region VI. March 16, 1989.

3. Reference 1.

4. Reference 1, section 9.1.2 Recommendations. "Where a source operates at substantially less than design capacity, and the changes in the stack parameters associated with the operating conditions could lead to higher ground level concentrations, loads such as 50 percent and 75 percent of capacity should also be modeled."

5. Reference 1.

6. Reference 1.

7. Reference 1, section 9.2.3 Recommendations (Multi-Source Areas). "Nearby Sources: All sources expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration for emission limit(s) should be explicitly modeled."

8. Reference 1, section 9.2.1 Discussion. "Background concentrations are an essential part of the total air quality concentration to be considered in determining source impacts."

9. Reference 8.

10. Reference 1, 9.2.2 Recommendations (Isolated Single Source). "Use air quality data collected in the vicinity of the source to determine the background concentration for the averaging times of concern."

11. Reference 10. "Determine the mean background concentration at each monitor by excluding values when the source in question is impacting the monitor."

12. Reference 7. "Other Sources: That portion of the background attributable to all other sources (e.g., natural sources, minor sources and distant major sources) should be determined either by the procedures found in section 9.2.2 or by application of a model using Table 9-1."

13. Reference 7.

14. "Nearby sources which are expected to cause a significant concentration gradient in the vicinity of the source under consideration should be explicitly modeled (as 'background' sources)." Memorandum from Calcagni, J., OAQPS, to W. Laxton, OAQPS. May 3, 1989.

15. Memorandum from Helms, G.T., OAQPS, to Air Branch Chief, Regions I-X. October 10, 1985. (PN 123-85-10-10-007).

16. Reference 1, section 7.2.5 Good Engineering Practice Stack Height. "If stacks for new or existing major sources are found to be less than the height defined by EPA's refined formula [H + 1.5L] for determining GEP height, then air quality impacts associated with cavity or wake effects due to the nearby building structures should be determined."

17. "This guidance provides considerable flexibility and requires judgement to be exercised by the reviewing agency in identifying which background sources should be fully modeled. The burden collecting building dimension data may be mitigated somewhat by application of this judgement." Memorandum from Calcagni, J., OAQPS, to W.B. Hathaway, Air Pesticides, and Toxics Division, Region VI. March 31, 1989.

4.6 RECEPTOR GRID

Definition of the receptor network used for air quality analyses in support of SIP revisions should be made on a case-by-case basis, taking into consideration the topography, the climatology, existing monitor locations, and results of the initial screening procedure.[1] Receptor sites for any analysis should be assigned in sufficient detail to estimate the highest concentrations and potential violations of the NAAQS or the PSD increment.[2]

A modeling analysis performed for the purpose of redesignating an area to attainment must follow the Guideline with respect to the scope of the receptor network and not necessarily address only the area to be redesignated.[3]

REFERENCES FOR SECTION 4.6

1. "The selection of receptor sites should be a case-by-case determination taking into consideration the topography, the climatology, monitor sites, and the results of the initial screening procedure." Section 8.2.2 Critical Receptor Sites; Guideline on Air Quality Models (Revised) and its Supplements (see section 4.2), codified as appendix W of title 40, part 51, Code of Federal Regulations. Office of the Federal Register.

2. Reference 1. "Receptor sites for refined modeling should be utilized in sufficient detail to estimate the highest concentrations and possible violations of a NAAQS or a PSD increment."

3. "If a modeling analysis is required for any reason, that analysis must meet the requirements of the Guideline." Memorandum from Bauman, R.D., OAQPS, to J. Tikvart, OAQPS. February 15, 1989.

4.7 OTHER MODEL REQUIREMENTS

The "Guideline on Air Quality Models (Revised)" provides discussion and guidance relative to a number of special modeling considerations that may occur from time to time. The special considerations most often associated with SO_2 are as follows.

Comparison of short term estimates and measurements of air quality on an event-by-event basis with the intent of calibrating a model is unacceptable given the uncertainties in both source and meteorological data.[1] In the case of long term estimates, model calibration may be the best alternative for improving the accuracy of estimated concentrations, provided a more accurate model for the particular situation is not available.[2]

Air quality modeling of SO_2 emissions involves some designation of the pollutant's chemical transformation. In rural areas this transformation is generally considered insignificant when the travel time is a few hours or less. Specification of the chemical transformation rate is more critical when modeling urban areas, where synergistic effects among pollutants are observed to occur. A half-life of four hours may be applied to the analysis of SO_2 emissions in urban areas.[3]

Issues that may arise in modeling analyses of SO_2 emissions are treatment of stagnation, fumigation and long range transport. Stagnation events, characterized by both long and short term periods of very light winds, and plume fumigation, an important phenomenon on and near shorelines, are not adequately addressed in current Guideline models. Determining the long range transport of SO_2 emissions may be significant in the analysis of source impacts on PSD Class I areas.[4] Assistance on the appropriate techniques to utilize in these modeling situations should be obtained from the EPA Regional Office.

While modeling is the preferred method for determining emission limitations for both new and existing sources, there may be circumstances in which no applicable model to the situation at hand exists (e.g., complex terrain, land/water interface areas). The Guideline provides criteria for determining the acceptability of measured data to be used in these instances.[5]

REFERENCES FOR SECTION 4.7

1. "Calibration of short term models is not common practice and is subject to much greater error and misunderstanding. There have been attempts by some to compare short term estimates and measurements on an event-by-event basis and then to calibrate a model with results of that comparison. This approach is severely limited by uncertainties in both source and meteorological data and therefore it is difficult to precisely estimate the concentration at an exact location for a specific increment of time. Such uncertainties make calibration of short term models of questionable benefit. Therefore, short term model calibration is unacceptable." Section 8.2.11 Calibration of Models; and its Supplements (see section 4.2), codified as appendix W of title 40, part 51, Code of Federal Regulations. Office of the Federal Register.

2. Reference 1. "Calibration of long term multi-source models has been a widely used procedure even though the limitations imposed by statistical theory on the reliability of the calibration process for long term estimates are well known. In some cases, where a more accurate model is not available, calibration may be the best alternative for improving the accuracy of the estimated concentrations needed for control strategy evaluations."

3. Reference 1, Section 8.2.6 Chemical Transformation. "The chemical transformation of SO_2 emitted from point sources or single industrial plants in rural areas is generally assumed to be relatively unimportant to the estimation of maximum concentrations when travel time is limited to a few hours. However, in urban areas, where synergistic effects among pollutants are of considerable consequence, chemical transformation rates may be of concern. In urban area applications, a half-life of 4 hours may be applied to the analysis of SO_2 emissions."

4. Reference 1, Section 7.2.6 Long Range Transport (LRT) (i.e., beyond 50 km). "However, 50 km is the useful distance to which most Gaussian models are considered accurate for setting emission limits. Since in many cases PSD analyses may show that Class I areas may be threatened at distances greater that 50 km from new sources, some procedure is needed to (1) determine if a significant impact will occur, and (2) identify the model to be used in setting an emission limit if the Class I increments are threatened..."

5. Reference 1, section 11.2.2 Use of Measured Data in Lieu of Model Estimates. "Modeling is the preferred method for determining emission limitations for both new and existing sources. ...[T]here are circumstances where there is no applicable model, and measured data may need to be used. Examples of such situations are: (1) complex terrain locations; (2) land/water interface areas; and (3) urban locations with a large fraction of particulate emissions from nontraditional sources."

5. STACK HEIGHT REGULATIONS

5.1 GENERAL REGULATIONS

Revised stack height regulations were promulgated on July 8, 1985 and implement provisions of section 123 of the Clean Air Act which dictate that the degree of emission limitation required for pollutant control under an applicable State Implementation Plan shall not be affected by stacks in excess of good engineering practice (GEP) stack height or by any other dispersion technique.[1,2] Stacks in existence or dispersion techniques implemented before December 31, 1970 are exempt from these provisions (see section 5.5.1 for definition of "in existence").[3] Sources defined in section 110(a)(3) of the Clean Air Act which were constructed, reconstructed or for which major modifications were performed after December 31, 1970 are not exempt from these provisions, however.[4]

A comprehensive overview of stack height policy is contained in the "Workshop on Implementing the Stack Height Regulations (Revised)."[5] This document includes a discussion of SIP stack height requirements and documentation in outline format and presents several checklists for GEP stack height review.

REFERENCES FOR SECTION 5.1

1. "Section 123, which was added to the Clean Air Act by the 1977 Amendments, regulates the manner in which techniques for dispersion of pollutants from a source may be considered in setting emission limitations. Specifically, section 123 requires that the degree of emission limitation shall not be affected by that portion of a stack which exceeds GEP or by 'any other dispersion technique.'" Federal Register 50:27892. July 8, 1985.

2. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, parts 51.118, 51.164, and 52.21(h). Washington, D.C. Office of the Federal Register.

3. United States Congress. U.S. Congress. Clean Air Act as Amended November 1990. 42 U.S.C. 7401 et. seq. section 123(a). Washington, D.C. U.S. Government Printing Office.

4. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.118(b). Washington, D.C. Office of the Federal Register.

5. U.S. Environmental Protection Agency. Workshop on Implementing the Stack Height Regulations (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, NC. October 1985.

5.2 GOOD ENGINEERING PRACTICE STACK HEIGHT

5.2.1 General. Discussion of the technical basis and procedures for determining GEP stack height are provided in the "Guideline for Determination of Good Engineering Practice Stack Height (Revised)."[1] Good Engineering Practice (GEP), with respect to stack height, is defined by section 123 of the Clean Air Act as: "the height necessary to insure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies or wakes which may be created by the source itself, nearby structures or nearby terrain obstacles." According to 40 CFR 51.100(ii), GEP stack height is determined, quantitatively, as the greatest of the following:

- o De Minimis
  - 65 meters, measured from the ground-level elevation at the base of the stack;
- o Formula Height
  - $Hg = H + 1.5L$

  where:

  Hg = good engineering practice stack height, measured from the ground-level elevation at the base of the stack,

  H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack,

  L = lesser dimension, height or projected width, of nearby structure(s).

  - -- Provided that the EPA, State or local control agency may require the use of a field study or fluid model to verify GEP stack height for the source.
  - For stacks in existence on January 12, 1979 and for which the owner or operator had obtained all

applicable permits or approvals required under 40 CFR Parts 51 and 52:

$Hg = 2.5H$

-- Provided the owner or operator furnishes evidence that this equation was actually relied on in establishing an emission limitation.

o Physical Demonstrations

The height demonstrated by a fluid modeling or field study approved by the EPA, State or local control agency, which ensures that the stack emissions do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures or nearby terrain features (see section 5.6).

Sources in existence prior to 1971 are not subject to the stack height regulation.

5.2.2 Definition of Nearby for GEP. For the purpose of determining GEP stack height, "nearby" is limited to five times the structure height or width, whichever is less (a distance not to exceed one-half mile) and in the case of a fluid model or field study is limited to one-half mile. This range may be extended, for the portion of a terrain feature which exists within a distance of up to 10 times the maximum height of the feature (not to exceed two miles), if such feature reaches a height, at one-half mile from the stack, that is at least 40 percent of the GEP stack height determined by Formula (2) above or 26 meters, whichever is greater, as measured from the ground level elevation at the base of the stack.[2]

5.2.3 Definition of Excessive Concentration. The term "excessive concentration," as it applies to a physical (fluid or field) demonstration of GEP stack height, is defined in 40 CFR 51.100(kk) for several situations, all of

which require showing a 40 percent increase in the maximum, ground-level concentration relative to the maximum concentration observed in the absence of downwash, wakes, or eddy effects. Certain situations also require a showing that the stack contributes to a total concentration, due to emissions from all sources, that exceeds the NAAQS or PSD increment. The stack emission rate in some cases must be based on a presumptive NSPS emission rate. (See section 5.6.4 for more detailed discussion).

REFERENCES FOR SECTION 5.2

1. U.S. Environmental Protection Agency. Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document For the Stack Height Regulations) (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-80-023R. June 1985.

2. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(jj). Washington, D.C. Office of the Federal Register.

5.3 DISPERSION TECHNIQUES

5.3.1 General. The revised, EPA stack height regulations generally prohibit stationary sources from taking credit for dispersion techniques in determining allowable emission limitations.

5.3.2 Prohibitions. As stated in 40 CFR 51.100(hh)(1), the prohibited dispersion techniques are:

- using that portion of a stack in excess of good engineering practice stack height;
- varying the pollutant emission rate according to atmospheric conditions or ambient concentrations of that pollutant (referred to as intermittent or supplemental control systems - ICS or SCS); or
- increasing final exhaust gas plume rise by manipulating source process parameters, exhaust gas parameters, stack parameters or combining exhaust gases from several existing stacks into one stack, or other selective handling of exhaust gas streams so as to increase the exhaust gas plume rise.

5.3.3 Exceptions. Although credit for selective handling of exhaust gas streams to increase the exhaust gas plume rise is generally prohibited, in certain circumstances credit is allowed for:

- merging of gas streams in original design and construction (also see section 5.4);
- utilizing techniques which increase final, exhaust gas plume rise, provided facility-wide allowable emissions of SO2 are less than 5,000 tons per year (see section 5.7.2);
- smoke management techniques involved in agricultural or silvicultural programs;
- episodic restrictions on residential wood burning and open burning; and
- reheating after a pollution control system.[1]

REFERENCES FOR SECTION 5.3

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(hh)(2). Washington, D.C. Office of the Federal Register.

5.4 REMANDED REGULATIONS

Three portions of the revised, EPA stack height regulations, promulgated on July 8, 1985, were remanded to EPA for review:[1]

- Under the definition of excessive concentration -
  - Grandfathering pre-October 11, 1983 within-formula stack height increases from demonstration requirements [40 CFR 51.100(kk)(2)];
- Under the definition of dispersion technique -
  - Dispersion credit for sources originally designed and constructed with merged or multiflue stacks [40 CFR 51.100(hh)(2)(ii)(A)]; and
- Under the definition of good engineering practice stack height -
  - Grandfathering of pre-1979 use of the refined "H + 1.5L" formula [40 CFR 51.100(ii)(2)].

As a result of the remand, an interim policy on stack height regulatory actions is in effect. This policy provides that most actions affected by the remand may proceed, provided appropriate caveat language is incorporated indicating that the action is subject to review and modification on completion of EPA's response to the court decision.[2]

REFERENCES FOR SECTION 5.4

1. "Although the court upheld most provisions of the rules, three portions were remanded to EPA for review: 1. Grandfathering pre-October 11, 1983 within-formula stack height increases from demonstration requirements [40 CFR 51.100(kk)(2)]; 2. Dispersion credit for sources originally designed and constructed with merged or multiflue stacks [40 CFR 51.100(hh)(2)(ii)(A)]; and 3. Grandfathering of pre-1979 use of the refined H + 1.5L formula [40 CFR 51.100(ii)(2)]." Memorandum from Potter, J.C., OAR, to Air Management Division Director, Regions I, III, and IX, Air and Waste Management Division Director, Region II, Air, Pesticides, and Toxics Management Division Director, Regions IV, and VI, Air and Radiation Division Director, Region V, Air and Toxics Division Director, Regions VII, VIII, and X. April 22, 1988.

2. "In general, actions taken at this time to approve or disapprove statewide stack height rules which are affected by the remand must include the qualification that they are subject to review and modification on completion of EPA's response to the court decision." Memorandum from Calcagni, J., OAQPS, to Air Branch Chief, Regions I-X. May 17, 1988. (PN 123-88-05-17-016).

5.5 SPECIFIC STACK HEIGHT POLICIES

5.5.1 Definition of "In Existence". In promulgating the 1982 stack height regulations, EPA adopted a definition of "stack heights in existence before December 31, 1970."[1] This definition allowed the grandfathering of stacks either: a) physically completed; b) for which continuous construction had begun; or c) for which construction had not yet commenced, but for which binding contracts had been signed that could not be cancelled without substantial loss to the source owner or operator. The revised stack height regulation promulgated on July 8, 1985 does not modify this definition except to restrict its applicability to facilities that have not undertaken major modifications or reconstruction and have not ducted effluent gas streams from post-1970 units into pre-1971 stacks.[2]

- Grandfathering exemptions may be supported in one of three ways:[3]
  - In the case of stacks physically completed prior to December 31, 1970 - proof of stack completion must be documented (an acceptable form of documentation, for example, would be a copy of the 1970 Federal Power Commission Report Form 67, which includes information on stack height);
  - Evidence submitted to support the commencement date of stack construction can include any contemporaneous documentation such as building inspection records, delivery receipts of construction materials or news clippings that clearly indicate that construction activities were under way before December 31, 1970; or
  - Date of signature on a contract for stack construction is acceptable for applying grandfathering exemptions provided the "binding contract" is one that commits the source owner or operator to financially undertake stack construction and that did not have an "escape" provision in effect on December 31, 1970 allowing cancellation by the owner or operator without penalty. If a contract contains provisions for

assessing penalties for modification or cancellation that were in effect before December 31, 1970, then the provisions must be reviewed to determine whether the penalties and other costs of cancellation would have imposed a "substantial loss" on the owner or operator. In general, EPA will presume a substantial loss would have resulted in those situations in which penalties exceed ten percent of the project cost.

Documentation supporting any of these grandfathering exemptions must be made available for public review by the State or source owner or operator.[4]

5.5.2 Tie-Ins to Existing Stacks. The definition of "source" that should be used in determining whether tie-ins to grandfathered stacks should be permitted or prohibited is that meaning a single emission unit. Hence, credit for tying a single, post-1970 unit(s) into a grandfathered stack serving a number of old units is prohibited under the revised stack height regulations.[5]

REFERENCES FOR SECTION 5.5

1. "3. Grandfathered Stack Height. The 1970 Clean Air Act became effective on December 31, 1970. Prior to that date some sources had constructed stacks taller than their GEP height. In Section 123, Congress recognized this and exempted those sources' stack heights. Section 123 allows credit for stack height in existence on December 31, 1970. A source's stack is considered to be 'in existence' if that stack was part of the design of a facility on which construction commenced prior to December 31, 1970." Federal Register 47:5865. February 8, 1982, p. 5865.

2. "The EPA's definition was upheld by the U.S. Court of Appeals for the D.C. circuit in Sierra Club v. EPA, 719 F.2d 436, and has not been modified in any way by the rule revisions promulgated on July 8, 1985, except to restrict its applicability to facilities that have not undertaken major modifications or reconstruction, and have not ducted the effluent gas streams from post-1970 units into pre-1971 stacks. Memorandum from D.D., Tyler, OAQPS, to Regional Air Management Division Director, Regions I-X. Determining Stack Heights "In Existence" Before December 31, 1970. October 28, 1985. (PN 123-85-10-28-010).

3. Reference 2.

4. Reference 2. "The burden of proof for showing that a stack is eligible for grandfathering exemption lies with either the State or the source owner or operator, as appropriate, and documentation in support of exemptions must be made available for public review during the rulemaking process."

5. "Q: What 'source' definition should be used in determining whether tie-ins to grandfathered stacks should be permitted or prohibited? A: The term 'source' in this instance means a single emitting unit. Thus, credit for tying a single post-1970 unit(s) into a grandfathered stack serving a number of old units is prohibited under the regulation." Memorandum from Helms, G.T., OAQPS, to Air Branch Chief, Regions I-X. October 10, 1985. (PN 123-85-10-10-007).

5.6 DEMONSTRATIONS BY FLUID MODELING, FIELD STUDIES OR NUISANCE

5.6.1 Applicability.

- Sources seeking credit for stack height above GEP formula height must demonstrate by a field study or fluid modeling analysis that this height is necessary to avoid excessive pollutant concentrations as a result of downwash, wakes or eddy effects created by the source itself, nearby structures or nearby terrain (refer to section 5.2 for definitions of "excessive concentration" and "nearby").[1]
- Sources seeking credit within formula height may also need to conduct such demonstrations: a) in those cases where it is believed that the formula may significantly overstate the appropriate stack height credit and b) to justify certain increases in stack height.[2]
- Sources seeking credit for increases in stack heights up to formula GEP may justify the increase by demonstating the actual presence of a local nuisance caused by the existing stack, as determined by the authority administering the SIP.[3]

5.6.2 Field Studies. A field demonstration of GEP height involves the installation and operation of a monitoring network designed to clearly identify maximum downwind concentrations. Concentration patterns from two release points must be determined: one near the source in the presence of structure(s) and/or terrain and the other in the absence of such features. Except for differences due to structure(s) and/or terrain, the atmospheric flow at the latter location must be similar to that near the source, as

verified by meteorological observations upwind of both sites.[4]

5.6.3 Fluid Modeling.

5.6.3.1 Credit for Height Above GEP Formula. In performing fluid modeling demonstrations, sources seeking credit for stacks greater than formula height must use the appropriate emission rate for the source category (see section 5.6.4) and the background air quality as determined by procedures described in section 4.5.3. The following "excessive concentration" criteria must be met: a) exceedance of the NAAQS or PSD increment and b) a concentration at least 40 percent in excess of the maximum concentration experienced in the absence of downwash, wakes or eddy effects. After these criteria are met, the source must use the lowest stack height necessary to meet the more restrictive of the two excessive concentration criteria in order to set emission limitations. This lowest height becomes the new GEP height.[5]

5.6.3.2. Credit for Height Less than or Equal to GEP Formula. For sources seeking credit after October 11, 1983 for increases in existing stack height up to GEP formula height, the excessive concentration criteria (a) and (b) given above generally apply. For sources seeking credit after January 12, 1979 for a stack height less than or equal to formula height; for sources seeking credit after November 9, 1984 based on the aerodynamic influence of cooling towers; and for sources seeking credit after December 31, 1970 based on the aerodynamic influence of structures not adequately represented by GEP formula, the 40 percent excess concentration is the only criterion needed to demonstrate equivalence to formula height.[6]

5.6.4 Emission Rate for Physical Demonstrations. For sources seeking credit above formula GEP height, the stack height regulations require that a presumptive emission rate equivalent to the NSPS be established for the source in question before fluid modeling is initiated to determine the stack height necessary to avoid excessive concentrations due to downwash.[7] The NSPS emission rate is "presumptive" in that EPA presumes that all sources seeking to justify stack heights in excess of those established by GEP formulae are capable of controlling their emissions to NSPS levels. If it is infeasible for a source to control its emissions to NSPS levels, then an alternative emission limit representing the lowest feasible emission limit must be met before credit for stack height in excess of GEP formula height can be obtained. These alternative emission rates will be reviewed by EPA based on the Best Available Retrofit Technology (BART) guidelines.[8,9,10] Unless the source owner or operator demonstrates that the emission rate prescribed by the NSPS applicable to the source category is infeasible, the allowable emission rate to be used in conducting the field study or fluid modeling demonstrations must be the NSPS emission rate.[11]

For certain sources seeking credit for increases in existing stack heights up to GEP formula height, the emission rate used in the demonstration shall be the emission rate specified by the applicable State Implementation Plan, or, in the case of no established limit, the actual emission rate shall be used.[12] For other sources for which verification of correct GEP height is requested, the satisfying 40 percent excess concentration criterion is sufficient demonstration.[13]

5.6.5 Not in Ambient Air. For the purpose of the physical demonstration, the exceedance of the NAAQS or PSD increment need not occur at a location meeting the definition of

ambient air.[14]

5.6.6 Additional Guidance. Sources of guidance on conducting fluid modeling demonstrations have been identified by EPA.[15] Documents which form the basis of information include: "Guideline for Use of Fluid Modeling to Determine Good Engineering Stack Height";[16] "Determination of Good Engineering Practice Stack Height - A Fluid Model Demonstration Study for a Power Plant";[17] "Guideline for Fluid Modeling of Atmospheric Diffusion";[18] and "Fluid Modeling Demonstration of Good Engineering Practice Stack Height in Complex Terrain."[19]

REFERENCES FOR SECTION 5.6

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(ii)(3). Washington, D.C. Office of the Federal Register.

2. "Nevertheless, in response to the court's remand, EPA is including in this final rule a provision for the authority administering these rules to require field studies or fluid modeling demonstrations, even for stacks built to formula height, in cases where it believes that the formula may significantly overstate the appropriate stack height credit. (Quite apart from any such regulatory provision, States have authority to require such demonstrations, on the terms outlined or on stricter or more lenient terms, under the savings provision of section 116 of the Clean Air Act)." Federal Register 50:27900. Monday, July 8, 1985.

3. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(kk)(2). Washington, D.C. Office of the Federal Register.

4. "A field demonstration of GEP stack height requires experiments to determine the concentration patterns from two release points -- one with the structure(s) and/or terrain; the other in the absence of structure(s) and/or terrain. [A] monitoring array must be arranged to clearly identify the maximum concentrations downwind of similar releases at both sites." U.S. Environmental Protection Agency. Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document For the Stack Height Regulations) (Revised). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-80-023R, June 1985. p. 47.

5. Reference 4, p. 52. "After demonstrating that both excessive concentration criteria are met as defined in Section 1, the source must determine the lowest stack height necessary to meet the more restrictive of the two excessive concentration criteria. This lower height is the new GEP height."

6. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(kk)(3). Washington, D.C. Office of the Federal Register.

7. "The regulations require that a presumptive emission rate equivalent to the new source performance standards (NSPS) be established for the source in question before modeling may be conducted to determine stack height needed to avoid excessive concentrations due to downwash (where the NSPS has been subject to revision, and the source in question is not subject to the revised NSPS, the earliest standard will be applied; e.g., for power plants a rate of 1.2 lb/MM Btu would be used)." Memorandum from Tyler, D.D., OAQPS, to Regional Air Management Division Director, Regions I-X. Implementation of Stack Height Regulations - Presumptive NSPS Emission Limit for Fluid Modeling Stacks Above Formula GEP Height. Memo dated October 28, 1985. (PN 123-85-10-28-009).

8. Reference 7. "This emission rate is described as 'presumptive' because it is EPA's presumption that all sources seeking to justify stack heights exceeding those provided by the GEP formulae are capable of controlling their emissions to NSPS levels. However, the regulations also allow source owners or operators to rebut this presumption, establishing an alternative emission rate that represents the most stringent level of control that can feasibly be met by that source in excess of the NSPS level. In the preamble to the regulations, EPA indicated that it will rely on the 'Guidelines for Determination of Best Available Retrofit Technology for Coal Fired Power Plants and other Existing Stationary Facilities' EPA-450/3-80-009b' (BART Guidelines) when reviewing these rebuttals."

9. "In conclusion, we are in full agreement with the position taken by Region III that sources seeking credit above formula height must meet an emission rate consistent with BART/NSPS." Letter from Gerald A. Emison, G.A., OAQPS, to J.P. Proctor. April 20, 1989.

10. Memorandum from Calcagni,J., OAQPS to I. Dickstein, Region VIII. November 27, 1990.

11. "Q: Can new or modified sources who have agreed to a case-by case best available control technology (BACT) emission rate be required to use this rate for fluid modeling rather than a less stringent new source performance standard (NSPS) emission rate? A: As set forth in 40 CFR 51.1(kk), the allowable emission rate to be used in making demonstrations under this part shall be prescribed by the NSPS that is applicable to the source category unless the owner or operator demonstrates that this emission rate is infeasible." Memorandum from Helms, G.T., OAQPS, to Air Branch

Chief, Regions I-X. October 10, 1985. (PN 123-85-10-10-007).

12. Reference 3.

13. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(kk)(3). Washington, D.C. Office of the Federal Register.

14. Reference 11. "Q: Must the exceedance of NAAQS or PSD increment due to downwash, wakes or eddies occur at a location meeting the definition of ambient air? A: No, the exceedance may occur at any location, including that to which the general public does not have access."

15. Memorandum from Tikvart, J.A., OAQPS, to D. Stonefield, OAQPS. September 19, 1985. (PN 123-85-09-19-006).

16. U.S. Environmental Protection Agency. Guideline for Use of Fluid Modeling to Determine Good Engineering Stack Height. Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-81-003. July 1981.

17. U.S. Environmental Protection Agency. Determination of Good Engineering Practice Stack Height - A Fluid Model Demonstration Study for a Power Plant. Environmental Science Research Laboratory. EPA Publication No. EPA-600/3-83-024. April 1983.

18. U.S. Environmental Protection Agency. Guideline for Fluid Modeling of Atmospheric Diffusion. Environmental Science Research Laboratory. EPA Publication No. EPA-600/8-81-009.

19. U.S. Environmental Protection Agency. Fluid Modeling Demonstration of Good Engineering Practice Stack Height in Complex Terrain. Atmospheric Sciences Research Laboratory, EPA Publication No. EPA-600/3-85-022. April 1985.

5.7 MERGED STACKS

5.7.1 General. Dispersion credit for the retrofit combining or merging of gas streams is generally not allowed under the stack height regulations.[1] Originally designed and constructed merged streams are creditable at this time [40 CFR 51.100(hh)(2)]; however, this provision is affected by the stack height remand (see section 5.4).

5.7.2 Exceptions. Credit for retrofit merging is allowed under circumstances where:[2]

- after July 8, 1985 such merging is part of a change in facility operation that includes the installation of pollution controls and is accompanied by a net reduction in the allowable emissions of a pollutant. This exclusion from the definition of "dispersion techniques" shall only apply to the emission limitation for the pollutant affected by such change in operation;
- before July 8, 1985 such merging: 1) was part of a change in operation at the facility that included the installation of emission control equipment, 2) was conducted for sound economic or engineering reasons[3], or 3) was not "significantly motivated by an intent to obtain emissions credit for increased dispersion."[4] Such a demonstration could be made by submitting evidence showing that consideration of dispersion advantages was conspicuously absent in the intent of the source owner or operator;[5] or
- the total, facility-wide allowable SO_2 emissions from the source do not exceed 5,000 tons per year.[6] This exception applies only to SO_2 and not to other pollutants.

In addition, exemption from prohibitions on gas stream merging is provided for sources which constructed their

stacks before December 31, 1970.

It is incumbent on the State or source owner or operator to demonstrate that any retrofit merging was not motivated by an intent to avoid emission controls. Information indicating that merging was specifically carried out to increase final exhaust gas plume rise serves as a demonstration of dispersion intent that justifies denial of credit for merged gas streams.[7]

REFERENCES FOR SECTION 5.7

1. Memorandum from Tyler, D.D., OAQPS, to Air Management Division Directors, Regions I-X. Implementation of Stack Height Regulations - Exceptions From Restrictions on Credit for Merged Stacks. October 28, 1985. (PN 123-85-10-28-008).

2. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.100(hh)(2)(ii). Washington, D.C. Office of the Federal Register.

3. Reference 1. "Sources that are not covered under these criteria may still qualify for exemption if they can show that merging was conducted for sound economic or engineering reasons."

4. Reference 1. "In some instances, a State or emission source owner may not be able to make a demonstration as described above, or believe that sound economic reasons existed for merging stacks, regardless of the relationship between financial savings attributable to reduced emission control requirements versus lower stack construction costs. In such cases, an opportunity should be provided to affirmatively demonstrate that merged stacks were not significantly motivated by an intent to obtain emissions credit for increased dispersion."

5. Reference 1. "For instance, such a demonstration could be made by submitting documentary or other evidence (e.g., internal company memoranda presenting the alternative construction opportunities available to the company) that indicates the intent of the source owner or operator and shows that consideration of dispersion advantages was conspicuously absent."

6. Reference 1. "Several exemptions from prohibitions on gas stream merging are provided for existing sources in the stack height regulations: 1- where sources constructed their stacks before December 31, 1970, 2- where the total facility-wide emissions from the source do not exceed 5,000 tons per year, 3- where the facility was originally designed and constructed with merged gas streams, and 4- where the merging was part of a change in facility operation that included the installation of pollution control equipment and resulted in no increase in the allowable emissions of any pollutant (where there was no federally-approved emission limit prior to merging gas stream, there must be no increase in the actual emissions of any

pollutant. Moreover, it is incumbent on the State to demonstrate that there was a logical relationship between the merging of existing gas streams and the installation of controls). Where there was an increase in emission in conjunction with the merging and installation of control equipment, the regulations require that source owners also make an affirmative demonstration that the merging was not motivated by dispersive intent."

7. Reference 1. "Because merged gas streams are generally regarded as prohibited dispersion techniques under the regulations, it is incumbent on the State or the source owner or operator to demonstrate that such merging was conducted for sound economic or engineering reasons, and was not significantly motivated by an intent to avoid emission controls. Consequently, the first step should entail a review of State and EPA files to determine the existence of any evidence of intent on the part of the source owner or operator. Information showing that merging was conducted specifically to increase final exhaust gas plume rise serves as a demonstration of dispersion intent that justifies a denial of credit for merged gas streams."

5.8 STACK HEIGHT NEGATIVE DECLARATIONS

5.8.1 General. Following promulgation of the revised stack height regulations on July 8, 1985, each State was required to review its SIP and determine if any sources were credited with stack heights or dispersion techniques not in accordance with the revised regulations.[1] Where sources are found in compliance with the revised regulations, a "negative declaration" is issued in the Federal Register for that State. A Federal Register notice of negative declaration for the stack height requirements does not need to be incorporated into the State Implementation Plan since it is not required under section 110 of the Act.

5.8.2 Information Needed. There are three primary ways to declare a source as unaffected by the stack height rules:[2]

- o source was constructed prior to December 31, 1970;
- o source stack height is less than GEP formula height; and
- o source emission limitation was not affected by stack height or by any other dispersion technique.

The simplest way to approach the negative declaration is to set up 2 tables, one for stack heights greater than 65 meters, and the other for sources with SO2 emissions greater than 5,000 tons per year. The lists at the end of this section provide examples of the information that should be contained in the negative declaration.[3]

It is very important that a description of the grandfathering documentation is provided along with the date of documentation, so that proof of the grandfathering can be easily traced back to a specific document.[4]

5.8.3 Modeling Needed. Source remodeling would be required in those situations in which credit for excess stack height

or dispersion techniques has been taken. Any remodeling must follow the "Guideline on Air Quality Models (Revised)." If a source has never been analyzed for dispersion, then no modeling is required.[5]

EXAMPLE INFORMATION TO BE CONTAINED IN A NEGATIVE DECLARATION

Stacks Greater than 65 Meters	Source Emissions Greater than 5,000 tons per year
Name	Name
Plant Location	Plant Location
Unit ID Number	Unit ID Number
Stack ID Number	Stack ID Number
Actual/GEP Height (ft)	Actual Height (ft)
Construction Date	Merged
Grandfather Documentation: Description & Date	Other Dispersion Techniques
2.5H	Documentation of Dispersion Techniques
H + 1.5L	Grandfather Documentation and Date
Modeled	
Need for Stricter Control	Need for Stricter Control

REFERENCES FOR SECTION 5.8

1. "Nine months after date of promulgation ..." United States Congress. Clean Air Act, as amended August 1977. 42 U.S.C. 1857 et. seq. Section 406(d)(2)(B). Washington, D.C. U.S. Government Printing Office. November 1977.

2. U.S. Environmental Protection Agency. Workshop on Implementing the Stack Height Regulations (Revised). Control Programs Development Division, Office of Air Quality Planning and Standards, Research Triangle Park, NC. October 1985.

3. From tables attached to the memorandum from Helms, G.T., OAQPS, to Air Branch Chief, Regions I-X. October 9, 1987. (PN 123-87-10-09-014).

4. "For grandfathering documentation, the date the source was built is not essential, but the type and date of the documentation that the source was built prior to December 31, 1970, must be listed." Memorandum from Helms, G.T., OAQPS, to Air Branch Chief, Region I-X. October 9, 1987. (PN 123-87-10-09-014).

5. "If a source has never been analyzed for dispersion, then it is not necessary to conduct a dispersion analysis now." Memorandum from Tyler, D.D., OAQPS, to Air Division Director, Regions I-X. February 11, 1986. (PN 123-86-02-11-012).

5.9 EMISSIONS BALANCING

Emissions balancing refers to the procedure whereby a source subject to the stack height regulations ("affected source") may obtain the required emission reduction from another source or set of sources ("providing sources").[1] Emissions balancing may be used to comply with the stack height regulations only if certain conditions are met.[2] These conditions include:

- an approvable emissions balance must require that the providing source(s) reduce emissions of the same pollutant, calculated on an annual average basis, to an extent 1.2 times the emission reduction required of the affected source by application of the stack height regulation. That is, 1.2 times that portion of the required reduction for which the affected source is seeking an emissions balance);
- an emissions balance must take place entirely within the boundaries of a single State or single interstate AQCR;
- emission reductions from the providing source(s) must be stack emissions, not fugitive emissions;
- both the affected and providing sources must be in compliance with federally-approved SIP requirements, including protection of the NAAQS, PSD increments and air quality related values of any Class I area; and
- an enforceable means of monitoring compliance should be included in the emissions balance SIP revision.

Additional details on the conditions necessary for an acceptable emissions balance, methodology for determining baseline emissions from which an emissions balance is credited and other procedural requirements are listed in Reference 2. A summary of major comments on the proposed emissions balancing policy and EPA response to these comments are contained in Reference 1.

REFERENCES FOR SECTION 5.9

1. "Today's final policy has been developed in consideration of the fact that emission reductions mandated by the stack height regulation may be obtained at (an)other source(s), in lieu of reducing emissions at its own facility. For the purposes of this policy, the source which is subject to more stringent emission limits is called the 'affected source;' the source which provides the emission reductions needed to satisfy such limits is called the 'providing source.' This joint satisfaction of an emission reduction obligation is referred to as an 'emissions balance.'" Stack Height Emissions Balancing: Final Policy. Federal Register 53:480. January 7, 1988.

2. Memorandum from Thomas, L.M., EPA Administrator, to Regional Administrators Regions I-X. December 23, 1987. (See Federal Register 53:483. January 7, 1988.)

6. GENERAL PROVISIONS

6.1 GENERAL

National Ambient Air Quality Standards (NAAQS) are necessary to protect the public health and welfare. The amount of time that nonattainment areas are given within the CAA to reach the SO_2 NAAQS can depend upon whether the standard is a primary standard (health based) or a secondary standard (welfare based). For areas that are in attainment or are designated unclassifiable, Prevention of Significant Deterioration (PSD) increments are set to prevent relative deterioration in air quality for different classes of air quality.

SIP's and SIP revisions provide for the implementation, maintenance, and enforcement of measures needed to attain and maintain NAAQS. If the provisions in a SIP are found to be inadequate, a SIP call may be issued by the federal agency. If a state does not correct the deficiencies after a SIP call, the federal agency may impose sanctions or develop a Federal Implementation Plan (FIP).

Each SIP must contain an enforceable pollution control strategy to ensure attainment and maintenance of all the NAAQS. According to 40 CFR 51.110(a), a control strategy must be selected "that provides the degree of emission reductions necessary for attainment and maintenance of the national ambient air quality standards. The emission reductions must be sufficient to offset any increases in air quality concentrations that are expected to result from emission increases due to projected growth of population, industrial activity, motor vehicle traffic, or other factors."

In general, a control strategy will consist of a set of emission limitations applicable to all sources within specified classes. The emission limit is the level of

emissions that is demonstrated to be the level that must not be exceeded in order to attain or maintain the NAAQS. With respect to SO_2 regulations, different emission limitations may apply depending on such parameters as facility size, fuel type, geographical location, and age of source.

6.2 CURRENT NAAQS AND PSD INCREMENTS

6.2.1 General. The authority for developing NAAQS is provided under section 109 of the CAA. Part C of the CAA (sections 160-169) establishes the basis for the prevention of significant deterioration (PSD) program.

6.2.2 National Ambient Air Quality Standards. The EPA is required, under section 109 of the CAA, to establish NAAQS for each pollutant for which air quality criteria are established (under section 108 of the CAA). There are two types of NAAQS: primary and secondary. The primary NAAQS are established to protect public health with an adequate margin of safety. The secondary NAAQS protects public welfare (soil, crops, vegetation, animals, visibility, building materials, etc.) from known or anticipated effects. The current primary SO_2 NAAQS are as follows: 80 ug/m3 (0.03 ppm) based on an annual arithmetic mean and 365 ug/m3 (0.14 ppm) based on the maximum 24-hour concentration not to be exceeded more than once per year. The current secondary NAAQS is 1,300 ug/m3 (0.5 ppm) based on the maximum 3-hour concentration not to be exceeded more than once per year.[1] For any ambient standard that cannot be exceeded more than once per year, a violation occurs if an exceedance is recorded twice at the same monitor or is predicted through modeling to occur twice at the same receptor in 1 year.[2]

6.2.3 Prevention of Significant Deterioration Increments. The PSD program mandated by Congress is required to balance three primary goals as specified in section 160 of the CAA. The first of these goals is to protect public health and welfare. This goal includes avoiding air quality degradation in all areas that are attaining the NAAQS. The second goal emphasizes the protection of air quality in national parks, wilderness areas, and similar areas of

special concern where air quality is considered particularly important. The third goal is to ensure that economic growth which causes environmental degradation in clean areas occurs only after careful deliberation by State and local communities.

The PSD requirements (see section 7.2.4 for additional detail) apply to areas that are classified as attainment or unclassifiable pursuant to section 107 of the CAA.[3] The program is implemented largely through the use of increments and area classifications that effectively define "significant deterioration" for individual pollutants. Numerical increments for SO_2 are defined in the CAA as the maximum allowable increase, above a baseline concentration, in the ambient concentration of SO_2 allowed in a PSD area. These increments limit the change in the ambient concentration of sulfur dioxide in any area that is in compliance with the NAAQS. The area classification scheme establishes three classes of geographic areas and applies increments of different stringency to each class. The most restrictive increments apply in Class I areas, which are regions of special national environmental concern. Less restrictive increments apply in Class II and Class III areas. Class II areas are all PSD areas that are designated as attainment or unclassifiable and that were not identified in the CAA as Class I areas. There are no Class III areas as of yet; however, these areas would permit more deterioration of air quality and higher industrial growth than Class II areas. The current PSD increments for SO_2 are shown in Table 6-1.

TABLE 6-1. PSD INCREMENTS FOR SO_2[4]

Area classification	Maximum Allowable increase (ug/m^3)*	
I	2	(annual arithmetic mean)
	5	(24-hour maximum)
	25	(3-hour maximum)
II	20	(annual arithmetic mean)
	91	(24-hour maximum)
	512	(3-hour maximum)
III	40	(annual arithmetic mean)
	182	(24-hour maximum)
	700	(3-hour maximum)

*For any period other than an annual period, the applicable maximum allowable increase may be exceeded during one such period per year at any one location.[4]

REFERENCES FOR SECTION 6.2

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, sections 50.4 and 50.5. Washington, D.C. Office of the Federal Register.

2. U.S. Environmental Protection Agency. Guideline of Air Quality Models (Revised). Office of Air quality Planning and Standards, Research Triangle Park, N.C. EPA Publication No. EPA-450/2-78-027R. July 1986. p. 11-7. (See also "Guidelines for Interpretation of Air Quality Standards (Revised). OAQPS No. 1.2-008. 1977)

3. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, sections 51.166 and 52.21. Washington, D.C. Office of the Federal Register.

4. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, section 51.166(c) and 52.21(c). Washington, D.C. Office of the Federal Register.

6.3 NONATTAINMENT AREA TIME FRAMES

Section 110(a) of the Clean Air Act (CAA) requires each State to submit a plan for attainment and maintenance of the national ambient air quality standards (NAAQS) to EPA. The plan must provide for attainment and maintenance of the NAAQS within the State. The schedules for SIP plan or plan revision and attainment of the primary SO_2 NAAQS were revised by the Clean Air Act Amendments of 1990 (CAAA).

6.3.1 Title I of the Clean Air Act Amendments of 1990. Title I (Air Pollution Prevention and Control) of the CAAA revamped the requirements for areas that have not attained the NAAQS for SO_2, and made numerous changes in the requirements for SIP's and SIP revisions, as well as the repercussions of State failures to meet the various SIP requirements.[1] The EPA has already and will continue to initiate rulemaking that will incorporate the provisions of the CAAA into the Code of Federal Regulations (CFR) in the near future. In order to provide States with early guidance on the EPA's interpretation of these provisions, a General Preamble for the implementation of title I was published on April 16, 1992 in the Federal Register.[2] The preamble focuses primarily on the SIP submissions required for nonattainment areas under part D of the amended Act.

The General Preamble discussed EPA's intended interpretation of the minimum changes all States must make in their SIP's in order to comply with the amended CAA provisions. Not only did the CAAA revise many provisions applicable to nonattainment areas and provide deadlines for submittal of SIP revisions, some areas were designated nonattainment "by operation of law" upon enactment of the CAAA pursuant to section 107(d)(1)(C). These areas are currently listed in 40 CFR part 81.[3]

Additionally, the CAAA added a new subpart 5 to

title I, which provides SIP submittal dates and attainment dates for areas designated as nonattainment by operation of law as part of the CAAA or subsequent to them. The dates provided in subpart 5 are discussed in the following sections.

6.3.2 Plan Submittal. The CAAA provided specific submission deadlines for States to submit SIP's for areas which violate the primary NAAQS in section 191. Plan requirements for nonattainment areas are found in part D of title I of the CAA. Part D is divided into 6 subparts containing sections 171 through 193 of the CAA.

6.3.2.1 Primary SIP Deadlines. Section 191 provides 18 months for submittal of a SIP plan meeting the requirements of subpart 1 of part D. Section 191(a) provides that States with areas which are redesignated as nonattainment after the enactment of the CAAA must submit implementation plans meeting the requirements of part D within 18 months of the redesignation. Section 191(b) provides that States with existing nonattainment areas lacking fully approved SIP's prior to the enactment of the 1990 amendments to the CAA must also submit SIP's within 18 months of the enactment of the CAAA (i.e., by May 15, 1992).[4]

6.3.2.2 Secondary SIP Deadlines. One result of the CAAA was that discretion was given to the EPA to establish, at the time of designation or redesignation as nonattainment, a schedule for submittal of a secondary plan or revision. Although the law allows up to 3 years for submittal of a secondary nonattainment plan, the EPA has established 18 months as the schedule for these submittals. Because the level of control necessary to attain the secondary NAAQS for SO_2 is no more difficult to establish than for the primary

NAAQS, the EPA will require SIP submittals for secondary nonattainment areas within 18 months of nonattainment designation, absent compelling justification by a State for an extended schedule.[5]

6.3.2.3 Combined Secondary and Primary SIP Deadlines. Although explicit plan submission deadlines were not given in section 191 for nonattainment areas violating both the primary and secondary SO_2 NAAQS, the EPA considers allowing separate submittals schedules to unnecessarily complicate plan processing and implementation.[6] Therefore, the EPA expects plans for attaining the secondary NAAQS to be submitted on the same schedule as plans for attaining the primary NAAQS for these areas.[7]

6.3.3 Attainment Schedule. The CAA requires the attainment of both the primary and the secondary NAAQS as expeditiously as practicable in section 172(a)(2). However, in the case of the primary NAAQS, the CAAA added a maximum attainment deadline as established in section 192 of no later than 5 years after designation.

6.3.3.1 Primary NAAQS Attainment Dates. There are three cases in which a State plan must be developed or revised to provide for attainment of the primary SO_2 NAAQS: (1) when a state contains an area that was designated nonattainment at the time of enactment of the CAAA; (2) when a state contains an area which is redesignated as nonattainment subsequent to the CAAA; and (3) when an approved plan addressing an area designated nonattainment is found to be substantially inadequate to attain or maintain the NAAQS. This last case is referred to as a SIP call and is allowed under section 110(k)(5). Section 192 established an attainment schedule of no more than 5 years for each of these cases, as specified below.

State plans for areas designated as nonattainment by operation of law at the time of enactment of the CAAA (i.e., initial nonattainment areas) must provide for attainment of the primary NAAQS as expeditiously as practicable [section 172(a)(2)] but no later than November 15, 1995.[8] Areas designated (or redesignated) as nonattainment subsequent to enactment of the CAAA also must attain the primary SO_2 NAAQS as expeditiously as practicable, but not later than 5 years after the designation.[9] In the case of a State whose approved plan for attaining the primary SO_2 NAAQS is found to be substantially inadequate, the revised plan must provide for attainment of the NAAQS by 5 years from the date of the finding of inadequacy.[10]

6.3.3.2 Secondary NAAQS Attainment Dates. As stated in section 6.3.3, although Congress retained the requirement to attain the secondary NAAQS as expeditiously as practicable in section 172(a)(2), a specific deadline for attainment of the secondary NAAQS was not provided in section 192.[11] In the General Preamble for the Implementation of Title I of the CAAA, the EPA announced plans to allow attainment with the secondary NAAQS to be scheduled on what is expeditious for the actual area. The EPA also advised that the provisions included in subpart R (40 CFR 51.340) would be consulted in determining expeditiousness. In the case of areas which are nonattainment for both primary and secondary SO_2 NAAQS, States may be allowed additional time beyond the 5-year deadline for the primary NAAQS to attain the secondary NAAQS, provided that the State can demonstrate that the secondary NAAQS cannot be attained within the same timeframe as the primary NAAQS.

REFERENCES FOR SECTION 6.3

1. "Title I of the Clean Air Act Amendments (CAAA) of 1990 revamped the requirements for areas that have not attained the national ambient air quality standards (NAAQS) for ozone, carbon monoxide (CO), particulate matter (PM-10), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead. In addition, title I made numerous changes in the requires for State implementation plans (SIP's) in general, including the provisions governing EPA's processing of SIP revisions, as well as the repercussions of State failures to meet the various SIP requirements." General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990. Federal Register 57:13498. April 16, 1992.

2. Reference 1. "This General Preamble principally describes EPA's preliminary views on how EPA should interpret various provisions of title I, primarily those concerning SIP revisions required for nonattainment areas."

3. Reference 1. "Some areas were designated 'by operation of law' upon enactment of the 1990 CAAA based upon their status immediately before enactment. Areas which were designated nonattainment by operation of law [section 107(d)(1)(C)] are listed in 40 CFR part 81." Page 13545.

4. Reference 1. "States with existing nonattainment areas for the primary SO_2 NAAQS where those areas lack fully approved SIP's, including part D plans, must submit implementation plans [section 191(b)]. These implementation plans must meet the requirements of subpart 1 of part D, and they must be submitted within 18 months after enactment of the 1990 CAAA (i.e., by May 15, 1992). Page 13545.

5. Reference 1. "As a result of the 1990 CAAA, EPA has the authority to establish a schedule for submittal of a secondary NAAQS plan or plan revision [section 172(b)]. The EPA must establish this schedule at the time of the nonattainment designation. The SIP must be submitted no later than 3 years from the date of the nonattainment designation. Although the law allows up to 3 years for SIP submittal, because the level of control is no more difficult to establish than for the primary NAAQS, and absent compelling justification by a State, EPA will require SIP's for these areas within 18 months of nonattainment designation." Page 13546.

6. Reference 1. "Explicit plan submission deadlines are given for nonattainment areas which violate the primary SO_2 NAAQS (section 191). Explicit plan submission deadlines are not given for nonattainment areas that violate only the secondary or both the primary and secondary SO_2 NAAQS, however." Page 13545.

7. Reference 1. "For areas which violate both primary and secondary NAAQS, allowing separate schedules for secondary and primary plans unnecessarily complicates the plan implementation and processing. Therefore, EPA expects secondary NAAQS attainment plans to be submitted on the same schedule as plans for the primary NAAQS for these areas." Page 13546.

8. Reference 1. "Areas which were designated nonattainment at the time of enactment (i.e., areas which are nonattainment by operation of law), must attain the primary NAAQS as expeditiously as practicable but not later than 5 years after enactment of the 1990 CAAA (i.e., by November 15, 1995) [section 192(b)]." Page 13546.

9. Reference 1. "Areas which are redesignated as nonattainment, subsequent to the November 15, 1990 date of enactment, must attain the primary NAAQS 'as expeditiously as practicable,' but not later than 5 years after the nonattainment designation [section 192(a)]." Page 13546.

10. Reference 1. "Some nonattainment areas have plans which were approved by EPA before enactment of the 1990 CAAA. If, subsequent to the plan's approval, EPA finds that such a plan is substantially inadequate, the plan must be revised to provide for attainment. The revised plan must provide attainment of the primary NAAQS within 5 years from the finding of inadequacy [section 192(c)]." Page 13546.

11. Reference 1. "In the 1990 CAAA, Congress provided for attainment "as expeditiously as practicable" in both primary and secondary nonattainment areas [section 172(a)(2)]. Congress set a specific attainment date of 5 years for primary NAAQS (see above) but did not set a specific deadline for attainment of secondary NAAQS (section 192). Page 13546.

12. Reference 1. "...EPA plans to allow attainment with the secondary NAAQS to be scheduled on the basis of what is expeditious for the area (section 193). Areas which are nonattainment for the secondary SO_2 NAAQS may

be allowed additional time for attainment beyond the deadlines mandated for the primary NAAQS. In general, EPA will rely on the substantive provisions of 40 CFR 51.340 (subpart R) to determine expeditiousness.

Areas which are nonattainment for both the primary and secondary NAAQS may split their attainment dates, i.e., attain the primary NAAQS within 5 years and attain the secondary NAAQS as expeditiously as practicable. This will be acceptable provided that the State can demonstrate that the secondary NAAQS cannot be attained within the same timeframe as the primary NAAQS." Page 13546.

6.4 ESTABLISHING EMISSION LIMITATIONS

6.4.1 Design Concentration. The general approach for determining SO_2 SIP emission limitations for an isolated point source is to use a dispersion model to identify the emission levels that provide attainment of the NAAQS. The averaging time for the emission limitation should be consistent with the modeling and reflect the period which results in the most stringent control requirements.

When short-term standards are most restrictive, it may be necessary to consider a broader range of concentrations than the highest value. For pollutants such as SO_2, the highest, second high concentration is the design concentration. Thus, a violation of the short-term standard occurs when the standard is exceeded a second time at the same site.[1]

6.4.2 Averaging Periods. The EPA policy regarding averaging periods for SO_2 SIP emission limitations is to require enforceable limits that protect the short-term (3-hour and 24-hour) NAAQS as well as the annual NAAQS. These emission limitations must be protective with maximum emission scenarios and worst-case meteorological conditions. Every emissions limit should clearly indicate the appropriate averaging time for that limit. The EPA will not approve an SO_2 SIP with emission limitations based on 30-day averaging, unless the SIP also contains short-term limits established by an approved dispersion modeling analysis.[2] This point is especially important for SO_2 sources that are complying with an NSPS (e.g., subpart Da). Although subpart Da allows 30-day averaging, parameters for evaluating the control system on a short-term basis must also be established for compliance with the NAAQS and PSD increments.[3]

6.4.3 Compliance Methods. Each SIP must identify methods for determining compliance with the emission limitations.[4] (See chapter 8 also.) The compliance methods should be consistent with the averaging periods for the emission limitations selected. For many sources, Continuous Emission Monitoring Systems (CEMS) should be used as the compliance test method. If a State adopts an SO_2 emission limitation without a stated averaging period, EPA accepts Method 6 (40 CFR 60 Appendix A) stack gas testing as the SO_2 compliance test method. In some situations, as an alternative to Method 6 (or equivalent) testing, the SIP may require short-term (3-hour, 24-hour) fuel sampling as SO_2 compliance test methods. A SIP may contain separate compliance test methods for each emission averaging period.[5]

6.4.4 Multipoint Rollback Modeling. Multipoint rollback modeling addresses the problem of inherently variable SO_2 emissions from smelting operations by correlating the frequency of emissions at various levels with the probability of violating the SIP. Essentially, the technique "rolls back" an entire yearly emission profile (frequency distribution) to protect the standards. The EPA has accepted this modeling technique in very few cases.

Although multipoint rollback modeling has been accepted for setting emission limitations for certain copper smelters, EPA does not believe the technique is appropriate for most situations. The EPA believes that in most situations the rollback approach is technically less sound than approved modeling methods. Multipoint rollback modeling was approved because of the unusual nature of smelter emission problems and the associated difficulty of using standard modeling techniques on these sources.[6] This technique was judged to be inappropriate for the Indiana SIP. Rejection of the technique was due to the fact that Indiana SO_2 emissions are dominated by large industrial

boilers and utility power plants, which have emissions that do not vary nearly so much as smelters and which do not have large fugitive emissions and complex terrain. Also, the EPA believes that other approved models already exist for establishing emission limitations for these sources.[7]

REFERENCES FOR SECTION 6.4

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51, appendix W, section 11.2.3.1 Design Concentrations. Washington, D.C. Office of the Federal Register.

2. "As you know, the current National Ambient Air Quality Standard (NAAQS) for SO_2 has both short-term (i.e., 3-hour and 24-hour averages) as well as annual average components. Because under the Clean Air Act, State Implementation Plans (SIPs) must demonstrate attainment of those short-term standards, EPA has a long standing policy to require emission limitations to be enforceable on a short-term basis to protect the short-term standard." Letter from Potter, J.C., to Ms. N. Maloley, Indiana Department of Environmental Management. May 23, 1986. (PN 110-86-05-23-075).

3. "The PSD regulations clearly require that the application of BACT conform with any applicable standard of performance under 40 CFR part 60 at a minimum. However, this should not be taken to supersede any additional limitations as needed to enable the source to demonstrate compliance with the NAAQS and PSD increments. In the case of sulfur dioxide (SO_2), source compliance with the 30-day rolling average emission limit under subpart Da does not adequately demonstrate compliance with the short-term NAAQS and PSD increments." Memorandum from Emison, G.A., OAQPS, to D. Kee, Region V-Air Management Division. November 24, 1986. (PN 165-86-11-24-016).

4. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.111(d). Washington, D.C. Office of the Federal Register. July 1, 1992

5. "...EPA has accepted Method 6 as the SIP compliance test method. The EPA also accepts continuous emissions monitoring and short-term fuel sampling and analysis (3-hour and 24-hour) as SO2 SIP test methods." Memorandum from Emison, G.A., OAQPS, to Air Management Division Directors, Regions I, III, V, and IX, Air and Waste Management Division Director, Region II, Air, Pesticides, and Toxics Division Directors, Region IV, and VI, and Air and Toxics Division Directors, Region VII, VIII, and X. July 29, 1987. (PN 110-87-07-29-084).

6. Reference 2. "Although in most circumstances EPA considers the rollback approach to be technically less

sound than approved modeling methods, the Agency finally approved that approach for Arizona as a result of a wide range of factors stemming from the very unusual nature of the smelter emission problems. As you know, the problems of smelters have proven particularly difficult, as demonstrated by Congress' own special treatment of smelters in section 119 of the Clean Air Act."

7. Reference 2. "My understanding is that the Indiana SIP for SO2, in contrast, is dominated by utility power plants and large industrial boilers, whose emissions do not vary nearly so much as smelters and which do not have large associated fugitive emissions sources or complex terrain. Approved models already exist and have been used nationally to account for multiple source interactions and stack height adjustments (where stack heights greater than GEP must be discounted). The existing air quality modeling methods for establishing emission limitations have been used successfully in different state SIPs which have sources similar to Indiana."

6.5 SIP REVISIONS

6.5.1 General. All SIP revisions must include a demonstration that the NAAQS and PSD increments are not violated in the area. Specific requirements for SIP processing are contained in *Guidelines for the Review of SIP Revisions by EPA Regional Offices.*[1]

6.5.2 SIP Completeness. In accordance with the requirements of section 110(k)(1) of the amended Act, EPA has promulgated minimum completeness criteria that any SIP submittal must meet [see 56 FR 23826 and 56 FR 42216]. The minimum completeness criteria serve as a tool for EPA to assess whether a SIP submittal is complete and, therefore, adequate to trigger an EPA review and action on the submittal. The completeness criteria provide criteria and procedures that can be used by States to prepare adequate SIP submittals.[2]

Two categories of criteria have been developed in order to determine whether a submittal by a State is complete: (1) administrative information and (2) technical support information. Administrative information includes the documentation necessary to demonstrate that the State has adhered to basic administrative procedures during the rule adoption process. Technical support information includes the documentation that adequately identifies all of the required technical components of the plan submission. If a submittal is determined to be complete, EPA will inform the State by letter of its determination and then begin the formal review for approvability. If a submittal is determined to be incomplete, EPA will return it to the State with a letter listing the deficiencies. EPA will attempt to make completeness determinations within 60 days of receiving a submittal in accordance with section 110(k)(1)(B) of the amended Act. However, if a completeness determination is

not made by EPA within 6 months of its receipt of the submittal, the submittal will be deemed complete.[2]

6.5.3 Approval Options. In the processing of SIP submittals, there are three general situations that can occur related to each required submittal: (1) the State may fail to submit the required plan; (2) the State may make a submittal that is deemed incomplete; or (3) the State may make a complete submittal. If the State fails to make a required submittal or makes a submittal that is determined by EPA to be incomplete, sanctions and FIP provisions of sections 179 and 110(c) will be triggered. If EPA determines that a submittal is complete, it must either approve or disapprove the submittal within 12 months of the date EPA determines the submittal is complete.[3] However, in some instances a State's complete SIP submission may include provisions that do not comply with applicable requirements of the Act. In those instances, EPA may issue a partial approval, a limited approval, or a conditional approval.[4,5]

Section 110(k)(3) of the amended Act addresses the situation in which a separable portion of a submittal meets all applicable requirements of the Act. If the disapproved portions of a SIP submittal are separable (*i.e.*, disapproval of a provision does not affect the stringency of other portions of the SIP), EPA will grant a partial approval of the SIP submittal.[5] The disapproval of any part of a SIP submittal starts the clocks for sanctions and FIP's requirements.[6]

In some instances, inseparable portions of a SIP submittal may be disapproved. However, if the submittal as a whole has a strengthening effect on the SIP, EPA may grant a limited approval of the SIP submittal.[5,7] The amended Act does not address situations requiring limited approval. Rather, EPA is using its "gap-filling" authority under sections 301(a) and 110(k)(3) to interpret the Act to

provide for such actions.[8]

Limited approval is not considered a complete action on the SIP submittal. It may be used where a submittal as a whole serves to improve air quality by providing progress toward attainment, RFP, and/or RACT, but fails to comply with all of the Act's requirements. For the action on a SIP submittal to be considered complete, EPA must issue, in addition to the limited approval, a limited disapproval that disapproves the SIP revision request as a whole for failing to meet one or more requirements of the Act.[5]

Limited approval differs from partial approval in that under limited approval, EPA approves the entire rule since that rule strengthens the SIP, although parts of it do not meet the requirements of the Act. Likewise, a limited disapproval applies to the entire rule, but the rule remains a part of the SIP because the rule strengthens the SIP.[9] Limited approval should not be used in situations where a rule is unenforceable for all situations or where it has no strengthening effects on the SIP; however, limited approval can be used when the rule is unenforceable in a limited number of situations and the rule has a strengthening effect on the SIP. Disapproval coinciding with (or following) the limited approval also starts the sanctions and FIP clocks.[10]

Under section 110(k)(4) of the amended Act, EPA may conditionally approve a plan based on a commitment of the State to adopt specific enforceable measures by a specified date within 1 year from the date of approval of the plan revision that incorporated that commitment.[11,12] If EPA determines that the State fails to meet the commitment within that year, the conditional approval would automatically become a disapproval. The sanctions and FIP clocks do not begin to run until the conditional approval becomes a disapproval.[12]

EPA's policy is to award conditional approvals only in rare situations that merit special consideration and after

evaluating specific types of SIP submittals. To ensure consistency, EPA's policy is to urge the Regions not to use conditional approvals without input from Headquarters as to whether such an approach is appropriate.[13] In general, the greater the extent to which a submittal is lacking in important plan elements, the less appropriate is the use of conditional approval. In some cases, EPA may accept a SIP revision consisting of a commitment only (with no specifically adopted rules) as a candidate for conditional approval. In such instances, the commitment should be accompanied by a work plan detailing specific measures to be adopted, steps that will be taken to adopt those measures, and a schedule for adoption. Such a submittal will be considered a SIP revision and is subject to State procedures for submitting SIP revisions.[14] Where the submittal contains specifically adopted rules that need some revisions to be fully approvable, the commitment should be explicit in describing the measures to be adopted and the corresponding schedule for implementation.[15]

Because conditional approval relies on a commitment from the State, EPA needs to make a determination of whether the State can reasonably be expected to meet its commitment. This determination would be based on consideration of a number of factors including, but not limited to, (1) the amount of technical work necessary for the measures to be adopted; (2) whether the measures are controversial; (3) the average length of the State adoption process and how far along in the process the State is; and (4) the State's past track record.[16]

For conditional approvals, sanctions and FIP clocks start if and when the approval is converted to a disapproval. This occurs in at least two situations. In the first case, the State fails to adopt and submit the specified measures by the end of one year. In this case, EPA will issue a finding of disapproval and the sanctions

and FIP clocks start on the date of issuance of the finding of disapproval.[17] The second situation is where an approval is converted to a disapproval when a State makes a complete submittal by the end of the 1-year period, but EPA concludes that the submittal does not adequately address the deficiencies that were the subject of the conditional approval. In this case, EPA will have to go through notice-and-comment rulemaking to disapprove the submittal, and the sanctions and FIP clocks start on the date of final disapproval.[18]

In a Federal Register notice published on October 1, 1993, the EPA has proposed that sanctions be applied in a specific order. The EPA has proposed that the offset sanction apply in an area 18 months after the date on which the EPA makes a finding and that the highway sanction apply in that area six months following application of the offset sanction.[19]

When the EPA finds that a State has failed to submit a plan or complete plan, the sanction and FIP clocks start on the date of the finding. If the EPA subsequently finds the late plan submittal complete, the sanction clock will permanently stop. If the EPA then takes final rulemaking action to conditionally approve the same plan, the FIP clock will temporarily stop. If the conditional approval converts to a disapproval, the FIP clock resumes where it stopped and a new sanction clock starts. The FIP clock will stop permanently if the State fulfills its commitment and the EPA takes final action fully approving the plan.[20]

6.5.4 Grandfathering. Generally, all SIP revisions are evaluated based on the requirements in existence at the time of EPA's rulemaking. However, EPA does have the flexibility to grandfather certain provisions in new regulations if the following conditions are met: (1) the new rule would represent an abrupt departure from existing practice; (2) affected parties must have relied on the old rule; (3) the

new rule would impose a large burden on those affected; and (4) there would be little statutory interest in applying the new rule.[21] (For grandfathering of modeling analyses, see section 4.2.)

Grandfathering is neither mandatory nor automatic. In determining whether to grandfather a State-submitted rule, the decision-maker should focus on whether good-faith efforts were made to comply with the existing rules. Grandfathering should not allow sources to circumvent tighter requirements or agencies to avoid difficult decisions.[22]

Exceptions to the allowance of grandfathering provisions include the following:

- If a court ruling has explicitly changed a current Federal requirement
- If the old regulation or policy was ill-founded
- If it would have substantial adverse environmental impact
- If lack of compliance with the new requirements renders the SIP inadequate for NAAQS attainment[23]

6.5.5 SIP Relaxations. All SIP relaxations should contain the following information in a Federal Register notice and/or technical support document: (1) plant name and location; (2) facility size (including number of units); (3) revised SO_2 emission limit, existing SIP limit, and corresponding averaging times; and (4) actual and "paper" (allowable) emissions decrease or increase.[24]

6.5.6 SIP Tightening. In general, where a SIP revision will result in an emissions decrease at a specific source and there is no other change in the stack parameters, a new control strategy demonstration will not be required.

REFERENCES FOR SECTION 6.5

1. U.S. Environmental Protection Agency, *Guidelines for the Review of SIP Revisions by EPA Regional Offices.* EPA-450/2-89-005, Research Triangle Park, NC, February 1989.

2. U.S. Environmental Protection Agency. *General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Proposed Rule.* Federal Register, 57:13565, Volume 57, No. 74. April 16, 1992. EPA Requirements; SIP Processing Requirements; Completeness.

3. "In general, there are three situations that can occur related to each required submittal: the State may fail to submit the required plan, the State may make a submittal that is not complete, or the State may make a complete submittal. Once a State submits a SIP and EPA has determined that the submittal is complete, EPA must either approve or disapprove the submittal within a specified time period. However, if the State fails to make a required submittal or makes a submittal that is determined to be incomplete, the sanctions and FIP provisions of section 179 and 110(c), respectively, will be triggered." Memorandum from Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, NC, to Director, Air, Pesticides, and Toxics Management Division, Regions I and IV; Director, Air and Waste Management Division, Region II; Director, Air, Radiation, and Toxics Division, Region III; Director, Air and Radiation Division, Region V; Director, Air, Pesticides and Toxics Division, Region VI; Director, Air and Toxics Division, Regions VII, VIII,IX, and X. Processing of State Implementation Plan (SIP) Submittals. July 9, 1992.

4. Reference 3, p. 1. "There are, however, three alternatives to full approval or full disapproval of a complete SIP submittal: partial approval, limited approval, and conditional approval."

5. Reference 2, p. 13565. EPA Requirements; SIP Processing Requirements; Partial Approvals; Full, Partial, and Limited Approval and Disapproval.

6. Reference 3, p. 2. "In the case where a separable portion of the submittal meets all of the applicable requirements, partial approval may be used to approve that part of the submittal and disapprove the

remainder. It is important that the two parts of the submittal be separable. The EPA can approve some of the rules and disapprove the rest as long as the rules that are disapproved do not affect those that are approved. The disapproval of any part of a required SIP submittal starts the clocks discussed above for sanctions and FIP's."

7. Reference 3, p. 2. "In some cases, a submittal may contain certain provisions that meet the applicable requirements of the Act along with other provisions that do not meet the requirements, and the provisions are not separable. Although a submittal may not meet all of the applicable requirements, EPA may want to consider whether the submittal as a whole has strengthening effect on the SIP. If this is the case, limited approval may be used to approve a rule that strengthens the existing SIP as representing an improvement over what is currently in the SIP and as meeting some of the applicable requirements of the Act."

8. Reference 3, p. 2. "The Act does not expressly provide for limited approvals. Rather, EPA is using its 'gap-filling' authority under section 301(a) of the Act in conjunction with section 110(k)(3) approval provision to interpret the Act to provide for this type of approval action."

9. Reference 3, p. 3. "A key distinction between the limited approval and a partial approval is that under a limited approval EPA's approval action goes to the entire rule. In other words, although portions of a rule prevent EPA from finding that the rule meets a certain requirement of the Act, EPA believes that the rule, as a whole, strengthens the SIP. Therefore, EPA approves the entire rule--even those portions that prohibit full approval. Likewise, when EPA issues the limited disapproval, the disapproval applies to the entire rule as failing to meet a specific requirement of the Act. The rule remains a part of the SIP, however, under the limited disapproval, because the rule strengthens the SIP."

10. Reference 3, p. 3. "The primary advantage of using the limited approval approach is to make the State submittal federally enforceable and to increase the SIP's potential to achieve additional reductions. Therefore, limited approval should not be used to approve any rule that is unenforceable for all situations. These rules and any other rules that do not have an overall strengthening effect on the SIP

should be disapproved. Limited approval can be used, however, where the rule is unenforceable for some limited number of situations but is enforceable for the majority of situations, if the rule, as a whole, strengthens the SIP . . . The disapproval coinciding with (or following) the limited approval also starts the sanctions and FIP clocks discussed above."

11. Reference 3, p. 4. "Under section 110(k)(4) of the Act EPA may conditionally approve a plan based on a commitment from the State to adopt specific enforceable measures within 1 year from the date of approval."

12. Reference 2, p. 13566. EPA Requirements; SIP Processing Requirements; Partial Approvals; Conditional Approval.

13. Reference 3, p. 4. "We will evaluate specific types of SIP submittals [*e.g.*, reasonable available control technology (RACT) catch-ups, particles with aerodynamic diameter less than or equal to a nominal 10 micrometers (PM-10) SIP's] to determine whether certain elements of that type of submittal, or that type of submittal as a whole, merit conditional approval. For this reason and to ensure consistency, Regions should not use conditional approvals without input from Headquarters as to whether such an approach is appropriate."

14. Reference 3, p. 5. "As a general matter, the greater the extent to which a submittal is lacking in important plan elements, the less appropriate the use of conditional approval may be. It should be noted however, that there may be circumstances under which EPA would accept a SIP revision consisting of a commitment only (without specifically adopted rules) as a candidate for conditional approval. In such cases, the commitment should also be accompanied by a work plan detailing any specific measures to be adopted, the steps that will be taken to adopt the measures, and the schedule for adoption of those measures. As stated earlier, a submittal that consists entirely of a commitment will be considered a SIP revision that is subject to the State process for submitting SIP revisions."

15. Reference 3, p. 5. "Where the submittal contains specifically adopted rules that need some revisions or corrections to be fully-approvable, the commitment may not need to be as comprehensive. The commitment should, however, be as explicit as possible concerning the measures that will be adopted, the steps that will be taken to adopt the measures, and the schedule for

adoption of those measures."

16. Reference 3, p. 6. "Because the conditional approval relies on a commitment from the State, EPA would need some level of confidence that the State would be able to meet such a commitment. In making a determination as to whether a State could reasonably be expected to meet its commitment, EPA would need to consider a number of factors such as: the amount of technical work necessary for measures to be adopted; whether adoption of the measures is expected to be controversial; the average length of the State adoption process; how far along in the process the State is; and the State's past track record. It should be noted that these are only some of the factors that should be considered. Each Region, in making a determination regarding the credibility of the State's commitment, may have to look at a number of other factors."

17. Reference 3, p. 6. "Unlike the limited approval/disapproval, the conditional approval does not immediately start the sanctions and FIP clocks. These clocks start if and when the approval is converted to a disapproval. There are at least two ways that the conditional approval may be converted to a disapproval. There are at least two ways that the conditional approval may be converted to a disapproval. First, if the State fails to adopt and submit the specified measures by the end of 1 year (from the final conditional approval), or fails to submit anything at all, EPA will have to issue a finding of disapproval but will not have to propose the disapproval . . . Therefore, at the end of 1 year from the conditional approval, the Regional Administrator (RA) will send a letter to the State finding that it had failed to meet its commitment and that the SIP submittal is disapproved. The 18-month clock for sanctions and the 2-year clock for FIP start as of the date of the letter. Subsequently, a notice to that effect will be published in the Federal Register, and appropriate language will be inserted in the Code of Federal Regulations. Similarly, if EPA receives a submittal addressing the commitment but determines that the submittal is incomplete, the RA will send a letter to the State making such a finding. As with the failure to submit, the sanctions and FIP clocks will begin as of the date of the finding letter."

18. Reference 3, p. 7. "Second, where the State does make a complete submittal by the end of the 1-year period, EPA will have to evaluate that submittal to determine if it may be approved and take final action on the

submittal within 12 months after the date EPA determines the submittal is complete. If the submittal does not adequately address the deficiencies that were the subject of the conditional approval, and is therefore not approvable, EPA will have to go through notice-and-comment rulemaking to disapprove the submittal. The 18-month clock for sanctions and the 2-year clock for a FIP start as of the date of final disapproval."

19. U.S. Environmental Protection Agency. Application Sequence for Clean Air Act Section 179 Sanctions. Federal Register 58:51270. October 1, 1993.

20. Memorandum from Berry, K.D., OAQPS to Director, Air, Pesticides, and Toxics Management Division, Regions I and IV; Director, Air and Waste Management Division, Region II; Director, Air, Radiation, and Toxics Division, Region III; Director, Air and Radiation Division, Region V; Director, Air, Pesticides and Toxics Division, Region VI; Director, Air and Toxics Division, Regions VII, VIII,IX, and X. Impact of Conditional Approvals on Sanction and Federal Implementation Plan (FIP) Clocks. July 14, 1993.

21. "However, an agency does have some flexibility to provide grandfathering provisions in new regulations. Generally, such provisions are appropriate where they meet a four-part test. First, the new rule represents an abrupt departure from well-established practice. Second, affected parties have relied on the old rule. Third, the new rule imposes a large burden on those affected. Fourth, there is no strong statutory interest in applying the new rule." Memorandum from Emison, G.A., OAQPS, to Director, Air Management Division Regions I, III, and IX; Director, Air, and Waste Management Division, Region II; Director, Air Pesticides and Toxics Division Region IV and VI; Director, Air and Radiation Division Region V; and Director Air and Toxics Division, Regions VII, VIII, and X. June 27, 1988. (PN 110-88-06-27-095).

22. Reference 21. "Grandfathering is not to be considered mandatory or automatic. In determining whether grandfathering should apply, and what the appropriate date should be, the decision maker should keep in mind the thrust of this guidance, *i.e.*, to honor good faith effort on the part of the State/local agency submitting the revision, balancing equity with other considerations. This guidance expressly is not intended as a vehicle to allow circumvention of tighter requirements or to facilitate the avoidance of

difficult decisions."

23. Reference 21. "B. There are certain exceptions to the general grandfathering guidance:" Items 2,3,4 and 6.

24. "In order to allow us to assess the relative impact of each SO_2 relaxation more accurately, I ask that the following information be included in each action memo.

    1. Plant name and location.

    2. Size of the facility (including the number of boilers) expressed in megawatts or Btu/hour firing capacity (design).

    3. Amount, type, and sulfur content of actual fuel combusted during the previous year.

    4. The revised SO_2 emission limit, the existing SIP limit, and the corresponding averaging times for these limits.

    5. The "paper" as well as actual increase or decrease in emissions.

Memorandum from Rhoads, R.G., OAQPS, to Director, Air and Hazardous Materials Division, Regions I-V and VIII. Information Required in Federal Register Packages. June 12, 1980.

6.6 SANCTIONS AND FIP REQUIREMENTS

Section 179(a) of the amended Act sets forth specific criteria for EPA to determine when to apply sanctions. Two types of sanctions are specified under section 179(b): (1) highway funding restrictions, and (2) increased emissions offset ratios for new and modified sources. A third type of sanction, restrictions on air grant funding, is provided for under section 179(a). The construction ban provisions of section 110(a)(2)(I) of the 1977 Clean Air Act Amendments were largely repealed with the passage of the amended Act in 1990.[1]

6.6.1 Actions Triggering Sanctions and FIP Requirements. Section 179(a) of the amended Act sets forth four types of findings which may trigger sanctions. The first is a finding that a State has failed to submit a SIP or an element of a SIP, or that the submittal fails to meet the completeness criteria. The second is a finding that a SIP submission for a nonattainment area fails to meet one or more elements of the plan required by the Act. The third is a finding that the State has not made any other submission required by the Act that meets the completeness criteria or has made a required submission that is disapproved by EPA for not meeting the Act's requirements. The fourth is a finding that a requirement of an approved plan is not being implemented.[1,2]

Section 110(c) sets forth two types of findings that trigger FIP requirements: (1) a finding that a State fails to make a required submittal or that a submittal does not satisfy the minimum completeness criteria under section 110(k)(1)(A), and (2) a disapproval of a SIP submittal in whole or in part.[3]

6.6.2 Sanctions and FIP Clocks. The amended Act provides a

"clock" for imposing sanctions and FIP requirements. Section 179(a) allows up to 18 months for the State to correct the deficiency that triggered EPA's disapproval before EPA can impose sanctions. Section 110(c)(1) gives the State two years to correct a deficiency and EPA to approve a new submittal before EPA is obligated to promulgate a FIP.[4]

The sanctions clock, triggered under section 179(a), can be stopped when the State corrects the deficiency prompting the finding. The EPA must apply one of the two sanctions specified under section 179(b) within 18 months after the date of the finding. If the deficiency persists, EPA must apply both sanctions at 24 months. Under section 179(a), EPA need not wait 24 months to apply both sanctions. EPA may apply both sanctions at 18 months if it determines a lack of good faith on the part of the State.[5] The FIP clock can be stopped only when EPA issues a final approval of the State submittal. Where the sanctions and FIP clocks were started by EPA disapproval of a plan, the sanctions and FIP clocks will run concurrently.[6]

6.6.3 Available Sanctions. The two sanctions available for EPA are provided under section 179(b) and include restriction of highway funding, and application of emission offset requirements. As part of the highway funding sanctions, EPA may prohibit approval by the Secretary of Transportation of projects or grants in the affected nonattainment area.[7] However, section 179(b)(1) of the amended Act provides exemptions for certain projects and grants that are intended to minimize air pollution problems.[8]

The emission offset sanction refers to the application of the emission offset requirements of section 173 and applies to new or modified sources. Under this sanction, the ratio of emissions reductions that must be obtained to

offset increased emissions (caused by the new or modified source) in the sanctioned area must be at least 2 to 1.[8,9]

REFERENCES FOR SECTION 6.6

1. U.S. Environmental Protection Agency. *General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Proposed Rule.* Federal Register, 57:13566, Volume 57, No. 74. April 16, 1992. EPA Requirements; Sanctions and Other Safeguards; Available Measures Under 1990 CAAA.

2. "The Act in section 179 requires EPA to impose sanctions based on four types of actions (findings) provided in section 179(a): (1) a finding that the State has failed to submit a SIP, a SIP element, or has submitted a SIP or SIP element that does not satisfy the completeness criteria; (2) that EPA disapproval of a SIP submission for a nonattainment area based on its failure to meet one or more elements required by the Act; (3) a determination that the State has not made any other submission, has made an inadequate submission (as required by the Act), or that EPA disapproves such submission; or (4) a finding that a requirement of an approved plan is not being implemented." Memorandum from Calcagni, John, Director, Air Quality Management Division, OAQPS, U.S. EPA, Research Triangle Park, NC, to Director, Air, Pesticides, and Toxics Management Division, Regions I and IV; Director, Air and Waste Management Division, Region II; Director, Air, Radiation, and Toxics Division, Region III; Director, Air and Radiation Division, Region V; Director, Air, Pesticides and Toxics Division, Region VI; Director, Air and Toxics Division, Regions VII, VIII, IX, and X. Processing of State Implementation Plan (SIP) Submittals. July 9, 1992.

3. Reference 2, p. 9. "Under section 110(c)(1), EPA is required to promulgate a FIP based on two types of findings: (1) a finding that a State has failed to make a required submittal or that a submittal does not satisfy the minimum completeness criteria under section 110(k)(1)(A), or the EPA disapproval of a SIP submittal in whole or in part."

4. Reference 2, p. 9. "For plan submittals required under part D or in response to a SIP call, section 179(a) allows for up to 18 months for the State to correct the deficiency that is the subject of a finding or disapproval before EPA is required to impose sanctions. Section 110(c)(1) provides for up to 2 years for the State to correct the deficiency and for EPA to approve a new submittal before EPA is obligated to promulgated a FIP."

5. Reference 2, p. 10. "Under section 179(a), in order to stop the sanctions clock, the State must correct the 'deficiency' prompting the finding. The EPA must apply one of the two sanctions available under section 179(b) within 18 months after the date of the finding and both sanctions at 24 months, unless the deficiency has been corrected. Section 179(a) also requires EPA to apply both sanctions after 18 months if EPA finds a lack of good faith on the part of the State."

6. Reference 2, p. 10. "In other words, EPA must approve the State submittal in order to stop the FIP clock. Where the sanctions and FIP clocks were started by EPA disapproval of a plan, the clocks will run concurrently. In this case, to correct the deficiency for purposes of the sanctions clock, the State must make a submittal which EPA finds approvable. Such a determination is not made until EPA issues a final approval of the plan. Final approval of a plan is also what is needed to stop the FIP clock."

7. Reference 2, p. 11. "For plan submittals required under part D or in response to a SIP call, if the State does not correct the specific deficiency within the 18-month period allowed under section 179(a), EPA must apply at least one of the two sanctions available under section 179(b) as described: (1) Highway funding sanctions: The EPA may impose a prohibition on the approval by the Secretary of Transportation of certain projects, or the awarding of certain grants."

8. Reference 1, p. 13566. EPA Requirements; Sanctions and Other Safeguards; Available Measures Under 1990 CAAA; Highway Funding Sanctions.

9. Reference 2, p. 11. "(2) Offset sanctions. A ratio of at least 2-to-1 will be required for emissions reductions within the nonattainment area to offset emissions from new or modified major facilities (as required under section 173)."

6.7 INTERIM CONTROL STRATEGIES

In certain situations, air pollution control equipment may need to be repaired, upgraded or replaced to meet the applicable emission limitations in a revised SIP. During the period until new or upgraded control equipment is operational and the source is in compliance, emissions from the source must not be allowed to increase. The existing control equipment must remain operational to the maximum extent possible, with appropriate maintenance and repair, until construction or linking of new equipment requires its shutdown or removal. A source may choose to implement interim controls that offer a higher degree of emission reduction instead of maintaining existing equipment. However, the use of such interim controls should not be allowed to unnecessarily delay the installation of final control equipment.[1]

Additional interim controls or other interim measures are required to prevent excess emissions during periods when existing control equipment must be taken off line to link or complete construction of new or upgraded equipment. Such measures may include installing additional temporary control equipment or operational controls (such as curtailing production rates, relocating production to complying process lines, "purchasing power or product elsewhere," or temporary shutdown).[2]

The source should also be required to implement an interim continuous emissions monitoring program. This will enable the agency to monitor emissions from the source during the interim period.[3]

REFERENCES FOR SECTION 6.7

1. "During the interim period until the new or upgraded control equipment is operational and the source is in compliance, emissions from the source must not be allowed to increase. The existing though inadequate control equipment must remain operational to the maximum extent possible, including being maintained and repaired, until such time that construction or tie-in of new equipment requires its shut down or removal. In lieu of maintaining the existing though inadequate control equipment, interim controls which offer a higher degree of emission reduction and are readily and reasonably available may be installed. The use of such interim controls shall not unduly delay the installation of final control equipment." Memorandum. Seitz, John S., Director, Stationary Source Compliance Division, OAQPS, U.S. EPA, Washington, DC, to Air Management Division Directors, Regions I, III, and IX; Air and Waste Management Division Director, Region II; Air, Pesticides and Toxics Management Division Directors, Regions IV and VI; Air and Toxics Division Directors, Regions VII, VIII and X; and Air and Radiation Division Director, Region V. Transmittal of OAQPS Interim Control Policy Statement. March 31, 1988. PN-113-88-03-31-047.

2. Reference 1. "When existing control equipment must be taken off line to tie in or complete construction of new or upgraded equipment, additional interim controls or other interim measures are required to ensure no increase in excess emissions occurs during the tie in period. Such measures may include installation of additional temporary control equipment or operational controls, *e.g.*, curtailment of production rates, relocation of production to complying process lines or facilities, purchase of power or product elsewhere as needed, or temporary shutdown."

3. Reference 1. "The source should also be required to implement an interim continuous emissions monitoring program, to enable the agency to monitor the emissions performance of the source during the interim period."

6.8 SIP CALLS

In accordance with section 110(k)(5) of the amended Act, the Administrator shall require the State to revise the SIP as necessary if the Administrator determines that the applicable implementation plan for any area is substantially inadequate to attain or maintain the relevant NAAQS. The Administrator shall establish deadlines (18 months maximum after date of notice) for the submittal of revised plans. Inadequate plan findings and notice shall be public.

Section 110(a)(2)(H) requires that SIP's provide for plan revisions as necessary to take account of NAAQS revisions or the availability of improved or more expeditious methods for attaining the standards. Such revisions should also be provided for should the Administrator find that the plan is subtantially inadequate to attain the applicable NAAQS, or to otherwise comply with any additional requirements of the Act. Relevant exceptions to these requirements for plan revisions are set forth in section 110(a)(3)(C).

Plan revisions for nonattainment areas are addressed in part D of title I of the Act. Any plan revision for a nonattainment area that is required in response to a section 110(k)(5) finding must correct the plan deficiency and meet all other applicable plan requirements under sections 110(a)(2) and part D of the Act. EPA may reasonably adjust the applicable deadlines to achieve a consistent application of plan requirements if the applicable attainment date has elapsed. EPA will issue written guidelines, as necessary, to facilitate submittal of adequate and approval plans.

6.9 NONATTAINMENT AREA CONTROL REQUIREMENTS FOR SO_2 SOURCES[1]

6.9.1 RACT. For most criteria pollutants, RACT is control technology that is reasonably available considering technological and economic feasibility (see memorandum from R. Strelow, December 9, 1976). The definition of RACT for SO_2 is that control technology which is necessary to achieve the NAAQS [40 CFR part 51.100 (o)]. Since SO_2 RACT is already defined as the technology necessary to achieve NAAQS, control technology which failed to achieve the SO_2 NAAQS would, by definition, fail to be SO_2 RACT.

The EPA intends to continue defining RACT for SO_2 as that control technology which will achieve the NAAQS within statutory timeframes.

6.9.2 RFP. Section 171(1) of the amended Act defines RFP as "such annual incremental reductions in emissions of the relevant air pollutant as are required by this part [part D] or may reasonably be required by EPA for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable date." This definition is most appropriate for pollutants which are emitted by numerous and diverse sources, where the relationship between any individual source and the overall air quality is not explicitly quantified, and where the emission reductions necessary to attain the NAAQS are inventory-wide. The definition is generally less pertinent to pollutants such as SO_2 which usually have a limited number of sources, relationships between individual sources and air quality which are relatively well defined, and emissions control measures which result in swift and dramatic improvement in air quality. That is, for SO_2, there is usually a single "step" between pre-control nonattainment and post-control

attainment.

Therefore, for SO_2, with its discernible relationship between emissions and air quality and significant and immediate air quality improvements, RFP will continue to be construed as "adherence to an ambitious compliance schedule."[2]

6.9.3 Contingency Measures. Section 172(c)(9) of the amended Act defines contingency measures as measures in a SIP which are to be implemented if an area fails to make RFP or fails to attain the NAAQS by the applicable attainment date. Contingency measures become effective without further action by the State or EPA, upon determination by EPA that the area has failed to (1) make reasonable further progress or (2) attain the SO_2 NAAQS by the applicable statutory deadline. These contingency measures shall consist of other available control measures that are not included in the control strategy.

The EPA interprets the contingency measure provisions as primarily directed at general programs which can be undertaken on an areawide basis. Again, SO_2 presents special considerations. First, for some of the other criteria pollutants, the analytical tools for quantifying the relationship between reductions in precursor emissions and resulting air quality improvements remain subject to significant uncertainties, in contrast with procedures for pollutants such as SO_2. Second, emission estimates and attainment analyses can be strongly influenced by overly-optimistic assumptions about control efficiency and rates of compliance for many small sources. In contrast, controls for SO_2 are well understood and are far less prone to uncertainty. Since SO_2 control measures are by definition based upon what is directly and quantifiably necessary to attain the SO_2 NAAQS, it would be unlikely for an area to implement the necessary emissions control yet fail to attain

the NAAQS. Therefore, for SO_2 programs, EPA interprets "contingency measures" to mean that the State agency has a comprehensive program to identify sources of violations of the SO_2 NAAQS and to undertake an aggressive follow-up for compliance and enforcement, including expedited procedures for establishing enforceable consent agreements pending the adoption of revised SIP's.

This definition of minimum contingency measures for SO_2 does not preclude a State from requiring additional contingency measures that are enforceable and appropriate for a particular source or source category.

A contingency measure for an SO_2 SIP might be a consent agreement between the State and EPA to reduce emissions from the source further in the event that contingencies are triggered. Alternatively, the source might adopt a contingency measure such as switching to low sulfur coal or reducing load until more permanent measures can be put into place to correct the problem. In either case, the contingency measure must be a fully adopted provision in the SIP in order for it to become effective at the time the Administrator determines that the area fails to meet RFP or fails to attain the standard by the statutory attainment date.

REFERENCES FOR SECTION 6.9

1. General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990. Federal Register 57:13547. April 16, 1992.

2. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, "Guidance Document for Correction of Part D SIP's for Nonattainment Areas," (Research Triangle Park, North Carolina: January 27, 1984), page 25.

7. PERMITS

7.1 PERMIT PROGRAMS

The discussion below pertains to permit requirements for construction and operation of major new or modified sources. Title V of the Clean Air Act of 1990, however, does include provisions for establishing State-administered operating permit programs. The EPA has promulgated regulations containing the minimum elements necessary for federally enforceable operating permit programs,[1] while EPA has not reached a final determination about the relationship between SIP's and title V permits.[2] Operating permits may, among other things, largely codify present SIP regulations. For this reason, it is important that SIP's are adequate and enforceable before operating permits are in place. The operating permit program is not discussed in this guideline.

REFERENCES FOR SECTION 7.1

1. 57 Federal Register 32,250 (July 21, 1992), Operating Permit Program.

2. 57 Federal Register 13,567-9 (April 16, 1992), General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Proposed Rule; Miscellaneous.

7.2 PERMIT REQUIREMENTS

7.2.1 General. Major new sources and existing sources that have undergone major modifications are generally required to obtain air pollution permits prior to construction/modification and operation. Permits are required to assure that emissions from sources are minimized via the application of good control technology, and that the resulting emissions do not cause or contribute to violation of any NAAQS or PSD increment. The requirements for these permits vary depending on the size and location of the proposed source. For a complete compendium of new source review and permitting guidance see: "New Source Review/Prevention of Significant Deterioration and Nonattainment Area Guidance Notebook." Additional information is available on the New Source Review Electronic Bulletin Board and the "New Source Review Workshop Manual."[1,2]

7.2.2 Nonattainment Areas.

7.2.2.1 Applicability. Major new or modified major stationary sources of SO_2 located within an area designated nonattainment for SO_2 pursuant to section 107 of the CAAA are required to obtain construction permits which satisfy the requirements of part D of title I of the CAA. Major SO_2 sources have the potential to emit at least 100 tons of SO_2 per year; major modifications occur if the net increase in SO_2 emissions at a major SO_2 source is at least 40 tons per year.[3]

7.2.2.2 Control Technology Requirements. All major sources subject to nonattainment area new source review requirements are required to control emissions to a degree that reflects the lowest achievable emission rate (LAER).[4] LAER is the

most stringent emission control demonstrated in any major source permit review or in any SIP regulations.[5] These control techniques must be applied to the proposed new source unless they are demonstrated to be technically infeasible, site-specific cost considerations notwithstanding.

7.2.2.3 Emission Offsets. Major new and modified sources are required to offset net increases in allowable SO_2 emissions that result after the application of LAER.[6] The degree of emission offset may vary by State but in general, the emission offset reductions must exceed the proposed net increase from the proposed source so that reasonable progress toward attainment of the NAAQS continues. Consistent with provisions of 40 CFR 51.165(a), new sources for which emission offsets are required must also comply with procedures relating to the permissible location of offsetting emissions, which are equivalent or more stringent than those set out in 40 CFR part 51, appendix S, section (IV)(D).

7.2.2.4 Net Air Quality Benefit. In order to satisfy the location requirements for SO_2 emission offsets as specified in 40 CFR part 51, appendix S, section (IV)(A), it may be necessary to demonstrate that a net air quality benefit will result. No specific net air quality benefit test exists. However, one way in which this demonstration may be made is with a modeling analysis that predicts that the proposed emissions increase and proposed emission offsets will not increase the concentration at an agreed upon number of receptors and will not significantly increase the concentration at all other receptors. A significant concentration increase for SO_2 is defined as an increase in ambient SO_2 concentrations that exceeds: 25 $\mu g/m^3$ for a 3-hour average; 5 $\mu g/m^3$ for a 24-hour average; and, 1 $\mu g/m^3$

for an annual average (see Table 7-1).

7.2.2.5 Other Requirements. In addition to the above requirements, any applicant for a new source permit within a nonattainment area must certify that other sources owned or operated by the applicant are in compliance with applicable air quality regulations. Compliance includes being on an approved compliance schedule.[7] The permit applicant must conduct an analysis of alternative sites, sizes, production processes, and environmental control techniques to demonstrate that the benefits of the proposed source outweigh the environmental and social costs imposed as a result of its location, construction, and modification.[8]

TABLE 7-1. SULFUR DIOXIDE CONCENTRATIONS

	Averaging Time (micrograms per cubic meter)		
	3-Hour	24-Hour	Annual
NAAQS	1,300	365	80
PSD Increments Class I	25	5	2
II	512	91	20
III	700	182	40
PSD significant ambient impact concentrations.	25	5	1
PSD significant monitoring concentration	--	13	--

7.2.3 NSR Transition. The amended Act makes numerous changes to the NSR requirements for nonattainment and PSD programs. These include creation of new and expanded nonattainment areas, extension of PSD coverage to Class I area boundaries, and a mandate for a PSD exemption for certain hazardous air pollutants. The EPA has provided its interpretation of the new or revised NSR nonattainment permit program requirements contained in part D of the amended Act within the *General Preamble*, New Source Review Nonattainment Permit Requirements. The EPA intends to issue regulations setting forth specific requirements for an approvable NSR program.[9] EPA has published transitional guidance on the most important issues involving the NSR program to be used in preparing SIP revisions in the interim between passage of the amended Act and adoption of the Agency's final regulations. This guidance appeared in a March 11, 1991 memorandum and is published in Appendix D of the *General Preamble*. The transitional guidance is not intended to replace existing State regulations or approved SIP's; however, it calls upon States to implement their NSR programs consistent with provisions of the amended Act that are applicable immediately.[10] The transitional guidance, since it does not represent final EPA action, has not been subject to judicial review and is not intended, and cannot be relied upon, to create any rights enforceable in litigation with the United States. The EPA may decide to follow the transitional guidance, or to act at variance with it based on specific circumstances. The Agency may also change the guidance at any time without public notice.[11]

Major issues relating to NSR SO_2 nonattainment dealt with in the transitional guidance include the following:

- *NSR construction permit requirements in nonattainment areas.* In States where the existing part D permit

program covers all designated nonattainment areas in the State, the program will automatically cover any new or expanded areas under the amended Act and States should apply the requirements of their existing programs. In other States, where a part D program may be limited to specific areas and does not apply to new or expanded areas, States must implement a transitional permit program until their existing programs are revised to meet the requirements of the amended Act, and expanded to cover all nonattainment areas in the State.[12]

- *Status of construction bans.* An existing construction ban that was imposed due to the absence of approved part D NSR rules remains in effect until a revised NSR SIP is approved. Specific construction bans may be lifted where appropriate. The status of construction bans in general will be published in the Federal Register. If a construction ban is lifted in a nonattainment area, and the area lacks an approved part D NSR rule, the State should meet the requirements of appendix S to 40 CFR part 51 in issuing permits for major new sources or major modifications until NSR rules meeting the requirements of the amended Act are adopted.[13]
- *Federal implementation plans.* The NSR permitting program in an existing FIP remains in effect until a SIP is approved or a revised FIP is adopted.[14]
- *Use of previously approved growth allowances.* Growth allowances in existing SIP's are invalidated [pursuant to section 173 (b) of the amended Act] in areas where a SIP call has been received either before or after enactment of the amended Act. In such areas, previously approved growth allowances cannot be used for NSR permits issued on or after November 15, 1990. Construction permits that rely on previously approved

growth allowances cannot be issued in SIP call areas under existing, approved part D programs. Emission offsets must be obtained on a case by case basis for any such permits, and any other existing part D requirements must be met.[15]

In a September 3, 1992 memorandum, the EPA provided a supplement to the transitional guidance in order to clarify EPA's position regarding the NSR permitting when a State does not submit a SIP revision implementing the additional part D NSR provisions of the amended Act by the applicable statutory deadline. For SO_2, the statutory submittal deadline for such revisions was May 15, 1992. This supplemental guidance is nonbinding in the same sense as the initial transition guidance and does not affect EPA's interpretations of NSR provisions in the amended Act as published in the *General Preamble*.[16]

The supplemental guidance addresses conditions under which permits may be issued to sources and obtain EPA recognition as being in compliance with the Act. In general, sources that have submitted complete permit applications by the submittal deadline may receive permits and be recognized as complying with the Act, provided that specific conditions are met. These conditions are spelled out in the guidance.[17] Submitted applications by the submittal deadline may be considered as complying with the Act provided that the source obtains from the State a permit which is consistent with the substantive new NSR part D provisions. Those NSR provisions applicable to SO_2 include section 173 offset requirements.[18] This guidance does not overrule any State rules or transitional guidance that may be more stringent.[19]

7.2.4 PSD Areas

7.2.4.1 Applicability. Major new stationary sources

located within areas designated as attainment or unclassifiable pursuant to section 107 of the CAA are required to undergo preconstruction review in accordance with regulations for the prevention of significant deterioration (PSD).[20,21] A major stationary source for PSD purposes is any stationary source which has the potential to emit 250 tons per year (tpy) or more (or 100 tpy or more, if the source category is one of the 28 categories specifically listed in the PSD regulations) of any pollutant subject to regulation under the CAA. Note that hazardous air pollutants initially or subsequently listed in section 112(b)(1) of the Clean Air Act are no longer subject to PSD review as individual pollutants. Therefore, emissions of arsenic, asbestos, benzene (including benzene from gasoline), beryllium, mercury, radionuclides (including radon and polonium), and vinyl chloride, which had previously been subject to review once a source became subject to PSD review, are now exempt. Such emissions are still regulated under PSD if they are one component of a more general pollutant subject to regulation under Clean Air Act provisions other than section 112.[22] An additional note: Hydrogen sulfide, which was initially included on the section 112 list, has been removed by act of Congress, and is, therefore, still a regulated pollutant subject to PSD review.[23,24] Any new major stationary source that also has the potential to emit 40 tpy or more of SO_2 in an area designated attainment or unclassifiable for SO_2 must undergo PSD review with respect to those SO_2 emissions. Similarly, any existing major stationary source that proposes a physical or operational charge that would increase emissions of SO_2 by 40 tpy or more is also subject to PSD for SO_2.

7.2.4.2 Control Technology Requirements. Major sources subject to PSD review for SO_2 are required to control their potential SO_2 emissions to a degree that reflects the best

available control technology (BACT).[25,26] BACT is the maximum degree of reduction for each pollutant which the permitting authority determines is achievable. A BACT analysis is done on a case-by-case basis, and considers energy, environmental, and economic impacts in determining the maximum degree of reduction achievable for the proposed source or modification. In no event can the determination of BACT result in an emission limitation which would not meet any applicable standard of performance under 40 CFR parts 60 and 61.

7.2.4.3 Air Quality Analysis. The applicant for a PSD permit is required to demonstrate via a modeling analysis that the proposed new emissions will not cause or contribute to a violation of any NAAQS or PSD increment.[27,28] The NAAQS impose a ceiling on total ambient concentrations. Increments impose a ceiling on the amount of increase in ambient concentrations relative to a baseline concentration (see Table 7-1). Both NAAQS and increments for SO_2 are expressed for annual, 24-hour, and 3-hour periods.

Guidance for preparing a demonstration of compliance with the NAAQS and the SO_2 increment is provided in the EPA's New Source Review Workshop Manual.[2] As part of this demonstration, a modeling analysis must be carried out in a manner that is consistent with the "Guideline on Air Quality Modeling (Revised)" (see Chapter 4 for more detail).

The emissions increment inventory contains data for determining changes in actual emissions for sources which affect the PSD increments. That is, (1) major sources at which construction occurred since the major source baseline data, and (2) any source at which an actual emission increase or decrease occurred after the minor source baseline date. Monitoring data may need to be provided by the applicant to meet preconstruction monitoring requirements under the PSD program. When monitoring data is

required, guidance is available in the "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)."[29]

The air quality analysis should also be used as a basis for establishing SO_2 emission limits if BACT-derived limits are not sufficient. In either case, the limits must be sufficient to protect both long-term and short-term SO_2 NAAQS and increments Thus, PSD emission limits that reflect the air quality analysis will need to be specified on a 3-hour and 24-hour basis as well as on an annual basis.[30]

An air quality analysis for PSD purposes occasionally reveals a violation of the SO_2 NAAQS due to background sources. In these situations, the State must take action to resolve the air quality problems. Depending upon whether the new source would be a significant contributor, the source may need to obtain emission reductions from existing sources as offset credit to mitigate its own contribution to a NAAQS violation.[31]

7.2.4.4 Other Impacts. Pursuant to 40 CFR part 51.166(o), the applicant must prepare additional impact analyses for each pollutant subject to regulation under the Act which will be emitted by the proposed new source or modification.[2,32] The analysis assesses the impacts of air, ground, and water pollution on soils, vegetation, and visibility caused by any increase in emissions of any regulated pollutant from the source or modification under review, and from associated growth.

Other impact analysis requirements may also be imposed on a permit applicant under local, State, or Federal laws which are outside the PSD permitting process. Receipt of a PSD permit does not relieve an applicant from the responsibility to comply fully with such requirements. For example, two Federal laws which may apply on occasions are

the *Endangered Species Act* and the *National Historic Preservation Act*. Such legislation may require additional analyses (although not as part of the PSD permit) if any federally-listed rare or endangered species, or any sites that are included (or are eligible to be included) in the National Register of Historic Sites, are identified in the source's impact area. Secondary emissions (*i.e.*, emissions not caused by the new source itself, but from associated growth) must be included in the impact analyses, e.g., emissions caused by the new construction itself.

An analysis of visibility impairment is conducted using a three-level screening technique. The analysis method is described in the EPA document entitled, *Workbook for Estimating Visibility Impairment*.[33]

7.2.4.5 Class I Areas. The PSD program is designed to provide the greatest degree of protection to Class I areas. For the most part, Class I areas are those specified by the CAA. They are protected by (1) a stringent Class I PSD increment and (2) air quality-related values (AQRV's) that the Federal Land Manager (FLM) has an affirmative duty to protect. AQRV's are those attributes of a Class I area that are dependent on the maintenance of a high level of ambient air quality. These may include acid deposition effects and visibility impairment in Class I areas.

Major stationary sources located within 100 kilometers of a designated Class I area are required to notify the FLM, who may require that the applicant conduct a Class I area impact assessment. Certain large major sources located more than 100 kilometers away may also be required to conduct a Class I assessment depending on their potential for adversely impacting a Class I area. A Class I impact analysis must show that the source will not cause or contribute to a violation of the Class I increment. Otherwise, the applicant must demonstrate to the

satisfaction of the FLM that no AQRV is adversely affected. If no violations of the increment are shown to occur, the FLM may still call for a denial of the PSD permit, based on demonstrable adverse impacts on any AQRV.

Procedures for Class I review, involving responsibilities for both the FLM and the reviewing agency, are contained in the New Source Review Workshop Manual, and in guidance documents produced by the National Parks Service, Forest Service, and Fish and Wildlife Service.

The Clean Air Act amendments of 1990 specify that the boundaries of areas designated as Class I must now conform to all boundary changes made at such parks or wilderness areas made since August 7, 1977 or in the future. Guidance for implementing this change is provided in a March 11, 1991 memorandum, "New Source Review (NSR) Transitional Guidance."[34]

7.2.5 SIP Permit Requirements. In addition to the special major source permit requirements listed above, SIP permit requirements are specified in 40 CFR part 51.165(b). These requirements govern the permitting of sources in areas where modeled or measured violations of the SO_2 NAAQS are discovered as part of the permitting analysis. Essentially, what is required is that a source demonstrate that its ambient impact would be less than the air quality significance levels for SO_2 in all areas and for all time periods where NAAQS violations will occur.[35] It is not necessary to demonstrate an insignificant impact everywhere in the impact area.

The 40 CFR part 165(b)(3) requirements also provide for sources that demonstrate significant air quality impacts at noncomplying receptors. In such situations, sources may obtain emission reductions (which must be federally enforceable) to offset their ambient impacts. The particular ambient criteria that must be satisfied to

conform to SIP provisions developed pursuant to 40 CFR part 51.165(b) must be discussed with each reviewing agency and reflect local plans for maintenance and attainment of the NAAQS.

7.2.6 Visibility. With respect to visibility protection, PSD permit reviews for new or modified major stationary sources must provide for:

- written notification (including the visibility analysis) of Federal Land Managers of any affected Federal Class I areas within 30 days of receipt of and at least 60 days prior to public hearing or, in cases where the reviewing agency receives advance notification (e.g., early consultation with the source prior to submission of the application), written notification shall be provided to the affected Federal Land Manager(s) within 30 days of such advance notification; and
- consideration of any analysis performed by the Federal Land Manager that is provided within 30 days of written notification as specified above and concludes that the proposed new major stationary source or major modification may have an adverse impact on visibility in any Federal Class I area. Where the reviewing agency finds that such an analysis does not demonstrate to the satisfaction of the State that an adverse impact will result in the Federal Class I area, the State must, in the notice of public hearing, either explain its decision or give notice as to where the explanation can be obtained.

New source review with respect to visibility protection must provide for review of any new major stationary source or major modification that:

- has an impact on any integral vista of a Federal Class I area, if the vista is identified in accordance with 40 CFR part 51.304 by the Federal Land Manager at least 12 months before submission of a complete permit application (or within 6 months if the Federal Land Manager has provided notice and opportunity for public comment); or
- proposes to locate in an area classified as nonattainment under section 107(d)(1)(A)(B)(C) of the Clean Air Act but which may have an impact on visibility in any Federal Class I area.

States may also require monitoring of visibility in any Federal Class I area near the proposed new stationary source or major modification.

New source reviews with respect to visibility generally shall be performed in accordance with State rules which meet the minimum requirements set forth at 40 CFR part 51.320. Where the State plan has been disapproved with respect to protection of visibility, the requirements at 40 CFR 52.27 and 52.28 apply to protect visibility in attainment areas and nonattainment areas, respectively. In any case, the reviewing agency must ensure that the source's emissions will be consistent with making reasonable progress toward the national visibility goal referred to in 40 CFR part 51.300(a).

REFERENCES FOR SECTION 7.2

1. The New Source Review Electronic Bulletin Board. Access through the Technology Transfer Network (TTN) Bulletin Board System, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. Communications Software Parameters: 8-N-1; 1200-2400 bps, (919)541-5742; 9600 bps, (919)541-1447. SYSOP (919)541-5384.

2. U.S. Environmental Protection Agency. New Source Review Workshop Manual, Draft, New Source Review Section, OAQPS. October 1990.

3. United States Congress. Clean Air Act, as amended Nov. 1990. 42 U.S.C. 7401 et. seq. section 172(c)(5). Washington, D.C. U.S. Government Printing Office. (See also U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.165(a). Washington, D.C. Office of the Federal Register.)

4. United States Congress. Clean Air Act, as amended Nov. 1990. 42 U.S.C. 7401 et. seq. section 173(a)(2). Washington, D.C. U.S. Government Printing Office. (See also U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51. Appendix S. section (IV)(A). Washington, D.C. Office of the Federal Register.)

5. United States Congress. Clean Air Act, as amended Nov. 1990. 42 U.S.C. 7401 et. seq. section 171(3). Washington, D.C. U.S. Government Printing Office.

6. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51. Appendix S. Washington, D.C. Office of the Federal Register.

7. United States Congress. Clean Air Act, as amended November 1990. 42 U.S.C. 7401 et. seq. section 173(a)(3). Washington, D.C. U.S. Government Printing Office.

8. United States Congress. Clean Air Act, as amended November 1990. 42 U.S.C. 7401 et. seq. section 173(a)(5). Washington, D.C. U.S. Government Printing Office.

9. "The Clean Air Act Amendments of 1990 (1990 Amendments) make numerous changes to the NSR requirements of the prevention of significant deterioration (PSD) and

nonattainment area programs. The 1990 Amendments create new and expanded nonattainment areas, extend PSD coverage to current Class I area boundaries, and mandate a PSD exemption for certain hazardous air pollutants. The Environmental Protection Agency (EPA) intends to propose by September of this year a regulatory package that will implement these and other changes to the NSR provisions. Final adoption of these revised regulations is projected for August 1992. In the interim period between passage of the 1990 Amendments and adoption of the Agency's final regulations EPA expects that numerous issues regarding the 1990 Amendments will arise." Federal Register 57:18074, Volume 57, No. 82. April 28, 1992. Appendix D - New Source Review (NSR) Program Transitional Guidance.

10. "This guidance document does not supersede existing State regulations or approved State implementation plans. However, in some cases, it calls upon States to implement their NSR programs in a manner consistent with provisions of the 1990 Amendments that are applicable immediately and with the requirements that flow directly from these provisions." Memorandum from Seitz, John S., Director, OAQPS, U.S. EPA, Research Triangle Park, NC, to Addressees. *New Source Review (NSR) Program Transitional Guidance*. March 11, 1991.

11. Reference 10. "Nonetheless, the policies set out in the transition memorandum are intended solely as guidance and do not represent final Agency action. They are not ripe for judicial review for this reason. Moreover, they are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. The EPA officials may decide to follow the guidance provided in this memorandum, or to act at variance with the guidance, based on an analysis of specific circumstances. The Agency also may change this guidance at any time without public notice."

12. Reference 9, p. 18076. "In many States, the existing approved part D permit program by its terms covers all designated nonattainment areas in the State, so part D permit program will automatically apply to the new and expanded nonattainment areas which are established under provisions of Title I of the 1990 Amendments. Thus, until new rules are adopted for these new or expanded nonattainment areas, States should apply the requirements of their existing approved part D permit program. However, in other States part D program may be limited to specified areas and does not apply to new

or expanded areas. In these cases, States must implement a transitional permitting program until their existing part D programs are revised to meet the requirements of the 1990 Amendments and expanded to cover all nonattainment areas in the State. Otherwise, both the goals of part D and Congress' intent in creating new or expanded nonattainment areas will be frustrated."

13. Reference 9, p. 18076-7. "Pursuant to section 110(n)(3), an existing construction ban that was imposed due to the absence of approved part D NSR rules remains in effect until a revised NSR SIP is approved. Existing construction bans imposed due to disapproval of primary sulfur dioxide NAAQS attainment plans also remain in effect. A Federal Register notice will be published soon announcing the status of construction bans in general and also lifting specific bans where appropriate. Should a construction ban be lifted in any area designated as nonattainment, and the area lacks an approved part D NSR rule, the State should meet the requirements of 40 CFR part 51, appendix S, in issuing permits to major new sources or major modifications prior to the adoption of NSR rules meeting the requirements of the 1990 Amendments."

14. Reference 9, p. 18077. "The NSR permitting program in an existing FIP remains in effect until a SIP is approved or a revised FIP is adopted." Federal Register 57:18077, Volume 57, No. 82. April 28, 1992. Appendix D - New Source Review (NSR) Program Transitional Guidance.

15. Reference 9, p. 18077. "Section 173(b) invalidates growth allowances in existing SIP's in areas that received a SIP call prior to enactment of the 1990 Amendments, or that received one thereafter. For NSR permits issued on or after November 15, 1990, previously-approved growth allowances cannot be used in these areas. Construction permits cannot be issued in SIP-call areas under existing EPA-approved part D programs to the extent that such permits rely on previously-approved growth allowances. Case-by-case emission offsets must be obtained for any such permits, and other existing part D requirements must be met."

16. "To address some immediate concerns generated by the 1990 CAAA, the Environmental Protection Agency (EPA) issued an initial NSR transitional memorandum on March 11, 1991, entitled 'New Source Review Program Transitional Guidance.' This memorandum supplements that effort by clarifying EPA guidance regarding the

permitting of new or modified sources in situations where a State does not submit a State implementation plan (SIP) revision implementing the augmented part D NSR provisions of the 1990 CAAA by the applicable statutory deadline. The statutory deadlines for submission of revised NSR SIP's are listed in the attachment. Moreover, as more fully set forth in the March 11, 1991 transitional memorandum, this supplemental memorandum sets forth nonbinding guidance that does not create any rights or otherwise predetermine the outcome of any procedures. Also, many of EPA's interpretations of the new part D NSR requirements are in the 'General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990' (General Preamble) (see 57 FR 1398, 13552-556, April 16, 1992). These interpretations are not affected by this memorandum." Memorandum from Seitz, John S., Director, OAQPS, U.S. EPA, Research Triangle Park, NC, to Addressees. New Source Review (NSR) Program Supplemental Transitional Guidance on Applicability of New Part D NSR Permit Requirements. September 3, 1992.

17. Reference 16. "Where States do not submit the part D NSR SIP by the applicable statutory deadline ... sources submitted complete permit applications ... by the submittal deadline may receive final permits under existing State NSR rules. In this situation, such sources will be considered by EPA to be in compliance with the Act without meeting the amended part D NSR provisions of the 1990 CAAA, provided they meet the following conditions:

    1. The State and source move expeditiously towards final permit issuance.

    2. Construction begins no later than 18 months from the date of permit issuance unless an earlier time is required under the applicable SIP.

    3. Construction is not discontinued for a period of 18 months or more.

    4. Construction is completed within a reasonable time. States may not grant permit extensions beyond these time periods unless the permittee is required in a federally-enforceable manner to meet the new part D NSR provision."

18. Reference 16. "Also, under today's guidance, where States miss the statutory deadline for part D NSR SIP submittal, for sources that have not submitted complete

permit applications by the SIP submittal deadline, EPA will also consider the source to be in compliance with the Act where the source obtains from the State a permit that is consistent with the substantive new NSR part D provisions in the 1990 CAAA. The substantive new provisions are the new applicability thresholds, the new offset ratios, the offset requirements of section 173, and the NO_x requirements of section 182(f) for most O_3 nonattainment areas and the NOTR."

19. Reference 16. "Please note that the Act allows States to implement the new part D NSR provisions prior to the statutory deadlines and in a manner more stringent than EPA guidance or rules. Thus, today's guidance does not apply in any State to the extent that the State's own rules or transitional guidance is more stringent."

20. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.166(b)(1)(i). (See also appendix S. Washington, D.C. Office of the Federal Register.)

21. Reference 2.

22. Reference 10.

23. "Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That in section 112(b)(1) of the Clean Air Act, as amended by section 301 of Public Law 101-549, strike out the term '7783064 Hydrogen Sulfide' in the list of pollutants." Congressional Record -- Senate. August 1, 1991. p. S11799.

24. Congressional Record -- House. November 25, 1991. pp. H11217 - H11219.

25. United States Congress. Clean Air Act, as amended Nov. 1990. 42 U.S.C. 7401 et. seq. section 165(i)(5). Washington, D.C. U.S. Government Printing Office.

26. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.166(j)(2). Washington, D.C. Office of the Federal Register.

27. United States Congress. Clean Air Act, as amended Nov. 1990. 42 U.S.C. 7401 et. seq. section 165(i)(5). Washington, D.C. U.S. Government Printing Office.

28. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part

51.166(k) and (l).

29. U.S. Environmental Protection Agency. Ambient Monitoring guidelines for Prevention of Significant Deterioration (PSD). Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-007. May 1987.

30. "This is in response to your November 17, 1986 memorandum in which you requested comment on Region V's belief that PSD permits must contain short-term emission limits to ensure protection of the NAAQS and PSD increments. I concur with your position and emphasize that this position reflects our national policy." Memo from Emison, G., OAQPS, to D. Kee., Region V. November 24, 1986.

31. Letter from Spink, M.L., Air Programs Branch, Region III, to Daniel, J.M., Department of Air Pollution Control, Virginia. April 25, 1990.

32. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 51.166(o). Washington, D.C. Office of the Federal Register.

33. U.S. Environmental Protection Agency. Workbook for Estimating Visibility Impairment. Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA Publication No. EPA-450/4-87-031. November 1980.

34. Attachment to Reference 10. Page 4.

35. "I believe the most appropriate course of action to follow is the second approach which considers the significant impact of the source in a way that is spatially and temporally consistent with the predicted violations." Memorandum from Emison, G.A., OAQPS, to T.S. Maslany, Air Management Division, Region III. July 5, 1988.

7.3 EMISSIONS TRADING

7.3.1 General Policy Aspects. Emissions trading consists of bubbles, netting, offsets, and emission reduction banking. These trading alternatives do not alter existing air quality requirements, e.g., this policy and guidance does not affect the applicable NSR/PSD rules for offsetting and netting. Still, these trading alternatives may provide flexibility to States and industry in meeting their requirements. Emission trading can result in reduced costs and faster compliance with applicable regulations. Any use of bubbles, banking, or similar emissions trading provisions must be approved by the EPA as a SIP revision or it must be approved by the state under an EPA approved generic bubble rule. A summary of emissions trading alternatives follows.[1]

7.3.1.1 Bubbling. The EPA's bubbling of emissions lets existing plants (or groups of plants) increase emissions at one or more emission sources in exchange for compensating extra decreases in emissions at other emission sources. To be approvable, each bubble must produce results which are equivalent to or better than the baseline emission levels in terms of ambient impact and enforceability. Thus, bubbles should not jeopardize compliance with ambient standards, applicable PSD increments or visibility requirements. Under EPA's policy for bubbling, emissions reductions from existing sources can not be used to meet technology-based requirements applicable to new or modified stationary sources.[2]

7.3.1.2 Netting. The netting of emissions may enable a physical change or change in the method of operation of a major stationary source to avoid preconstruction permit requirements under New Source Review (NSR). An exemption is allowed when the netting results in no significant net

emissions increase at the major source. By "netting out," the modification is not considered "major" and is therefore not subject to associated preconstruction permit requirements for major modifications under 40 CFR 51.165(a) and (b), 51.166, 52.21, 52.24, 52.27, or 52.28. The modification must nevertheless meet applicable NSPS, NESHAPs, State preconstruction applicability review requirements added pursuant to 40 CFR 51.160, and SIP requirements.[3]

7.3.1.3 Offsets. Where it is determined that a source will cause or contribute to a violation of a NAAQS or a PSD increment, new and modified major stationary sources may be required to obtain surplus emission reductions to more than "offset" their increased emissions and air quality impact. This requirement is designed to permit industrial growth in an area without interfering with the existing air quality maintenance plan or a demonstration of attainment.

7.3.1.4 Banking. Emission reduction banking lets firms store qualified emission reductions for later use in bubble, netting, or offset transactions. Banked emission reduction credits can also be sold to firms seeking alternative ways to meet regulatory requirements.

7.3.1.5 Emission Reduction Credits. Emission reduction credits are the common currency of all trading activity. To ensure that emission trades do not contravene relevant requirements of the Clean Air Act, only reductions which are surplus, enforceable, permanent, and quantifiable can qualify as emission reduction credits and be banked or used in an emissions trade.

7.3.2 SO_2-Specific Policy Aspects. For SO_2, certain aspects of the emissions trading policy are especially worth

noting. Generally, an emissions trading applicant must demonstrate that the proposed trades will not cause an increase in baseline emissions. The baseline emission depends upon the type of area the source operates in. Usually, an air quality demonstration for SO_2 via ambient dispersion modeling is required.[4]

The emissions trading policy offers four alternatives States can evaluate for approval of any bubble or offset. These include[5]:

(1) De Minimis. In general, no modeling is needed to determine the ambient equivalence to trades in which applicable net baseline emissions do not increase or whose gross sum totals less than 40 tpy for sulfur dioxide.

(2) Level I. In general no modeling is needed to determine ambient equivalence if:

(a) The trade does not result in an increase in applicable net baseline emissions;

(b) The relevant sources are located in the same vicinity (within 250 meters of each other);

(c) No increase in baseline emissions occurs in the source with the lower effective plume height as determined under EPA's Guidelines on Air Quality Models; and

(d) No complex terrain is within the area of significant impact of the trade or 50 kilometers, whichever is less;

(e) Stacks with increasing baseline emissions are tall enough to avoid possible downwash situations, as determined by the formula at 50 FR 27892 (July 8, 1985) (to be codified at 40 CFR part 51).

(3) Level II. Bubble trades which are neither de minimis nor Level I may nevertheless be evaluated for approval based on modeling to determine ambient equivalence limited solely to the impacts of the specific emission sources involved in the trade, 1) if there is no increase in applicable net baseline emissions, 2) if the potential

change in emissions before and after the trade will not cause a significant increase in pollutant concentrations at any receptor for any averaging time specified in an applicable ambient air quality standard, and 3) if such an analysis does not predict any increase in ambient concentrations in a mandatory Federal Class I area. The definition of "significant" as used above can be found in the Emission Trading Policy Federal Register Notice, 51 FR 43845 (December 4, 1986) footnote 38.

(4) Level III. Full dispersion modeling considering all sources affecting the trade's area of impact is required to determine ambient equivalence if applicable net baseline emissions will increase as a result of the trade, or if the trade cannot meet criteria for approval under de minimis, Level I or Level II.

For discussion on stack height emissions balancing policy see section 5.9.

REFERENCES FOR SECTION 7.3

1. Federal Register 51:43832. Emissions Trading Policy Statement; General Principles for Creation, Banking and Use of Emission Reduction Credits; Final Policy Statements and Accompanying Technical Issues Document.

2. Reference 1, p. 43830. Introduction: Basic Elements of Emissions Trading; The Bubble.

3. Reference 1, p. 43830. Introduction: Basic Elements of Emissions Trading; Netting.

4. Reference 1, p. 43826. Final Policy Statements and Accompanying Technical Issues Document. "Bubble applicants must show that their proposed trades are at least equivalent in ambient effect to the SIP emission limits the bubble would replace. For some criteria pollutants (e.g., VOC or NOx (this test may generally be met by showing equal reduction in emissions. For other pollutants (e.g., SO2, TSP, or CO) it was traditionally met, prior to the 1982 policy, through dispersion modeling."

5. Reference 1, p. 438444-5. Final Policy Statements and Accompanying Technical Issues Document.

8. COMPLIANCE AND ENFORCEMENT

8.1 GENERAL

Implementation and enforcement provisions must be included in a SIP to show how the requirements of the plan will be put into effect and how sources that are in violation of the plan's requirements will be brought into compliance. Therefore, the emission limits and other requirements (1) must be written so that they are enforceable, (2) must require continuous compliance with the SIP provisions and with the NAAQS, (3) must include provisions for monitoring and testing to determine compliance, and (4) must include provisions for compliance schedules to address violations of the SIP requirements. A compendium of EPA's enforcement guidance is contained in, "The Clean Air Act Compliance/Enforcement Policy Compendium."

8.2 ENFORCEABILITY CRITERIA

To be enforceable, the wording of SIP regulations must unambiguously describe what facilities are affected by the rule and what they are required to do to be in compliance. The requirements should be within the statutory authority of the regulatory agency and, in all cases, the owner or operator of a source should be aware of the standard of conduct required by the regulation. A SIP regulation should explicitly set forth:

- o who must comply with the regulation[1], including a description of the facilities covered by the regulation[2];
- o quantity of emissions which cannot be exceeded (e.g., the emission limit);
- o period over which compliance is determined (e.g., the averaging time)[3] which is consistent with air quality modeling and otherwise sufficient to protect all SO_2 NAAQS[4];
- o date by which compliance is expected (or the date on which noncompliance will be considered a violation

of the rule)[5], and the important dates required in any compliance schedule which the source is required to submit to the state[6];

- o recordkeeping and reporting requirements;
- o requirement of continuous compliance; and
- o methods to be used to determine compliance[7] (including the method for determining the level of emissions prior to implementing the controls for regulations expressed as a percentage reduction requirement)[8].

In addition, any exemptions to the regulation should also be clearly stated in the text of the regulation. For example, exemptions based on the size of the facility or on the emission levels from a source should state explicitly how the owner or operator of the source is to determine size and emission level (e.g., whether emissions are actual or design emissions, how actual emissions are calculated). Provisions of a regulation that allow for variations in the normal mode of compliance should be clearly specified. These variance provisions require prior EPA approval for a general variance or EPA approval on a case-by-case basis.[9,10]

If the SIP regulation includes provisions of Federal regulations that are incorporated by reference, those Federal regulations should be examined to check that they are appropriate and relevant.[11] To allow for future changes to the referenced Federal regulations, the SIP regulation could reference the current version of the Federal regulation or any subsequent version promulgated by EPA.

The SIP regulations should explicitly state recordkeeping and reporting requirements. They should describe the records that are to be kept to demonstrate compliance, how long and where the records are to be maintained, accessibility for inspection, and schedules and content requirements for any required reports. Whenever possible, the SIP should specify the form and format of reports or it should give an example of

an acceptable report. The SIP regulations should be written so that failure to submit a required report is itself a violation of the regulations.

REFERENCES FOR SECTION 8.2

1. "Your review should ensure that the rules in question are clearly worded and explicit in their applicability to the regulated sources." Memorandum and attachment from Potter, J.C., OAR, Adams, T.L., Jr., OECM, and Blake, F.S., General Counsel to Regional Administrators, Regions I - X, et al. September 23, 1987. Review of State Implementation Plans and Revisions for Enforceability and Legal Sufficiency. (PN 113-87-09-23-041).

2. "The SIPs should include a description of the types of affected facilities." Memorandum and attachment from Alushin, M.S., Associate Enforcement Counsel for Air Enforcement, et al. to Regional Administrators, Regions I - X, et al. September 23, 1987. Review of State Implementation Plans and Revisions for Enforceability and Legal Sufficiency. (PN 113-87-09-23-041).

3. Reference 1. "The period over which compliance is determined and the relevant test method to be used should be explicitly noted."

4. Memorandum and attachment from Baumen, R., AQMD, and Biondi, R., SSCD, to Air Branch Chiefs, Regions I-X. November 28, 1990. SO_2 SIP Deficiency Checklist.

5. Reference 1. "The rule should be clear as to who must comply and by what date."

6. Reference 2. "Also, the regulation should specify the important dates required of any compliance schedule which is required to be submitted by the source to the state."

7. Reference 3.

8. Reference 2. "Also, some regulations might require a certain percentage reduction from sources. The regulation should be clear as to how the baseline from which such a reduction is to be accomplished is set."

9. Reference 1. "Also provisions which allow for "alternate equivalent techniques" or "bubbles" or any other sort of variation of the normal mode of compliance must be completely and explicitly defined and must make clear whether or not EPA case-by-case approval is required to make such a method of compliance federally effective."

10. Reference 2. "These provisions must make it clear as to whether EPA approval of state granted alterative compliance techniques is required on a case-by-case basis in order for the changed mode of compliance to replace the

existing federally enforceable requirement."

11. Reference 2. "Some federal regulations are inappropriate for adoption by reference."

8.3 CONTINUOUS COMPLIANCE

8.3.1 General. As a general rule, sources are required to meet all applicable emission limitations and other control requirements incorporated into a SIP regulation at all times. Emission limitations and other control requirements are established to prevent concentrations of pollutants in the ambient air from exceeding National Ambient Air Quality Standards (NAAQS). Ambient air should meet NAAQS at all times. An exceedance of the SIP emission limits and other requirements might result in an exceedance of the NAAQS, therefore, compliance with the SIP regulations must be continuous. Continuous compliance means that excess emissions should be avoided by proper design, operation, and maintenance of air pollution sources. It also means that excess emissions, that occur as a result of a malfunction or other emergency situation, are minimized and quickly terminated.[1]

All periods of excess emissions are violations of the standard. However, enforcement action might not be appropriate in all situations.[2] Even with proper design, operation, and maintenance of equipment, malfunctions might occur. Unusual start-up and shut-down episodes might also cause exceedances to occur. A third situation during which exceedances might not require enforcement action is an emergency situation of fossil fuel shortages.

If a malfunction occurs such that bypassing pollution control equipment will prevent death, personal injury, or severe property damage, the pollution control agency can consider specific circumstances before choosing to take enforcement action.[3] During such a malfunction or emergency situation, the owner or operator of the pollution source is expected to minimize and eliminate emission limit exceedances as quickly as possible. When an emission exceedance occurs in emergency situations, the source operator or owner is responsible for proving that the excess emissions resulted from

a true malfunction (e.g. unpreventable, unavoidable).

Exceptions to the continuous compliance requirement for malfunctions, unusual start-up or shut-down, or fossil fuel shortages, can be included in a SIP. If they are included in a SIP, such regulations must be narrowly drafted. Since it might be difficult to write an unambiguous regulation which differentiates between a true malfunction and a malfunction which could have been prevented, a preferred approach is the enforcement discretion approach.[4] For the enforcement discretion approach, rather than write exceptions into the regulation, the enforcement agency uses its discretion to determine when the enforcement action is inappropriate, although a violation did occur.

8.3.2 Enforcement Discretion Approach. The enforcement discretion approach allows the enforcing agency to determine whether emission limit violations are cases which do not require enforcement actions. In these situations, the source is responsible for proving that enforcement action would be inappropriate. An advantage to this approach is that by using the enforcement discretion, an agency encourages sources to establish and follow proper operating and maintenance procedures. Proper procedures help to minimize periods of excess emissions. To demonstrate that enforcement action is inappropriate, a source must prove that it has an active continuous compliance program and it must demonstrate that excess emissions were due to an unavoidable malfunction. Components of an active continuous compliance program might include a self-monitoring of emissions and/or surrogate operating parameters, maintenance of spare parts inventories, and establishing procedures for correcting types of violations that are likely to occur.[5] Criteria that the enforcing agency should consider in determining whether enforcement actions are appropriate include:

- o equipment was properly sized, designed, and

installed;

- o equipment and processes were maintained and operated to minimize emissions;
- o repairs were made quickly;
- o the amount and duration of the excess emissions were minimized to the extent possible;
- o all possible steps were taken to minimize the impact of excess emissions on ambient air quality;
- o excess emissions were not part of a recurring pattern which would indicate the source was inadequately designed, operated, or maintained.[6]

Unless the above criteria are met, enforcement action should be taken for the violation.

8.3.3 Malfunctions and Unusual Start-up or Shut-down. All excess emissions are violations of the applicable standard. A SIP may not allow "automatic exemptions" for malfunctions that sources allege have occurred. Instead, a SIP should provide for proceedings to determine whether enforcement actions should be taken. For such proceedings the burden of proof, that an actual malfunction occurred, is upon the source. A malfunction is defined as a sudden and unavoidable breakdown of process or control equipment.[7]

Start-up and shut-down are part of normal process operations. Excess emissions during these periods should be avoided through careful planning. Likewise, excess emissions should not take place during scheduled maintenance periods because these periods can also be planned.[8] It is reasonable to expect that careful planning and proper equipment design and operation and maintenance will eliminate violations of emission limitations during such periods.

In rare cases, excess emissions during start-up or shut-down can not be avoided. An example of such a situation is when a process starts up only once or twice a year and the condition of the emissions during a few hours is such that the

effluent gas would severely damage the control equipment. For all such situations, the source must adequately show that excess emissions could not be prevented.[9]

8.3.4 Fuel Shortage Emergencies. The exemption from the continuous compliance requirement for periods of fuel shortage were enacted into the Clean Air Act by Congress at section 110(f). Under section 110(f), a Governor may petition the President to declare that an energy emergency exists. To request such a declaration, the Governor must find that an energy emergency exists in the vicinity of a source (such as a natural gas curtailment) that could lead to high levels of unemployment or loss of necessary energy supplies to residences, and that suspension of SIP requirements would alleviate the emergency. Under such a declaration, the requirements of any part of the SIP can be suspended for up to 4 months. The EPA administrator may disapprove any SIP suspension which does not comply with section 110(f).[10] Any energy emergency claim should be based on adequate documentation, including the identities of the affected parties, the amount and duration of the expected shortage, current inventories of energy supplies, the availability of alternative supplies, and actions taken to mitigate the impacts of the emergency. The source(s) and the State are responsible for providing sufficient information and for meeting other requirements of section 110(f) before an energy emergency will be declared.[11]

REFERENCES FOR SECTION 8.3

1. "In the strict legal sense, sources are required to meet, without interruption, all applicable emission limitations and control requirements, unless such limitations specifically provide otherwise." Memorandum from Bennett, K.M., OANR, to Directors, Air and Waste Management Divisions and Air Management Divisions, Regions I - X. June 21, 1982. Definition of "Continuous Compliance" and Enforcement of O & M Violations.

2. "States can, of course, consider any demonstration by the source that the excess emissions were due to an unavoidable occurrence in determining whether any enforcement action is required." Memorandum and attachment from Bennett, K.M., OANR, to Regional Administrators, Regions I - X. September 28, 1982. Policy on Excess Emissions During Startup, Shutdown, Maintenance, and Malfunctions. (PN 113-83-02-15-017)

3. "Therefore, during this latter situation, if effluent gases are bypassed which cause an emission limitation to be exceeded, this excess need not be treated as a violation if the source can show that the excesses could not have been prevented through careful and prudent planning and design and that bypassing was unavoidable to prevent loss of life, personal injury, or severe property damage." Memorandum and attachment from Bennett, K.M., OANR, to Regional Administrators, Regions I - X. February 15, 1983. Policy on Excess Emissions During Startup, Shutdown, Maintenance, and Malfunctions. (PN 113-83-02-15-017).

4. Reference 2. "EPA can approve SIP revisions which incorporate the "'enforcement discretion approach.'"

5. Reference 1. "Such a program would normally involve one or more of the following elements: continuous or periodic self-monitoring of emissions; monitoring of operating parameters such as scrubber pressure drop, incinerator combustion temperature or flow rates; maintenance of spare parts inventory; maintenance of spare control device modules; and procedures designed to correct the types of violations that are most likely to occur."

6. Reference 2. "The excess emissions are not part of a recurring pattern indicative of inadequate design, operation, or maintenance."

7. Reference 2. "'Malfunction' means a sudden and unavoidable breakdown of process or control equipment."

8. Reference 2. "Consequently, excess emissions during periods of scheduled maintenance should be treated as a violation unless a source can demonstrate that such emissions could not have been avoided through better scheduling for maintenance, or through better operation and maintenance practices."

9. Reference 3.

10. "EPA Administrator may review the Governors suspension and disapprove it if he determines that it does not satisfy the criteria set forth in (3) above." Memorandum from Durning, M.B., Assistant Administrator for Enforcement, and Hawkins, D.G., Assistant Administrator for Air Noise, and Radiation, to The Administrator. March 6, 1979. Energy Emergency Task Force; Implementation of section 110(f) of the Clean Air Act.

11. "Although EPA should provide assistance in developing the state's record, the responsibility of providing this information rests with the state and the source." Memorandum from Hawkins, D., Assistant Administrator for Air Noise, and Radiation, and Durning, M.B., Assistant Administration for Enforcement, to The Administrator. June 19, 1979. Supplemental Guidance Regarding Implementation of section 110(f) of the Clean Air Act.

8.4 COMPLIANCE MONITORING REQUIREMENTS

The EPA regulations require SIPs to contain legally enforceable procedures to require stationary sources to install and operate equipment for continuously monitoring, recording and reporting emissions [40 CFR 51.214(a)]. The SIP should identify the types of sources (by source category and capacity) that must install, maintain, and operate the equipment; the planned use of the data; calculations, recordkeeping, reporting, and quality assurance prccedures; and the pollutants that must be monitored [40 CFR 51.214(b)].

Industries and control agencies benefit from routinely monitoring emissions, keeping records, and periodically reporting. The benefits include increased cost effectiveness by increasing the sources' energy efficiency and through pollution prevention and better targeting of "problem sources". For SO_2 emissions, continuous emission monitoring systems (CEMS) provide the best means for directly determining source compliance with emission regulations. In some situations, CEMS technology might not be feasible so alternative methods of compliance might be necessary. These alternative technologies might include instrumental monitoring of process parameters such as temperature, pressure, and voltage, and manual monitoring of process information.[1]

Wherever technologically feasible, CEMS should be the required method for monitoring emissions from a source. This is particularly true for major sources and for sources located in nonattainment areas. CEMS should be used to monitor the continuous compliance of NSPS and PSD sources in attainment areas.[2] Wherever it is technically feasible CEMS requirements should also be incorporated into NSR preconstruction reviews, operating permits, and resolution of enforcement actions. If SO_2, TRS, or H_2S CEMS are not technically feasible, the regulation should require monitoring of process and control system parameters sufficient to ensure continuous compliance.[3]

CEMS data should also be used to identify significant violators of a SIP regulations.[4,5]

EPA regulations require SIP revisions to require source continuous monitoring to determine compliance for some types of sources(40 CFR part 51, appendix P). These sources include power plants, sulfuric acid plants, and FBC catalytic cracking unit regenerators at petroleum refineries that exceed size thresholds. If a State does not have plants that meet these qualifications, these provisions need not be included in the SIP. The State, however, should submit a certification with the SIP that there are no plants meeting these specifications.[6] Many States require CEMS on major sources such as pulp and paper plants and smelters.

Further, the operating permit rule requires that all sources' permits contain periodic monitoring and testing. Section 70.6(a)(3)(i)(B) of the permit rule requires that where the underlying standard (e.g., SIP) does not contain a periodic monitoring or testing method, the permit must provide one. Where the underlying regulation does provide periodic monitoring or testing, that method simply needs to be incorporated into the operating permit. Periodic monitoring must be representatives of the source's compliance with the underlying emission standard, consistent with the averaging time of the standard, result in accurate and reliable data, be consistent with approved testing and/or monitoring requirements, be directly comparable to an applicable requirement, and reported at least semiannually. This method must be used in the compliance certifications required by the permit rule, as evidence of continuous or intermitent compliance. As such, the periodic monitoring method is directly enforceable evidence of compliance with the emission limit. EPA is developing guidance on the criteria for periodic monitoring and testing under the operating permit program.

Likewise, any emission units subject to enhanced monitoring would need to incorporate directly enforceable

enhanced monitoring requirements into the operating permit. Enhanced monitoring is at least as stringent as periodic monitoring, therefore, compliance with enhanced monitoring requirements are deemed to meet the minimum criteria for periodic monitoring. These enhanced or periodic monitoring requirements should be considered when making SIP revisions, so such revisions will be consistent with what will otherwise be separately required by the operating permit.

The primary purposes of requiring such monitoring are to assure that the source (1) has timely and accurate compliance data; (2) has a quantitative basis to monitor emissions changes which are caused by process or control equipment changes (e.g., so the source is able to modify maintenance procedures); and (3) can minimize energy and raw product use rates by using information made available by the CEMS. Such monitoring measurably helps agencies ensure continuous compliance and allows them to target resources for the sources which violate their emission limits.

REFERENCES FOR SECTION 8.4

1. "While EPA considers continuous emission monitoring systems (CEMS) to be the most useful means of directly determining source compliance with emission regulations, the agency also recognizes the need to rely on the application of other means of continuous monitoring. These include instrumental monitoring of process parameters such as temperature, pressure, and voltage, and manual monitoring of process information such as the number of gallons and chemical analysis of specific paints used to coat automobiles." Letter from Riley, William, Administrator, Environmental Protection Agency, to Congressman John Dingell. April 10, 1991.

2. "CEMS should be used to assure continuous compliance of sources in both attainment and nonattainment areas." Memorandum and attachment from Emison, G.A., OAQPS, to Air Management Division Director, Regions I, III, and IX, Air and Waste Management Division Director, Region II, Air, Pesticides and Toxics Management Division Director, Regions VII, VIII and X, Air and Radiation Division Director, Region V. March 31, 1988. Transmittal of Reissued OAQPS CEMS Policy.

3. Reference 2. "OAQPS is committed to promoting, encouraging and utilizing CEMS data as a compliance assessment measure."

4. Reference 2. "Where CEMS is the compliance method, CEMS data should be used to identify significant violators."

5. Reference 1. "CEMS may be used most efficiently and effectively in the... detection and documentation of a violation of an emission standard and an operation and maintenance (O & M) requirement..."

6. Reference 2. "The second type of CEMS data is where CEMS is not the compliance method."

8.5 COMPLIANCE PLANS/SCHEDULES

The EPA regulations require each SIP to contain legally enforceable compliance schedules that set forth the dates by which all stationary and mobile sources or categories must be in compliance with the SIP [40 CFR 51.260(a)]. Compliance plans/schedules should include:

- o enforceable milestones;
- o stipulated penalties;
- o final compliance dates; and
- o compliance test method.

The compliance schedules contained in the SIP must provide for attainment of compliance with the primary standards as soon as practicable, or no later than a specified date [40 CFR 51.261(a)]. Section 192 of the CAAA requires SIPs to provide for the attainment of primary SO_2 NAAQS as expeditiously as possible, but in no case later than five years after designation of the area to nonattainment.

The 172(a)(2)(B) also requires SIPs to provide for the attainment of secondary NAAQS as expeditiously as practicable. In general, EPA will rely on the substantive provisions of 40 CFR 51.340 (subpart R) to determine expeditiousness.

To determine whether the secondary NAAQS will be attained as expeditiously as practicable, the EPA will consider:

- o the time required to modify the process or to design and construct control equipment;
- o the time required to investigate alternative control or pollution reduction technologies;
- o contractual obligations, such as long-term fuel contracts, that may constrain fuel switching; and
- o the need to phase in costs of control over a reasonable period of time.[1]

If a SIP revision provides for the extension of the compliance date for a source, the State must demonstrate that the extension will not interfere with timely attainment and

maintenance of the standards and, where relevant, that the source will make continued reasonable further progress towards attainment [40 CFR 51.262]. This will entail an analysis of the effect that changes in other sources' emissions will have on the attainment status of the area. Second, the proposed time extension must also be consistent with the requirement that nonattainment area SIPs provide for "implementation of all reasonably available control measures as expeditiously as practicable."[2]

REFERENCES FOR SECTION 8.5

1. "State Justification. The compliance schedule and cost estimates recognize that PSI's existing coal contracts limit their ability to rapidly substitute lower sulfur coal for their existing supply." Memorandum and attachment from Bauman, B., OAQPS, to Emison, G.A., OAQPS. August 25, 1988. Gibson County, Indiana, SO_2 Plan.

2. "Second, time extensions also must be consistent with the requirement that nonattainment area SIPs provide for implementation of all reasonably control measures as expeditiously as practicable' [§172(b)(2)]." Memorandum and attachment from Potter, J.C., OAR, to Regional Administrators, Regions I - X. August 7, 1986. Policy on SIP Revisions Requesting Compliance Date Extensions for VOC Sources. (PN 110-86-07-076).

9. NEW SOURCE PERFORMANCE STANDARDS AND EMISSION GUIDELINES

9.1 GENERAL

Under section 111 of the Clean Air Act (CAA), EPA is required to develop emission regulations for a category of sources which "...causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare."[1] These regulations, referred to as new source performance standards (NSPS), are to reflect the degree of emission reduction achievable through technology that has been adequately demonstrated, taking into consideration the cost of the emission reductions and any environmental, and energy impacts of meeting the standard.[2] Under section 111 of the CAA, the EPA is also required to develop emission guidelines (EG) to require States to submit plans for the control of existing emissions of certain air pollutants for which NSPS have been established.[3]

This chapter does not provide a comprehensive overview of the section 111 program, but it does summarize relevant NSPS and EG provisions (including emission limits, compliance testing, and monitoring procedures) for several source categories that are significant emitters of SO_2. These source categories (presented in sections 9.2 and 9.3) include: (1) steam generators; (2) municipal waste combustors; (3) stationary gas turbines; (4) sulfuric acid plants; (5) petroleum refineries; and (6) smelters (this is not an exhaustive list for SO_2 sources). Detailed summaries of the relevant NSPS and EG provisions are included in Tables 9-1 through 9-12, while each NSPS and EG is discussed briefly in the text. Section 9.4 clarifies aspects of the provisions for modifications and reconstructions.

Most existing NSPS subparts concentrate on determining initial compliance through the performance of reference

method tests. That approach documents that a source is capable of complying using its installed control technology but does not necessarily assure that the source will remain in compliance over time. Generally, the NSPS standards also include monitoring provisions, but those monitoring provisions are separate from the compliance determination process. Most existing monitoring is intended to serve as an indicator of compliance, not a determination of compliance.

Please note that continuous compliance does not necessarily mean continuous monitoring. Although the term "continuous" generally means at all times, the Agency has determined that less frequent measurements or determinations of compliance can ensure continuous compliance. For SO_2 continuous monitoring means use of CEMS.

REFERENCES FOR SECTION 9.1

1. United States Congress. Clean Air Act as amended November 1990. 42 U.S.C. 7401 et. seq. Section 111(b)(1)(A). Washington, D.C. U.S. Government Printing Office.

2. United States Congress. Clean Air Act as amended November 15, 1990. 42 U.S.C. 7401 et. seq. Section 111(a)(1). Washington, D.C. U.S. Government Printing Office.

3. United States Congress. Clean Air Act as amended November 15, 1990. 42 U.S.C. 7401 et. seq. Section 111(d)(1). Washington, D.C. Government Institutes, Inc.

9.2 NSPS PROVISIONS FOR SO_2

9.2.1 Subpart D--Fossil-Fuel-Fired Steam Generators[1]. This subpart applies to fossil-fuel-fired steam generating units that commenced construction after August 17, 1971, and that have a heat input capacity greater than 250 million British thermal units per hour (MM Btu/hr). A fossil-fuel-fired steam generating unit is defined as a furnace or boiler used in the process of burning fossil fuel (coal, oil, and natural gas) for the purpose of producing steam by heat transfer.

For this source category, SO_2 emissions are limited to 0.80 pounds (lb) of pollutant per MM Btu heat input for liquid fuel and 1.2 lb/MM Btu heat input for solid fuel.

Excess emissions is determined by continuously monitoring the SO_2 concentration in the flue gas and calculating 3-hour averages [CFR 60.45(g)(2)]. However, compliance is determined by a Method 6 stack test [CFR 60.46(b)(4)]. See Table 9-1 for details.

9.2.2 Subpart Da--Electric Utility Steam Generating Units[2]. This subpart applies to electric utility steam generating units that commenced construction after September 18, 1978, and that have a design heat input capacity greater than 250 MM Btu/hr. An electric utility steam generating unit is defined as a steam electric generating unit that supplies more than one-third of its potential electric output and more than 25 MW electrical output to any utility power distribution system for sale. This NSPS applies to both the traditional utility power plants and to the independent power producers (IPP).

For units in this source category that combust liquid or gaseous fuels, subpart Da limits SO_2 emissions to either: (1) 0.80 lb/MM Btu heat input and 90 percent SO_2 reduction from the potential combustion concentration or (2) to

0.20 lb/MM Btu heat input (without any percent SO_2 reduction required).

For those units combusting solid fuels, SO_2 emissions are limited to either: (1) 1.2 lb/MM Btu heat input and 90 percent reduction or (2) 0.6 lbs/MM Btu and 70 percent SO_2 reduction.

Compliance with this regulation is determined by continuously monitoring the SO_2 concentration in the flue gas [CFR 60.48a(c)(5)] and calculating 30-day averages [CFR 60.43a(g)].

It should be noted that even though Subpart Da specifies continuous compliance based on a 30-day rolling average emission rate, SIP emission limits must be based on a short-term (e.g., 3-hour or 24-hour) average to show compliance with the short-term NAAQS. This requirement is discussed in sections 6.1 and 6.2. See Table 9-2 for details.

9.2.3 Subpart Db--Industrial, Commercial, and Institutional Steam Generators[3]. This subpart applies to industrial, commercial, and institutional steam generating units that commenced construction after June 19, 1984, and that have a heat input capacity greater than 100 MM Btu/hr and that are not covered by subpart Da. The steam generating unit in this source category is defined as a device that combusts any fuel or by-product/waste to produce steam or to heat water or any other transfer medium. Note that this subpart does not apply to process dryers or kilns.[4] Subpart Db requires an SO_2 emission reduction of 90 percent or compliance with an SO_2 emission limit as specified by an equation in the regulation (see Table 9-3). There are, however, a few exceptions to this general rule. For units combusting only coal refuse in a fluidized bed combustion unit, subpart Db requires an 80 percent SO_2 emission reduction and compliance with an SO_2 emission limit of

1.2 lb/MM Btu heat input. For units combusting coal and/or oil using an emerging technology, subpart Db requires a 50 percent SO_2 emission reduction and compliance with an emission limit specified by an equation in the regulation. For certain intermittently-used (low-capacity factor) steam generating units, subpart Db requires emission limits of 1.2 lb/MM Btu heat input (for coal-fired units) and 0.5 lb/MM Btu heat input (for oil-fired units) without any percent reduction requirement.

Compliance with subpart Db is determined by continuously monitoring the flue gas and calculating 30-day rolling averages. As discussed above, compliance with a 30-day rolling average for the NSPS does not necessarily guarantee compliance with the short-term (e.g., 3-hour or 24-hour) NAAQS. Thus, compliance with subpart Db does not negate the responsibility of the source to comply with SIP emission limits. See Table 9-3 for details.

9.2.4 Subpart Dc--Small Industrial-Commercial-Institutional Steam Generating Units[5]. This subpart applies to small industrial- commercial-institutional steam generating units that commenced construction after June 9, 1989, and that have a heat input capacity of less than 100 MM Btu/hr, but greater than or equal to 10 MM Btu/hr. A steam generating unit is defined as all devices that combust fuel and produce steam, heat water, or heat other fluids which are used as heat transfer media. Note that this subpart does not apply to process dryers or kilns.[4] For units in this source category, subpart Dc requires an SO_2 emission reduction of 90 percent for coal-fired units that have a heat input capacity greater than 75 million Btu/hr and greater than 55 percent annual capacity factor, limit SO_2 emissions to 1.2 lb/MM Btu for all coal-fired units, and limit SO_2 emissions from oil-fired units to 0.5 lb/MM Btu heat input.

Compliance with subpart Dc is based on calculated

30-day rolling averages of continuous monitoring data, fuel sampling, Method 6B, or in some cases, fuel supplier certification. See Table 9-4 for details.

9.2.5 Subpart Ea--Municipal Waste Combustors[6]. This subpart applies to municipal waste combustors (MWC's) that commenced construction after December 20, 1989 and that have a capacity to combust over 250 tons per day (tpd) of municipal solid waste (MSW) which is composed of residential, commercial, and/or institutional discards. An MWC unit is defined as any facility that combusts any MSW. The MWC emissions are a composite pollutant, comprised of MWC organics, MWC acid gases, and MWC metals emissions. The MWC acid gas emissions require an SO_2 emission reduction of 80 percent or 30 parts per million by volume (ppmv). Compliance with subpart Ea is determined by continuously monitoring on a 24-hour geometric mean basis. See Table 9-5 for details.

9.2.6 Subpart GG--Stationary Gas Turbines[7]. This NSPS applies to stationary gas turbines that commenced construction after October 3, 1977, and that have a heat input capacity greater than 100 MM Btu/hr. The emission limits include a restriction on the SO_2 concentration in the exhaust gas (less than or equal to 0.015 percent, by volume), or a limit in the fuel sulfur content (less than 0.8 percent, by weight). Compliance with this NSPS is determined by daily monitoring of the fuel sulfur content after an initial performance test demonstrates that the outlet concentration limit has been met. See Table 9-6 for details.

9.2.7 Subpart H--Sulfuric Acid Plants[8]. This NSPS applies to sulfur acid production units that commenced construction after August 17, 1971. Sulfur dioxide emission are limited

to 4 lb SO_2/ton of acid produced. Compliance is determined by continuously monitoring exhaust gases and calculating average SO_2 emission rates for three consecutive 1-hour periods. See Table 9-7 for details.

9.2.8 Subpart J--Petroleum Refineries[9]. This NSPS applies to petroleum refineries with fuel combustion devices that commenced construction after June 11, 1973, and with Claus sulfur recovery plants (>20 long tons/day capacity) that commenced construction after October 4, 1976. Sulfur dioxide emission limits apply only to Claus sulfur recovery plants and are 0.25 percent in the exhaust gas. Compliance with the emission limit is determined by continuously monitoring exhaust gases and calculating 6-hour averages of the exhaust gas SO_2 concentration. See Table 9-8 for details.

9.2.9 Subparts P, Q, and R--Smelters[10,11,12]. There are three NSPS that apply to certain categories of smelting operations. These NSPS include subpart P (Primary Copper Smelters), subpart Q (Primary Zinc Smelters), and subpart R (Primary Lead Smelters). These three standards all limit the concentration of SO_2 in smelter exhaust gases to 0.065 percent (by volume). Exemptions from the emission limit are listed in the respective regulations. Compliance with the emission limits is determined by continuously monitoring the exhaust gas and calculating 6-hour, 2-hour, and 2-hour averages for the copper smelter, zinc smelter, and lead smelter standards, respectively. See Tables 9-9 through 9-11 for details.

REFERENCES FOR SECTION 9.2

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart D. Washington, D.C. Office of the Federal Register.

2. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart Da. Washington, D.C. Office of the Federal Register.

3. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart Db. Washington, D.C. Office of the Federal Register.

4. "Subparts Db and Dc does not apply to process dryers or kilns." Memorandum from Jordan, B., OAQPS, to Addressees. Applicability of NSPS subparts Db/Dc to Process Dryers. November 17, 1992.

5. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart Dc. Washington, D.C. Office of the Federal Register.

6. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart Ea. Washington, D.C. Office of the Federal Register.

7. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart GG. Washington, D.C. Office of the Federal Register.

8. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart H. Washington, D.C. Office of the Federal Register.

9. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart J. Washington, D.C. Office of the Federal Register.

10. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart P. Washington, D.C. Office of the Federal Register.

11. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart Q. Washington, D.C. Office of the Federal Register.

12. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart R. Washington, D.C. Office of the Federal Register.

9.3 EG PROVISIONS FOR SO_2

9.3.1 Subpart Ca--Municipal Waste Combustors[1]. This subpart applies to existing MWC's at commenced construction on or before December 20, 1989, and that have a capacity to combust over 250 tpd of MSW. An MWC unit is defined as any facility that combusts any MSW. The MWC plants are classified as large MWC plants, which have a plant capacity greater than 250 tpd but less than or equal to 1,100 tpd of MSW, and very large MWC plants, which have a plant capacity greater than 1,100 tpd of MSW. For MWC units in this source category, subpart Ca regulates MWC emissions and nitrogen oxides (NO_x). The MWC emissions are a composite pollutant, comprised of MWC organics, MWC acid gases, and MWC metals emissions. The MWC acid gas emissions require an SO_2 emission reduction of 70 percent or 30 ppmv for very large MWC plants and 50 percent or 30 ppmv for large MWC plants. Compliance with subpart Ca is determined by continuously monitoring on a 24-hour geometric mean basis. See Table 9-12 for details.

REFERENCE FOR SECTION 9.3

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60, subpart Ca. Washington, D.C. Office of the Federal Register.

9.4 MODIFICATION/RECONSTRUCTION PROVISIONS

"Modification" refers to "any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies..." as described in the NSPS general provisions. Some of the possible changes that do not qualify as modifications include: (1) routine maintenance, repair, and replacement, (2) increases in production rate not accompanied by capital expenditures, (3) increased capacity utilization, (4) fuel switching, provided that facility was originally designed to handle the new fuel, (5) addition of air pollution control and related equipment, and (6) the change in ownership of an existing facility.[1] The key factor here is that if emissions increase then it is considered a modification. If the emission increase is offset with control of that emission then it is not considered a modification.

"Reconstruction" generally includes "the replacement of components of an existing facility to such an extent that: (1) the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new facility, and (2) it is technologically feasible to meet the applicable standards..."[2]

New source performance standards apply to any facility that has been modified or reconstructed as defined above. In light of the modification and reconstruction provisions, it is important to point out that "repowered" sources may be subject to the applicable NSPS. Emission units that have reduced capacity due to physical deterioration are treated as though they have an actual capacity that is smaller than the original design. Physical capacity restoration to those units, even if they only restore the units to the original design capacity, result in an emission increase and, if they

include substantial capital outlay, may subject the emission units to the NSPS.[3]

REFERENCES FOR SECTION 9.4

1. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60.14. Washington, D.C. Office of the Federal Register.

2. U.S. Environmental Protection Agency. Code of Federal Regulations. Title 40, chapter I, subchapter C, part 60.15. Washington, D.C. Office of the Federal Register.

3. Letter from Clay, D.R., OAR, to J.W. Boston, Wisconsin Electric Power Company. February 15, 1989.

TABLE 9-1. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40

Subpart D--Standards of Performance for
Fossil-Fuel-Fired Steam Generators

Affected facility	Applicable time frame	Emission limits
Fossil-fuel-fired steam generating unit >73 MW heat input rate (250 MMBtu/hour); or fossil-fuel and wood-residue-fired steam generating unit capable of firing at >73 MW (250 MMBtu/hour).	After 8/17/71	340 ng/J (0.80 lb/MMBtu) heat input derived from liquid fossil fuel and wood residue. 520 ng/J (1.2 lb/MMBtu) heat input (1.2 lb/MMBtu) derived from solid fossil fuel and wood residue (except units at the Newton Power Station owned or operated by the Illinois Public Service Co.) When different fossil fuels burned simultaneously, limit determined by proration using the formula: $PS(SO_2) = [y(340) + z(520)]/(y + z)$ (See Section 60.43.)

TABLE 9-1. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40 (CONCLUDED)

Subpart D--Standards of Performance for Fossil-Fuel-Fired Steam Generators

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 (Appendix B) used in evaluating acceptability of CEMS at time of installation (i.e., for preparing calibration mixtures). Span (liquid fossil fuel) = 1,000 ppm. Span (solid fossil fuel) = 1,500 ppm Span (combination of fuels) = (1,000y + 1,500z) ppm. where: y = the fraction of total heat input derived from gaseous fossil fuel; and z = the fraction of total heat input derived from solid fossil fuel. All span values rounded to nearest 500 ppm.	Continuous monitoring system (to measure SO_2 and either CO or O_2) required except for: (1) a steam generating unit that burns only gaseous fossil fuel and (2) a unit without an FGD system if the owner/operator monitors SO_2 by fuel sampling and analysis. If no continuous monitoring system used for SO_2, then none required for O_2 or CO_2. Methods 3, 3A, 6, 6A, 6B, or 6C. Method 1 for selection of sampling site and sampling traverses. For Method 6, Method 3 for gas analysis. Method 6 or 6C for concentration of SO_2. Method 6A may be used whenever Methods 6 or 6C and 3 or 3A data are used to determine the SO_2 emission rate in ng. Method 6C shall be used only at the sole discretion of the source owner or operator. Min. sampling time for Method 6, 20 min.; and min. sample vol. = 0.02 dscm (0.71 dscf) for each sample. Arithmetic average of 2 samples = 1 run. Samples taken ~30 min. For Methods 6 and 6C, the O_2 sample shall be obtained simultaneously at the same point in the duct.	Method 6 stack test. Excess emissions is any 3-hour period during which the average emissions (arithmetic average of 3 contiguous 1-hour periods) of SO_2 as measured by a continuous monitoring system exceed the standards.

TABLE 9-2. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40a

Subpart Da--Standards of Performance for Electric Utility Steam Generators

Affected facility	Applicable time frame	Emission limits
Electric utility steam generating unit capable of combusting >73 MW heat input (250 MMBtu/hour) of fossil fuel (either alone or in combination with any other fuel)	After 9/18/78	When combusting solid or solid-derived fuel: (1) 520 ng/J (1.20 lb/MMBtu) heat input and 10% of the potential combustion conc. (90%) or (2) 30% of the potential combustion conc. (70% reduction) when emissions are ≤260 ng/J (0.60 lb/MMBtu) heat input. When combusting liquid or gaseous fuels (except those derived from solid fuels): (1) 340 ng/J (0.80 lb/MM Btu) heat input and 10% of the potential combustion conc. (90%) or (2) 100% of the potential combustion conc. (0% reduction) when emissions are ≤ 86 ng/J (0.20 lb/MMBtu) heat input. When combusting solid solvent refined coal (SCR-I): 520 ng/J (1.20 lb/MMBtu) heat input and 15% of the potential combustion conc. (85%)

TABLE 9-2. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40a (CONCLUDED)

Subpart Da--Standards of Performance for Electric Utility Steam Generators

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 used in evaluating acceptability of CEMS at time of installation (i.e., used in preparing calibration gas mixtures). Span = 125% of max. estimated hourly potential emissions of the fuel fired (at the inlet) and 50% (at the outlet). Performance test based on average emission rates for the first 30 days within 60 days after achieving the max. production rate. (Not later than 180 days after date of initial startup.) Calculated as arithmetic average of all hourly emission rates for the 30 successive boiler operating days except for data obtained during emergency conditions. Compliance with % reduction is based on average inlet and outlet emission rates. Standards, use 30-day rolling average basis. Compliance with % reduction determined on a 24-hour basis.	Continuous monitoring system for SO_2 (both inlet and outlet of control device). Alternatively, an as-fired fuel monitoring system (upstream of coal pulverizers) meeting the requirements of Method 19 (Appendix A) may be used. Continuous monitoring system for O_2 or CO_2. 1 hour averages must contain at least 2 data points. Methods 3 or 3A, 6 or 6C. Method 6A or 6B may be used whenever Methods 6 and 3 data are required to determine the SO_2 emission rate in ng/J. Methods 6A and 6C are used solely at the discretion of the owner/operator. Min. sampling time for Method 6, 20 min.; and min. sample vol. = 0.02 dscm (0.71 dscf) for each sample. Samples collected -every 60 min. Each sample = 1 hour average. Method 6B operated for 24 hours per sample. Min. sample vol. = 0.02 $dscm^3$ (0.71 dscf) for each sample. Each Method 6B sample = 24 1-hour averages.	Any 30-hour period during which the average (rolling) emissions of SO_2 as measured by a continuous monitoring system (i.e., CEMS) exceed the standards.

TABLE 9-3. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40b

Subpart Db--Standards of Performance for
Industrial-Commercial-Institutional Steam Generators

Affected facility	Applicable time frame	Emission limits
Steam generating unit with input capacity from fuels combusted of >29 MW (100 MMBtu/hour) heat input	After 6/19/84	When combusting coal or oil: 10% of the potential combustion conc. (90% reduction) and an emission limit determined by the following formula: $E_S = \frac{(K_a H_a + K_b H_b)}{(H_a + H_b)}$ where: E_s = SO_2 emission limit, (ng/J [lb/MM Btu]) K_a = 520 ng/J (1.2 lb/MMBtu) K_c = 340 ng/J (0.80 lb/MMBtu) H_a = heat input from combusting coal, J (MMBtu) H_b = heat input from combusting oil, J (MMBtu) When combusting coal refuse alone in an FBC: 20% of the potential combustion conc. (80% reduction) with SO_2 emissions $\leq$520 ng/J (1.2 lb/MMBtu) heat input. When combusting coal or oil (alone or in combination) and using an emerging technology: 50% of the potential combustion conc. (50% reduction) and emission limit calculated using the following formula: $E_S = \frac{(K_c H_c + K_c H_c)}{(H_c + H_d)}$ where: E_s = SO_2 emission limit, (ng/J [lb/MM Btu]) K_c = 260 ng/J (0.60 lb/MMBtu) K_d = 170 ng/J (0.40 lb/MMBtu) H_c = heat input from combusting coal, J (MMBtu) H_d = heat input from combusting oil, J (MMBtu)
Steam generating unit with input capacity from fuels combusted of >29 MW (100 MMBtu/hour) heat input (1) with annual capacity factor $\leq$30%; (2) located in a noncontinental area; (3) combusting coal or oil alone or in combination with another fuel, in a duct burner as part of a combined cycle system where 30% or less of heat input is from coal or oil in the duct burner and $\geq$70% is from exhaust gases entering the duct burner; (4) combusting very low sulfur oil.		When combusting coal: 520 ng/J (1.2 lb/MMBtu) heat input When combusting oil: 215 ng/J (0.50 lb/MMBtu) heat input No % reduction here.

TABLE 9-3. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40b (CONCLUDED)

Subpart Db--Standards of Performance for
Industrial-Commercial-Institutional Steam Generators

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Conducted over first 30 consecutive operating days. 30 day average. First day of test scheduled within 30 days of achieving max. production rate (but no later than 180 days after startup). Performance Specification 2 (Appendix B) used in evaluating acceptability of CEMS at time of installation (i.e., preparing calibration gas mixtures). Quarterly accuracy determinations and daily calibration drift tests according to Procedure 1, Appendix F. Span = 125% of max. estimated hourly potential emissions of fuel combusted (at the inlet); 50% (at the outlet).	Continuous monitoring system for SO_2, and O_2 or CO_2 (at inlet and outlet). 30-day rolling average basis except if (1) annual capacity factor for oil limited to 10% or less; (2) only oil which emits <215 ng/J is combusted; and (3) no other fuel is combusted. Alternative methods: (1) Collect coal or oil samples at inlet and analyze for S and heat content (Method 19); (2) Method 6B; (3) Daily emission rate determined by Method 6A; (4) Mean 30-day emission rate (Equation 19-20 of Method 19).	Any 30-day period during which the average (rolling) emissions of SO_2 as measured by a continuous monitoring system (i.e., CEMS) exceed the standards.

TABLE 9-4. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40c

Subpart Dc--Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Affected facility	Applicable time frame	Emission limits
Industrial-commercial-institutional steam generating unit <29 MW (100 MM Btu/hr) and ≥ 2.9 MW (10 MM Btu/hr) heat input capacity.	After 6/9/89	When combusting coal: 520 ng/J (1.2 lb/MM Btu) heat input. When comubsting coal in a unit having a heat input capacity >22 MW (75 MM Btu/hr) and operating at greater than a 55% annual capacity factor: 520 ng/J (1.2 lb/MM Btu) heat input and 10% of the potential combustion conc. (90%). When combusting oil: 215 ng/J (0.50 lb/MM Btu) heat input; or firing oil with a sulfur content of 0.5 wt. % or less.

TABLE 9-4. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.40c (CONCLUDED)

Subpart Dc--Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Conducted over first 30 consecutive operating days. 30 day average. First day of test scheduled within 30 days of achieving max. production rate (but no later than 180 days after startup). Performance specifications 1, 2, and 3 (Appendix B) provide applicable procedures for operation of CEMS. Quarterly accuracy determinations and daily calibration drift tests according to Procedure 1, Appendix F. Span = 125% of max. estimated hourly potential emissions of fuel combusted (at the inlet); 50% (at the outlet).	Coal-fired units subject to percent-reduction may use continuous monitoring system, as-fired fuel sampling, or emission measurements using Method 6B, at inlet and outlet 30-day rolling average basis. Units subject to emission limits may use CEMS, Method 6B emission measurements, daily fuel sampling and analysis, or shipment fuel sampling analysis. Residual-oil and coal-fired units with heat input capacities between 2.9 and 8.7 MW (10 and 30 MM Btu/hr) and all distillate oil-fired units may use supplier certification in lieu of monitoring, measurement, or analysis.	Any 30-hour period during which the average (rolling) emissions of SO_2 as measured by a continuous monitoring system (i.e., CEMS) or calculated using manual data or fuel analysis exceed the standards.

TABLE 9-5. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.50a

Subpart Ea--Standards of Performance for Municipal Waste Combustors

Affected facility	Applicable time frame	Emission limits
Municipal waste combustor combusting >225 Mg/day (250 tpd) of municipal solid waste (residential, commercial and/or institutional discards).	After 12/20/89	When combusting acid gases: 80% reduction in SO_2 emissions or a 30 ppm SO_2 emission limit on a daily (block average) 24-hour geometric mean basis measured continuously.

TABLE 9-5. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.50a (CONCLUDED)

Subpart Ea--Standards of Performance for Municipal Waste Combustors

Initial compliance testing	Monitoring	Definition of Noncompliance
Compliance test in accordance with Section 60.8. Procedures under Section 60.13 for installation, evaluation, and operation. Performance specifications 1, 2, and 3 (Appendix B) provide applicable procedures for operation of CEMS. Quarterly accuracy determinations and daily calibration drift tests shall be performed in accordance with procedure 1, Appendix F. Span = 125% of max. estimated hourly potential sulfur dioxide emissions of the MWC unit combusted (at the inlet); 50% (at the outlet).	Continuous monitoring system for SO_2, or O_2 or CO_2 from acid gases on a daily (block) 24-hour geometric mean basis.	Any 24-hour period during which the average (rolling) emissions of SO_2 as measured by a continuous monitoring system (i.e, CEMS) exceed the standards.

TABLE 9-6. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.330

Subpart GG--Standards of Performance for Stationary Gas Turbines

Affected facility	Applicable time frame	Emission limits
Stationary gas turbine with a heat input at peak load >10.7 GJ/hour, based on the lower heating value of the fuel fired.	After 10/3/77	One of the following conditions must be met: (1) $\leq$ 0.015% by vol. of SO_2 from gases discharged to the atmosphere at 15% O_2 (dry basis); (2) $\leq$0.8% by weight S content of fuel burned.

TABLE 9-6. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.330 (CONCLUDED)

Subpart GG--Standards of Performance for Stationary Gas Turbines

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8.	Reference Method 20 for the concentration of SO_2. SO_2 content of fuel fired must be monitored. If fuel is from a bulk storage tank, values shall be determined each time fuel is transferred to the storage tank. If fuel does not undergo bulk storage, values shall be determined and recorded daily. For S content, use ASTM D-2880-71 for liquid fuels: use ASTM D-1072-80, D-3031-81, D-4084-82, or D-3246-81 for gaseous fuels.	Any daily period during which the S content of the fuel fired exceeds 0.8%.

TABLE 9-7. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.80

Subpart H--Standards of Performance for Sulfuric Acid Plants

Affected facility	Applicable time frame	Emission limits
Sulfuric acid production unit (any facility producing sulfuric acid by the contact process burning elemental S, alkylation acid, H_2S, organic sulfides and mercaptans, or acid sludge).	After 8/17/71	$\leq$2 kg SO_2/metric ton of acid produced (4 lb/ton), production being expressed as 100% H_2SO_4.
A source that processes elemental S or an ore that contains elemental S and uses air to supply oxygen.		

TABLE 9-7. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.80 (CONCLUDED)

Subpart H--*Standards of Performance for Sulfuric Acid Plants*

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 used to evaluate the acceptability of CEMS at time of installation (i.e., used in preparing calibration gas mixtures).	Continuous monitoring system. Determine conversion factor 3 times daily by measuring the conc. of SO_2 entering the converter. Span = 1,000 ppm of SO_2. Reference Method 8 (only the SO_2 portion).	All 3-hour periods (or the arithmetic average of 3 consecutive 1-hour periods) during which the integrated average SO_2 emissions exceed the applicable emission limits.
Performance Specifications 2 and 3 used to evaluate the acceptability of CEMS at time of installation (i.e., used in preparing calibration gas mixtures).	An alternative method (not required) would be to continuously monitor SO_2, CO, and CO_2 (if required). Span for CO_2 (if required) = 10%. Span for O_2 = 20.9%. No SO_2 conversion factor needed. Method in reg. to calculate SO_2 emission rate. Reference Method 8 for SO_2 and acid mist; reference Method 3 for O_2 and CO_2. No production rate or total gas flow rate needed.	

TABLE 9-8. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.100

Subpart J--Standards of Performance for Petroleum Refineries

Affected facility	Applicable time frame	Emission limits
Fuel gas combustion device	After 6/11/73	≤230 mg/dscm (0.10 gr/dscf) H_2S (unless it can be demonstrated to the Administrator that the method for treating combustion gases is equally effective in controlling SO_2 emissions).
All Claus sulfur recovery plants >20 long tons/day	After 10/4/76	≤0.025% vol. SO_2 at 0% O_2 (dry basis) (if an oxidation control system or a reduction control system followed by incineration is used).
		≤0.030% vol. reduced S compounds and 0.0010% vol. of H_2S calculated as SO_2 at 0% O_2 (dry basis).

TABLE 9-8. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.100 (CONCLUDED)

Subpart J--Standards of Performance for Petroleum Refineries

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 used to evaluate the acceptability of CEMS at time of installation (i.e., used in preparing calibration gas mixtures). Span = 100 ppm. Reference Method 6 for SO_2. Reference Method 11 for H_2S.	Continuous monitoring system (except if continuous monitor for H_2S is used). Performance Spec. 2 used in preparing calibration gas mixtures. Span = 100 ppm. If Reference Method 6 for SO_2, Method 1 for velocity traverse and Method 2 for determining velocity and volumetric flow rate. Reference Method 11 for H_2S (for both methods, min. sampling time = 10 min; min. sample vol. = 0.01 dscm (0.35 dscf). *Arithmetic average of 2 samples* = 1 run. Sampling at ~1 hour intervals.	All 3-hour period when the average H_2S conc. exceeds 230 mg/dscm (0.10 gr/dscf), if H_2S is removed from the fuel gas before it is burned; or any 3-hour period when the average conc. SO_2 level exceeds the specified limits if compliance is achieved by removing SO_2 from the combusted fuel gases.
Performance test in accordance with Section 60.8. Performance Spec. 2 used in evaluating acceptability of CEMS at time of installation (i.e., used in preparing calibration gas mixtures). Span = 500 ppm. Reference Method 6.	Continuous monitoring system. Span = 500 ppm. Reference Method 6. Method 1 for velocity traverses and Method 2 for *determining velocity and volumetric* flow rate. Min. average of 4 consecutive hours of continuous sampling = 1 run.	Any 12-hour period when the average conc. SO_2 in the discharged gases exceeds 250 ppm at 0% O_2 (dry basis). Any 6-hour period during which the average emission (arithmetic average of 6 contiguous 1-hour periods) of SO_2 as measured by a continuous monitoring system exceed the specified emission limits.
Performance test in accordance with Section 60.8. Continuous monitoring system for H_2S. Span = 20 ppm for monitoring H_2S. Span = 600 ppm for monitoring reduced S compounds. Reference Method 15 (or Reference Method 15a for reduced S compounds).	Continuous monitoring system for H_2S. Span = 20 ppm for monitoring H_2S. Span = 600 ppm for monitoring reduced S compounds. Reference Method 15 (or Reference Method 15a for reduced S compounds). For Method 15, each run = 16 samples taken over min. of 3 hours. Method 4 used to determine moisture content of gases. For Method 15a, each run = 1 3-hour sample or 3 1-hour samples.	Any 12-hour period when the average conc. of H_2S, or reduced sulfur compounds in the discharged gases, exceeds 10 ppm or 300 ppm, respectively, at 0% O_2 (dry basis). Any 6-hour period during which the average emissions (arithmetic average of 6 contiguous 1-hour periods) of SO_2 as measured by a continuous monitoring system exceed the specified emission limits.

TABLE 9-9. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.160

Subpart P--Standards of Performance for Primary Copper Smelters

Affected facility	Applicable time frame	Emission limits
Primary cooper smelter (dryer, roaster, smelting furnace, and copper converter)	After 10/16/74	≤0.065% by vol. of SO_2 from gases discharged to the atmosphere. (Reverbertory smelting furnaces are exempted during periods when the total smelter charge at the primary copper smelter contains a high level of volatile impurities. A change in fuel combusted in a reverbertory smelting furnace is not considered a modification.)

TABLE 9-9. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.160 (CONCLUDED)

Subpart P--Standards of Performance for Primary Copper Smelters

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 (Appendix B) used to evaluate acceptability of CEMS at time of installation (i.e., used to prepare calibration gases and for calibration checks). Span of continuous monitoring system may = 0.15% SO_2 by vol. if necessary to maintain system output between 20% and 90% of full scale. Reference Method 6.	Maintain a monthly record of the total smelter charge and weight % (dry basis) as As, Sb, Pb, and Zn in this charge. Approved methods must be accurate to $\pm$10%. Continuous monitoring system. Span = 0.20% SO_2 by vol. One 6-hour average shall constitute 1 run. Monitoring drift not to exceed 2% of span.	All 6-hour periods during which the average emissions of SO_2, as measured by the continuous monitoring system, exceed the specified standards. Excess emissions for $\leq$1.5% of the 6-hour periods during a quarter will not be considered as potential violation.

TABLE 9-10. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.170

Subpart Q--Standards of Performance for Primary Zinc Smelters

Affected facility	Applicable time frame	Emission limits
Primary zinc smelter (roaster and sintering machine)	After 10/16/74	≤0.065% by vol. of SO_2 from gases discharged to the atmosphere. (Any sintering machine which eliminates more than 10% of the S initially contained in the zinc sulfide ore will be considered as a roaster.)

TABLE 9-10. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.170 (CONCLUDED)

Subpart Q--Standards of Performance for Primary Zinc Smelters

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 (Appendix B) used to evaluate acceptability of CEMS at time of installation (i.e., used to prepare calibration gases and for calibration checks). Span of continuous monitoring system may = 0.15% SO_2 by vol. if necessary to maintain system.	Continuous monitoring system. Span = 0.20% SO_2 by vol. One 2-hour average shall constitute 1 run. The 2-hour average SO_2 concs. shall be calculated and recorded daily for the 12 consecutive 2-hour periods of each operating day (to be the arithmetic mean of the appropriate 2 contiguous 1-hour average SO_2 concs. provided by the CEMS). Monitoring drift not to exceed 2% of span.	Any 2-hour period during which average SO_2 emissions exceed the standard.

TABLE 9-11. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.180

Subpart R--Standards of Performance for Primary Lead Smelters

Affected facility	Applicable time frame	Emission limits
Primary lead smelter (sintering machine, electric smelting furnace, and converter)	After 10/16/74	$\leq$0.065% by vol. of SO_2 from gases discharged to the atmosphere.

TABLE 9-11. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.180 (CONCLUDED)

Subpart R--Standards of Performance for Primary Lead Smelters

Initial performance testing	Monitoring	Definition of Noncompliance
Performance test in accordance with Section 60.8. Performance Specification 2 of Appendix B used to evaluate acceptability of CEMS at time of installation (i.e., used to prepare calibration gases and for calibration checks). Span of continuous monitoring system may = 0.15% SO_2 by vol. if necessary to maintain system.	Continuous monitoring system. Span = 0.20% SO_2 by vol. One 2-hour average shall constitute 1 run. The 2-hour average SO_2 concs. shall be calculated and recorded daily for the 12 consecutive 2-hour periods of each operating day (to be the arithmetic mean of the appropriate 2 contiguous 1-hour average SO_2 concs. provided by the CEMS). Monitoring drift not to exceed 2% of span.	Any 2-hour period during which average SO_2 emissions exceed the standard.

TABLE 9-12. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.30a

Subpart Ca--Emissions Guidelines and Compliance Times for Municipal Waste Combustors

Affected facility	Applicable time frame	Emission limits
Municipal waste combustor combusting between 225 Mg/day (250 tpd) 1,000 Mg/day and (1,100 tpd) of municipal solid waste (residential, commercial and/or institutional discards).	Before 12/20/89	70% reduction in SO_2 emissions or a 30 ppm SO_2 emission limit on a daily (block average) 24-hour geometric mean basis measured continuously.
Municipal waste combustor combusting >1,000 Mg/day (1,100 tpd) of municipal solid waste (residential, commercial and/or institutional discards).		50% reduction in SO_2 emissions or a 30 ppm SO_2 emission limit on a daily (block average) 24-hour geometric mean basis measured continuously.

TABLE 9-12. SUMMARY OF SO_2 REGULATIONS IN 40 CFR 60.30a (CONCLUDED)

Subpart Ca--Emissions Guidelines and Compliance Times
for Municipal Waste Combustors

Initial compliance testing	Monitoring	Definition of Noncompliance
Compliance test in accordance with Section 60.8. Procedures under Section 60.13 for installation, evaluation, and operation. Performance specifications 1, 2, and 3 (Appendix B). Provide applicable procedures for operation of CEMS. Quarterly accuracy determinations and daily calibration drift tests according to Procedure 1, Appendix F. Span = 125 of max. estimated hourly potential emissions of fuel combusted (at the inlet); 50% (at the outlet).	Continuous monitoring system for SO_2, or O_2 or CO_2 from acid gases on a daily (block) 24-hour geometric mean basis.	Any 24-hour period during which the average (rolling) emissions of SO_2 as measured by a continuous monitoring system exceed the standards.

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16. ABSTRACT

The SO_2 (sulfur dioxide) guideline document is a compilation of currently available policy and guidance for SO_2 programs. It is intended only to provide a guide to SO_2 policy and guidance in effect at the time of the document's preparation and does not present any new policy or guidance. Each chapter summarizes relevant policy and guidance and provides detailed references to guide the user to more complete sources found in the appendix and elsewhere. References include statutory and regulatory sources (Clean Air Act and Code of Federal Regulations), Federal Register notices, and U.S. Environmental Protection Agency (EPA) guidance documents and memoranda, and questions and answers. The guideline covers topics such as air quality status, air quality monitoring and modeling, and control strategies.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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