AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

Title 40—Protection of Environment

(This book contains parts 53–59)

Part

CHAPTER I—Environmental Protection Agency (Continued) 53

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

EDITORIAL NOTES: 1. Subchapter C—Air Programs is contained in volumes 40 CFR parts 50–51, part 52.01–52.1018, part 52.1019–end, parts 53–59, part 60 (60.1–end), part 60 (Appendices), parts 61–62, part 63 (63.1–63.599), part 63 (63.600–63.1199), part (63.1200–End), parts 64–71, parts 72–80, parts 81–85, part 86 (86.1–86.599–99), part 86 (86.600 to end) and parts 87–99.

2. Nomenclature changes to chapter I appear at 65 FR 47324, 47325, Aug. 2, 2000; 66 FR 34375, 34376, June 28, 2001.

SUBCHAPTER C—AIR PROGRAMS (CONTINUED)

Part		*Page*
53	Ambient air monitoring reference and equivalent methods	5
54	Prior notice of citizen suits	104
55	Outer continental shelf air regulations	105
56	Regional consistency	129
57	Primary nonferrous smelter orders	131
58	Ambient air quality surveillance	205
59	National volatile organic compound emission standards for consumer and commercial products	291

SUBCHAPTER C—AIR PROGRAMS—(Continued)

PART 53—AMBIENT AIR MONITORING REFERENCE AND EQUIVALENT METHODS

Subpart A—General Provisions

Sec.
53.1 Definitions.
53.2 General requirements for a reference method determination.
53.3 General requirements for an equivalent method determination.
53.4 Applications for reference or equivalent method determinations.
53.5 Processing of applications.
53.6 Right to witness conduct of tests.
53.7 Testing of methods at the initiative of the Administrator.
53.8 Designation of reference and equivalent methods.
53.9 Conditions of designation.
53.10 Appeal from rejection of application.
53.11 Cancellation of reference or equivalent method designation.
53.12 Request for hearing on cancellation.
53.13 Hearings.
53.14 Modification of a reference or equivalent method.
53.15 Trade secrets and confidential or privileged information.
53.16 Supersession of reference methods.

TABLE A–1 TO SUBPART A—SUMMARY OF APPLICABLE REQUIREMENTS FOR REFERENCE EQUIVALENT METHODS FOR AIR MONITORING OF CRITERIA POLLUTANTS

APPENDIX A TO SUBPART A—REFERENCES

Subpart B—Procedures for Testing Performance Characteristics of Automated Methods for SO_2, CO, O_3, and NO_2

53.20 General provisions.
53.21 Test conditions.
53.22 Generation of test atmospheres.
53.23 Test procedures.

APPENDIX A TO SUBPART B—OPTIONAL FORMS FOR REPORTING TEST RESULTS

Subpart C—Procedures for Determining Comparability Between Candidate Methods and Reference Methods

53.30 General provisions.
53.31 Test conditions.
53.32 Test procedures for methods for SO_2, CO, O_3, and NO_2.
53.33 Test procedure for methods for lead.
53.34 Test procedure for methods for PM_{10} and $PM_{2.5}$.

TABLE C–1 TO SUBPART C—TEST CONCENTRATION RANGES, NUMBER OF MEASUREMENTS REQUIRED, AND MAXIMUM DISCREPANCY SPECIFICATION

TABLE C–2 TO SUBPART C—SEQUENCE OF TEST MEASUREMENTS

TABLE C–3 TO SUBPART C—TEST SPECIFICATIONS FOR LEAD METHODS

TABLE C–4 TO SUBPART C—TEST SPECIFICATIONS FOR PM_{10} AND $PM_{2.5}$ METHODS

FIGURE C–1 TO SUBPART C—SUGGESTED FORMAT FOR REPORTING TEST RESULTS

APPENDIX A TO SUBPART C—REFERENCES

Subpart D—Procedures for Testing Performance Characteristics of Methods for PM_{10}

53.40 General provisions.
53.41 Test conditions.
53.42 Generation of test atmospheres for wind tunnel tests.
53.43 Test procedures.

Subpart E—Procedures for Testing Physical (Design) and Performance Characteristics of Reference Methods and Class I Equivalent Methods for $PM_{2.5}$

53.50 General provisions.
53.51 Demonstration of compliance with design specifications and manufacturing and test requirements.
53.52 Leak check test.
53.53 Test for flow rate accuracy, regulation, measurement accuracy, and cut-off.
53.54 Test for proper sampler operation following power interruptions.
53.55 Test for effect of variations in power line voltage and ambient temperature.
53.56 Test for effect of variations in ambient pressure.
53.57 Test for filter temperature control during sampling and post-sampling periods.
53.58 Operational field precision and blank test.
53.59 Aerosol transport test for Class I equivalent method samplers.

TABLE E–1 TO SUBPART E—SUMMARY OF TEST REQUIREMENTS FOR REFERENCE AND CLASS I EQUIVALENT METHODS FOR $PM_{2.5}$

TABLE E–2 TO SUBPART E—SPECTRAL ENERGY DISTRIBUTION AND PERMITTED TOLERANCE FOR CONDUCTING RADIATIVE TESTS

FIGURE E–1 TO SUBPART E—DESIGNATION TESTING CHECKLIST

FIGURE E–2 TO SUBPART E—PRODUCT MANUFACTURING CHECKLIST

APPENDIX A TO SUBPART E—REFERENCES

Subpart F—Procedures for Testing Performance Characteristics of Class II Equivalent Methods for $PM_{2.5}$

53.60 General provisions.

53.61 Test conditions for $PM_{2.5}$ reference method equivalency.
53.62 Test procedure: Full wind tunnel test.
53.63 Test procedure: Wind tunnel inlet aspiration test.
53.64 Test procedure: Static fractionator test.
53.65 Test procedure: Loading test.
53.66 Test procedure: Volatility test.
TABLE F–1 TO SUBPART F—PERFORMANCE SPECIFICATIONS FOR $PM_{2.5}$ CLASS II EQUIVALENT SAMPLERS
TABLE F–2 TO SUBPART F—PARTICLE SIZES AND WIND SPEEDS FOR FULL WIND TUNNEL TEST, WIND TUNNEL INLET ASPIRATION TEST, AND STATIC CHAMBER TEST
TABLE F–3 TO SUBPART F—CRITICAL PARAMETERS OF IDEALIZED AMBIENT PARTICLE SIZE DISTRIBUTIONS
TABLE F–4 TO SUBPART F—ESTIMATED MASS CONCENTRATION MEASUREMENT OF $PM_{2.5}$ FOR IDEALIZED COARSE AEROSOL SIZE DISTRIBUTION
TABLE F–5 TO SUBPART F—ESTIMATED MASS CONCENTRATION MEASUREMENT OF $PM_{2.5}$ FOR IDEALIZED ''TYPICAL'' COARSE AEROSOL SIZE DISTRIBUTION
TABLE F–6 TO SUBPART F—ESTIMATED MASS CONCENTRATION MEASUREMENT OF $PM_{2.5}$ FOR IDEALIZED FINE AEROSOL SIZE DISTRIBUTION
FIGURE E–1 TO SUBPART F—DESIGNATION TESTING CHECKLIST
APPENDIX A TO SUBPART F—REFERENCES

AUTHORITY: Sec. 301(a) of the Clean Air Act (42 U.S.C. sec. 1857g(a)), as amended by sec. 15(c)(2) of Pub. L. 91–604, 84 Stat. 1713, unless otherwise noted.

SOURCE: 40 FR 7049, Feb. 18, 1975, unless otherwise noted.

Subpart A—General Provisions

SOURCE: 62 FR 38784, July 18, 1997, unless otherwise noted.

§ 53.1 Definitions.

Terms used but not defined in this part shall have the meaning given them by the Act.

Act means the Clean Air Act (42 U.S.C. 1857–1857l), as amended.

Administrator means the Administrator of the Environmental Protection Agency or the Administrator's authorized representative.

Agency means the Environmental Protection Agency.

Applicant means a person or entity who submits an application for a reference or equivalent method determination under § 53.4, or a person or entity who assumes the rights and obligations of an applicant under § 53.7. Applicant may include a manufacturer, distributor, supplier, or vendor.

Automated method or analyzer means a method for measuring concentrations of an ambient air pollutant in which sample collection (if necessary), analysis, and measurement are performed automatically by an instrument.

Candidate method means a method for measuring the concentration of an air pollutant in the ambient air for which an application for a reference method determination or an equivalent method determination is submitted in accordance with § 53.4, or a method tested at the initiative of the Administrator in accordance with § 53.7.

Class I equivalent method means an equivalent method for $PM_{2.5}$ which is based on a sampler that is very similar to the sampler specified for reference methods in appendix L of this part, with only minor deviations or modifications, as determined by EPA.

Class II equivalent method means an equivalent method for $PM_{2.5}$ that utilizes a $PM_{2.5}$ sampler in which an integrated $PM_{2.5}$ sample is obtained from the atmosphere by filtration and is subjected to a subsequent filter conditioning process followed by a gravimetric mass determination, but which is not a Class I equivalent method because of substantial deviations from the design specifications of the sampler specified for reference methods in appendix L of part 50 of this chapter, as determined by EPA.

Class III equivalent method means an equivalent method for $PM_{2.5}$ that has been determined by EPA not to be a Class I or Class II equivalent method. This fourth type of $PM_{2.5}$ method includes alternative equivalent method samplers and continuous analyzers, based on designs and measurement principles different from those specified for reference methods (e.g., a means for estimating aerosol mass concentration other than by conventional integrated filtration followed by equilibration and gravimetric analysis. These samplers (or monitors) are those deemed to be substantially different from reference method samplers and

are likely to use components and methods other than those specified for reference method samplers.

Collocated describes two or more air samplers, analyzers, or other instruments which sampler the ambient air that are operated silmultaneously while located side by side, separated by a distance that is large enough to preclude the air sampled by any of the devices from being affected by any of the other devices, but small enough so that all devices obtain identical or uniform ambient air samples that are equally representative of the general area in which the group of devices is located.

Equivalent method means a method for measuring the concentration of an air pollutant in the ambient air that has been designated as an equivalent method in accordance with this part; it does not include a method for which an equivalent method designation has been canceled in accordance with §53.11 or §53.16.

ISO 9001-registered facility means a manufacturing facility that is either:

(1) An International Organization for Standardization (ISO) 9001-registered manufacturing facility, registered to the ISO 9001 standard (by the Registrar Accreditation Board (RAB) of the American Society for Quality Control (ASQC) in the United States), with registration maintained continuously.

(2) A facility that can be demonstrated, on the basis of information submitted to the EPA, to be operated according to an EPA-approved and periodically audited quality system which meets, to the extent appropriate, the same general requirements as an ISO 9001-registered facility for the design and manufacture of designated reference and equivalent method samplers and monitors.

ISO-certified auditor means an auditor who is either certified by the Registrar Accreditation Board (in the United States) as being qualified to audit quality systems using the requirements of recognized standards such as ISO 9001, or who, based on information submitted to the EPA, meets the same general requirements as provided for ISO-certified auditors.

Manual method means a method for measuring concentrations of an ambient air pollutant in which sample collection, analysis, or measurement, or some combination therof, is performed manually. A method for PM_{10} or $PM_{2.5}$ which utilizes a sampler that requires manual preparation, loading, and weighing of filter samples is considered a manual method even though the sampler may be capable of automatically collecting a series of sequential samples.

$PM_{2.5}$ sampler means a device, associated with a manual method for measuring $PM_{2.5}$, designed to collect $PM_{2.5}$ from an ambient air sample, but lacking the ability to automatically analyze or measure the collected sample to determine the mass concentrations of $PM_{2.5}$ in the sampled air.

PM_{10} sampler means a device, associated with a manual method for measuring PM_{10}, designed to collect PM_{10} from an ambient air sample, but lacking the ability to automatically analyze or measure the collected sample to determine the mass concentrations of PM_{10} in the sampled air.

Reference method means a method of sampling and analyzing the ambient air for an air pollutant that is specified as a reference method in an appendix to part 50 of this chapter, or a method that has been designated as a reference method in accordance with this part; it does not include a method for which a reference method designation has been canceled in accordance with §53.11 or §53.16.

Sequential samples for PM samplers means two or more PM samples for sequential (but not necessarily contiguous) time periods that are collected automatically by the same sampler without the need for intervening operator service.

Test analyzer means an analyzer subjected to testing as part of a candidate method in accordance with subparts B, C, D, E, or F of this part, as applicable. Test sampler means a PM_{10} sampler or a $PM_{2.5}$ sampler subjected to testing as part of a candidate method in accordance with subparts C, D, E, or F of this part.

Ultimate purchaser means the first person or entity who purchases a reference method or an equivalent method for purposes other than resale.

§ 53.2 General requirements for a reference method determination.

The following general requirements for a reference method determination are summarized in table A–1 of this subpart.

(a) *Manual methods.* (1) For measuring sulfur dioxide (SO_2) and lead, Appendices A and G of part 50 of this chapter specify unique manual reference methods for those pollutants. Except as provided in § 53.16, other manual methods for SO_2 and lead will not be considered for reference method determinations under this part.

(2) A reference method for measuring PM_{10} must be a manual method that meets all requirements specified in appendix J of part 50 of this chapter and must include a PM_{10} sampler that has been shown in accordance with this part to meet all requirements specified in subparts A and D of this part.

(3) A reference method for measuring $PM_{2.5}$ must be a manual method that meets all requirements specified in appendix L of part 50 of this chapter and must include a $PM_{2.5}$ sampler that has been shown in accordance with this part to meet the applicable requirements specified in subparts A and E of this part. Further, reference method samplers must be manufactured in an ISO 9001-registered facility, as defined in § 53.1 and as set forth in § 53.51, and the Product Manufacturing Checklist set forth in subpart E of this part must be completed by an ISO-certified auditor, as defined in § 53.1, and submitted to EPA annually to retain a $PM_{2.5}$ reference method designation.

(b) *Automated methods.* An automated reference method for measuring carbon monoxide (CO), ozone (O_3), and nitrogen dioxide (NO_2) must utilize the measurement principle and calibration procedure specified in the appropriate appendix to part 50 of this chapter and must have been shown in accordance with this part to meet the requirements specified in subpart B of this part.

§ 53.3 General requirements for an equivalent method determination.

(a) *Manual methods.* A manual equivalent method must have been shown in accordance with this part to satisfy the applicable requirements specified in subpart C of this part. In addition, PM_{10} or $PM_{2.5}$ samplers associated with manual equivalent methods for PM_{10} or $PM_{2.5}$ must have been shown in accordance with this part to satisfy the following additional requirements:

(1) A PM_{10} sampler associated with a manual method for PM_{10} must satisfy the requirements of subpart D of this part.

(2) A $PM_{2.5}$ Class I equivalent method sampler must satisfy all requirements of subparts C and E of this part, which include appropriate demonstration that each and every deviation or modification from the reference method sampler specifications does not significantly alter the performance of the sampler.

(3) A $PM_{2.5}$ Class II equivalent method sampler must satisfy the applicable requirements of subparts C, E, and F of this part.

(4) Requirements for $PM_{2.5}$ Class III equivalent method samplers are not provided in this part because of the wide range of non-filter-based measurement technologies that could be applied and the likelihood that these requirements will have to be specifically adapted for each such type of technology. Specific requirements will be developed as needed and may include selected requirements from subparts C, E, or F of this part or other requirements not contained in this part.

(5) All designated equivalent methods for $PM_{2.5}$ must be manufactured in an ISO 9001-registered facility, as defined in § 53.1 and as set forth in § 53.51, and the Product Manufacturing Checklist set forth in subpart E of this part must be completed by an ISO-certified auditor, as defined in § 53.1, and submitted to EPA annually to retain a $PM_{2.5}$ equivalent method designation.

(b) *Automated methods.* (1) Automated equivalent methods for pollutants other than $PM_{2.5}$ or PM_{10} must have been shown in accordance with this part to satisfy the requirements specified in subparts B and C of this part.

(2) Automated equivalent methods for PM_{10} must have been shown in accordance with this part to satisfy the requirements of subparts C and D of this part.

(3) Requirements for $PM_{2.5}$ Class III automated equivalent methods for

$PM_{2.5}$ are not provided in this part because of the wide range of non-filter-based measurement technologies that could be applied and the likelihood that these requirements will have to be specifically adapted for each such type of technology. Specific requirements will be developed as needed and may include selected requirements from subparts C, E, or F of this part or other requirements not contained in this part.

(4) All designated equivalent methods for $PM_{2.5}$ must be manufactured in an ISO 9001-registered facility, as set forth in subpart E of this part, and the Product Manufacturing Checklist set forth in subpart E of this part must be completed by an ISO-certified auditor and submitted to EPA annually to retain a $PM_{2.5}$ equivalent method designation.

[62 FR 38784, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§53.4 Applications for reference or equivalent method determinations.

(a) Applications for reference or equivalent method determinations shall be submitted in duplicate to: Director, National Exposure Research Laboratory, Department E (MD-77B), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

(b) Each application shall be signed by an authorized representative of the applicant, shall be marked in accordance with §53.15 (if applicable), and shall contain the following:

(1) A clear identification of the candidate method, which will distinguish it from all other methods such that the method may be referred to unambiguously. This identification must consist of a unique series of descriptors such as title, identification number, analyte, measurement principle, manufacturer, brand, model, etc., as necessary to distinguish the method from all other methods or method variations, both within and outside the applicant's organization.

(2) A detailed description of the candidate method, including but not limited to the following: The measurement principle, manufacturer, name, model number and other forms of identification, a list of the significant components, schematic diagrams, design drawings, and a detailed description of the apparatus and measurement procedures. Drawings and descriptions pertaining to candidate methods or samplers for $PM_{2.5}$ must meet all applicable requirements in reference 1 of appendix A of this subpart, using appropriate graphical, nomenclature, and mathematical conventions such as those specified in references 3 and 4 of appendix A of this subpart.

(3) A copy of a comprehensive operation or instruction manual providing a complete and detailed description of the operational, maintenance, and calibration procedures prescribed for field use of the candidate method and all instruments utilized as part of that method (under §53.9(a)).

(i) As a minimum this manual shall include:

(A) Description of the method and associated instruments.

(B) Explanation of all indicators, information displays, and controls.

(C) Complete setup and installation instructions, including any additional materials or supplies required.

(D) Details of all initial or startup checks or acceptance tests and any auxiliary equipment required.

(E) Complete operational instructions.

(F) Calibration procedures and required calibration equipment and standards.

(G) Instructions for verification of correct or proper operation.

(H) Trouble-shooting guidance and suggested corrective actions for abnormal operation.

(I) Required or recommended routine, periodic, and preventative maintenance and maintenance schedules.

(J) Any calculations required to derive final concentration measurements.

(K) Appropriate references to appendix L of part 50 of this chapter; reference 6 of appendix A of this subpart; and any other pertinent guidelines.

(ii) The manual shall also include adequate warning of potential safety hazards that may result from normal use and/or malfunction of the method and a description of necessary safety precautions. (See §53.9(b).) However, the previous requirement shall not be interpreted to constitute or imply any warranty of safety of the method by

EPA. For samplers and automated methods, the manual shall include a clear description of all procedures pertaining to installation, operation, preventive maintenance, and troubleshooting and shall also include parts identification diagrams. The manual may be used to satisfy the requirements of paragraphs (b)(1) and (b)(2) of this section to the extent that it includes information necessary to meet those requirements.

(4) A statement that the candidate method has been tested in accordance with the procedures described in subparts B, C, D, E, and/or F of this part, as applicable.

(5) Descriptions of test facilities and test configurations, test data, records, calculations, and test results as specified in subparts B, C, D, E, and/or F of this part, as applicable. Data must be sufficiently detailed to meet appropriate principles described in paragraphs 4 through 6 of reference 2 of appendix A of this subpart, part b, sections 3.3.1 (paragraph 1) and 3.5.1 (paragraphs 2 and 3) and in paragraphs 1 through 3 of reference 5 (section 4.8, Records) of appendix A of this subpart. Salient requirements from these references include the following:

(i) The applicant shall maintain and include records of all relevant measuring equipment, including the make, type, and serial number or other identification, and most recent calibration with identification of the measurement standard or standards used and their National Institute of Standards and Technology (NIST) traceability. These records shall demonstrate the measurement capability of each item of measuring equipment used for the application and include a description and justification (if needed) of the measurement setup or configuration in which it was used for the tests. The calibration results shall be recorded and identified in sufficient detail so that the traceability of all measurements can be determined and any measurement could be reproduced under conditions close to the original conditions, if necessary, to resolve any anomalies.

(ii) Test data shall be collected according to the standards of good practice and by qualified personnel. Test anomalies or irregularities shall be documented and explained or justified. The impact and significance of the deviation on test results and conclusions shall be determined. Data collected shall correspond directly to the specified test requirement and be labeled and identified clearly so that results can be verified and evaluated against the test requirement. Calculations or data manipulations must be explained in detail so that they can be verified.

(6) A statement that the method, analyzer, or sampler tested in accordance with this part is representative of the candidate method described in the application.

(c) For candidate automated methods and candidate manual methods for PM_{10} and $PM_{2.5}$, the application shall also contain the following:

(1) A detailed description of the quality system that will be utilized, if the candidate method is designated as a reference or equivalent method, to ensure that all analyzers or samplers offered for sale under that designation will have essentially the same performance characteristics as the analyzer(s) or samplers tested in accordance with this part. In addition, the quality system requirements for candidate methods for $PM_{2.5}$ must be described in sufficient detail, based on the elements described in section 4 of reference 1 (Quality System Requirements) of appendix A of this subpart. Further clarification is provided in the following sections of reference 2 of appendix A of this subpart: part A (Management Systems), sections 2.2 (Quality System and Description), 2.3 (Personnel Qualification and Training), 2.4 (Procurement of Items and Services), 2.5 (Documents and Records), and 2.7 (Planning); part B (Collection and Evaluation of Environmental Data), sections 3.1 (Planning and Scoping), 3.2 (Design of Data Collection Operations), and 3.5 (Assessment and Verification of Data Usability); and part C (Operation of Environmental Technology), sections 4.1 (Planning), 4.2 (Design of Systems), and 4.4 (Operation of Systems).

(2) A description of the durability characteristics of such analyzers or samplers (see § 53.9(c)). For methods for $PM_{2.5}$, the warranty program must ensure that the required specifications (see table A–1 of this subpart) will be

met throughout the warranty period and that the applicant accepts responsibility and liability for ensuring this conformance or for resolving any nonconformities, including all necessary components of the system, regardless of the original manufacturer. The warranty program must be described in sufficient detail to meet appropriate provisions of the ANSI/ASQC and ISO 9001 standards (references 1 and 2 in appendix A of this subpart) for controlling conformance and resolving nonconformance, particularly sections 4.12, 4.13, and 4.14 of reference 1 in appendix A of this subpart.

(i) Section 4.12 in appendix A of this subpart requires the manufacturer to establish and maintain a system of procedures for identifying and maintaining the identification of inspection and test status throughout all phases of manufacturing to ensure that only instruments that have passed the required inspections and tests are released for sale.

(ii) Section 4.13 in appendix A of this subpart requires documented procedures for control of nonconforming product, including review and acceptable alternatives for disposition; section 4.14 in appendix A of this subpart requires documented procedures for implementing corrective (4.14.2) and preventive (4.14.3) action to eliminate the causes of actual or potential nonconformities. In particular, section 4.14.3 requires that potential causes of nonconformities be eliminated by using information such as service reports and customer complaints to eliminate potential causes of nonconformities.

(d) For candidate reference or equivalent methods for $PM_{2.5}$, the applicant shall provide to EPA for test purposes one sampler or analyzer that is representative of the sampler or analyzer associated with the candidate method. The sampler or analyzer shall be shipped FOB destination to Department E, (MD-77B), U.S. EPA, 79 T.W. Alexander Drive, Research Triangle Park, NC 27711, scheduled to arrive concurrent with or within 30 days of the arrival of the other application materials. This analyzer or sampler may be subjected to various tests that EPA determines to be necessary or appropriate under §53.5(f), and such tests may include special tests not described in this part. If the instrument submitted under this paragraph malfunctions, becomes inoperative, or fails to perform as represented in the application before the necessary EPA testing is completed, the applicant shall be afforded an opportunity to repair or replace the device at no cost to EPA. Upon completion of EPA testing, the analyzer or sampler submitted under this paragraph shall be repacked by EPA for return shipment to the applicant, using the same packing materials used for shipping the instrument to EPA unless alternative packing is provided by the applicant. Arrangements for, and the cost of, return shipment shall be the responsibility of the applicant. EPA does not warrant or assume any liability for the condition of the analyzer or sampler upon return to the applicant.

§53.5 Processing of applications.

After receiving an application for a reference or equivalent method determination, the Administrator will publish notice of the application in the FEDERAL REGISTER and, within 120 calendar days after receipt of the application, take one or more of the following actions:

(a) Send notice to the applicant, in accordance with §53.8, that the candidate method has been determined to be a reference or equivalent method.

(b) Send notice to the applicant that the application has been rejected, including a statement of reasons for rejection.

(c) Send notice to the applicant that additional information must be submitted before a determination can be made and specify the additional information that is needed (in such cases, the 120-day period shall commence upon receipt of the additional information).

(d) Send notice to the applicant that additional test data must be submitted and specify what tests are necessary and how the tests shall be interpreted (in such cases, the 120-day period shall commence upon receipt of the additional test data).

(e) Send notice to the applicant that the application has been found to be

substantially deficient or incomplete and cannot be processed until additional information is submitted to complete the application and specify the general areas of substantial deficiency.

(f) Send notice to the applicant that additional tests will be conducted by the Administrator, specifying the nature of and reasons for the additional tests and the estimated time required (in such cases, the 120-day period shall commence 1 calendar day after the additional tests have been completed).

§ 53.6 Right to witness conduct of tests.

(a) Submission of an application for a reference or equivalent method determination shall constitute consent for the Administrator or the Administrator's authorized representative, upon presentation of appropriate credentials, to witness or observe any tests required by this part in connection with the application or in connection with any modification or intended modification of the method by the applicant.

(b) The applicant shall have the right to witness or observe any test conducted by the Administrator in connection with the application or in connection with any modification or intended modification of the method by the applicant.

(c) Any tests by either party that are to be witnessed or observed by the other party shall be conducted at a time and place mutually agreeable to both parties.

§ 53.7 Testing of methods at the initiative of the Administrator.

(a) In the absence of an application for a reference or equivalent method determination, the Administrator may conduct the tests required by this part for such a determination, may compile such other information as may be necessary in the judgment of the Administrator to make such a determination, and on the basis of the tests and information may determine that a method satisfies applicable requirements of this part.

(b) In the absence of an application requesting the Administrator to consider revising an appendix to part 50 of this chapter in accordance with § 53.16, the Administrator may conduct such tests and compile such information as may be necessary in the Administrator's judgment to make a determination under § 53.16(d) and on the basis of the tests and information make such a determination.

(c) If a method tested in accordance with this section is designated as a reference or equivalent method in accordance with § 53.8 or is specified or designated as a reference method in accordance with § 53.16, any person or entity who offers the method for sale as a reference or equivalent method thereafter shall assume the rights and obligations of an applicant for purposes of this part, with the exception of those pertaining to submission and processing of applications.

§ 53.8 Designation of reference and equivalent methods.

(a) A candidate method determined by the Administrator to satisfy the applicable requirements of this part shall be designated as a reference method or equivalent method (as applicable), and a notice of the designation shall be submitted for publication in the FEDERAL REGISTER not later than 15 days after the determination is made.

(b) A notice indicating that the method has been determined to be a reference method or an equivalent method shall be sent to the applicant. This notice shall constitute proof of the determination until a notice of designation is published in accordance with paragraph (a) of this section.

(c) The Administrator will maintain a current list of methods designated as reference or equivalent methods in accordance with this part and will send a copy of the list to any person or group upon request. A copy of the list will be available for inspection or copying at EPA Regional Offices.

§ 53.9 Conditions of designation.

Designation of a candidate method as a reference method or equivalent method shall be conditioned to the applicant's compliance with the following requirements. Failure to comply with any of the requirements shall constitute a ground for cancellation of the designation in accordance with § 53.11.

(a) Any method offered for sale as a reference or equivalent method shall be accompanied by a copy of the manual referred to in §53.4(b)(3) when delivered to any ultimate purchaser.

(b) Any method offered for sale as a reference or equivalent method shall generate no unreasonable hazard to operators or to the environment during normal use or when malfunctioning.

(c) Any analyzer, PM_{10} sampler, or $PM_{2.5}$ sampler offered for sale as part of a reference or equivalent method shall function within the limits of the performance specifications referred to in §53.20(a), §53.30(a), §53.50, or §53.60, as applicable, for at least 1 year after delivery and acceptance when maintained and operated in accordance with the manual referred to in §53.4(b)(3).

(d) Any analyzer, PM_{10} sampler, or $PM_{2.5}$ sampler offered for sale as a reference or equivalent method shall bear a prominent, permanently affixed label or sticker indicating that the analyzer or sampler has been designated by EPA as a reference method or as an equivalent method (as applicable) in accordance with this part and displaying any designated method identification number that may be assigned by EPA.

(e) If an analyzer is offered for sale as a reference or equivalent method and has one or more selectable ranges, the label or sticker required by paragraph (d) of this section shall be placed in close proximity to the range selector and shall indicate clearly which range or ranges have been designated as parts of the reference or equivalent method.

(f) An applicant who offers analyzers, PM_{10} samplers, or $PM_{2.5}$ samplers for sale as reference or equivalent methods shall maintain an accurate and current list of the names and mailing addresses of all ultimate purchasers of such analyzers or samplers. For a period of 7 years after publication of the reference or equivalent method designation applicable to such an analyzer or sampler, the applicant shall notify all ultimate purchasers of the analyzer or $PM_{2.5}$ or PM_{10} sampler within 30 days if the designation has been canceled in accordance with §53.11 or §53.16 or if adjustment of the analyzer or sampler is necessary under §53.11(b).

(g) If an applicant modifies an analyzer, PM_{10} sampler, or $PM_{2.5}$ sampler that has been designated as a reference or equivalent method, the applicant shall not sell the modified analyzer or sampler as a reference or equivalent method nor attach a label or sticker to the modified analyzer or sampler under paragraph (d) or (e) of this section until the applicant has received notice under §53.14(c) that the existing designation or a new designation will apply to the modified analyzer, PM_{10} sampler, or $PM_{2.5}$ sampler or has applied for and received notice under §53.8(b) of a new reference or equivalent method determination for the modified analyzer or sampler.

(h) An applicant who has offered $PM_{2.5}$ samplers or analyzers for sale as part of a reference or equivalent method may continue to do so only so long as the facility in which the samplers or analyzers are manufactured continues to be an ISO 9001-registered facility, as set forth in subpart E of this part. In the event that the ISO 9001 registration for the facility is withdrawn, suspended, or otherwise becomes inapplicable, either permanently or for some specified time interval, such that the facility is no longer an ISO 9001-registered facility, the applicant shall notify EPA within 30 days of the date the facility becomes other than an ISO 9001-registered facility, and upon such notification, EPA shall issue a preliminary finding and notification of possible cancellation of the reference or equivalent method designation under §53.11.

(i) An applicant who has offered $PM_{2.5}$ samplers or analyzers for sale as part of a reference or equivalent method may continue to do so only so long as updates of the Product Manufacturing Checklist set forth in subpart E of this part are submitted annually. In the event that an annual Checklist update is not received by EPA within 12 months of the date of the last such submitted Checklist or Checklist update, EPA shall notify the applicant within 30 days that the Checklist update has not been received and shall, within 30 days from the issuance of such notification, issue a preliminary finding and notification of possible cancellation of the reference or equivalent method designation under §53.11.

§ 53.10 Appeal from rejection of application.

Any applicant whose application for a reference or equivalent method determination has been rejected may appeal the Administrator's decision by taking one or more of the following actions:

(a) The applicant may submit new or additional information in support of the application.

(b) The applicant may request that the Administrator reconsider the data and information already submitted.

(c) The applicant may request that any test conducted by the Administrator that was a material factor in the decision to reject the application be repeated.

§ 53.11 Cancellation of reference or equivalent method designation.

(a) *Preliminary finding.* If the Administrator makes a preliminary finding on the basis of any available information that a representative sample of a method designated as a reference or equivalent method and offered for sale as such does not fully satisfy the requirements of this part or that there is any violation of the requirements set forth in § 53.9, the Administrator may initiate proceedings to cancel the designation in accordance with the following procedures.

(b) *Notification and opportunity to demonstrate or achieve compliance.* (1) After making a preliminary finding in accordance with paragraph (a) of this section, the Administrator will send notice of the preliminary finding to the applicant, together with a statement of the facts and reasons on which the preliminary finding is based, and will publish notice of the preliminary finding in the FEDERAL REGISTER.

(2) The applicant will be afforded an opportunity to demonstrate or to achieve compliance with the requirements of this part within 60 days after publication of notice in accordance with paragraph (b)(1) of this section or within such further period as the Administrator may allow, by demonstrating to the satisfaction of the Administrator that the method in question satisfies the requirements of this part, by commencing a program to make any adjustments that are necessary to bring the method into compliance, or by taking such action as may be necessary to cure any violation of the requirements of § 53.9. If adjustments are necessary to bring the method into compliance, all such adjustments shall be made within a reasonable time as determined by the Administrator. If the applicant demonstrates or achieves compliance in accordance with this paragraph (b)(2), the Administrator will publish notice of such demonstration or achievement in the FEDERAL REGISTER.

(c) *Request for hearing.* Within 60 days after publication of a notice in accordance with paragraph (b)(1) of this section, the applicant or any interested person may request a hearing as provided in § 53.12.

(d) *Notice of cancellation.* If, at the end of the period referred to in paragraph (b)(2) of this section, the Administrator determines that the reference or equivalent method designation should be canceled, a notice of cancellation will be published in the FEDERAL REGISTER and the designation will be deleted from the list maintained under § 53.8(c). If a hearing has been requested and granted in accordance with § 53.12, action under this paragraph (d) will be taken only after completion of proceedings (including any administrative review) conducted in accordance with § 53.13 and only if the decision of the Administrator reached in such proceedings is that the designation in question should be canceled.

§ 53.12 Request for hearing on cancellation.

Within 60 days after publication of a notice in accordance with § 53.11(b)(1), the applicant or any interested person may request a hearing on the Administrator's action. If, after reviewing the request and supporting data, the Administrator finds that the request raises a substantial issue of fact, a hearing will be granted in accordance with § 53.13 with respect to such issue. The request shall be in writing, signed by an authorized representative of the applicant or interested person, and shall include a statement specifying:

(a) Any objections to the Administrator's action.

(b) Data or other information in support of such objections.

§53.13 Hearings.

(a)(1) After granting a request for a hearing under §53.12, the Administrator will designate a presiding officer for the hearing.

(2) If a time and place for the hearing have not been fixed by the Administrator, the hearing will be held as soon as practicable at a time and place fixed by the presiding officer, except that the hearing shall in no case be held sooner than 30 days after publication of a notice of hearing in the FEDERAL REGISTER.

(3) For purposes of the hearing, the parties shall include EPA, the applicant or interested person(s) who requested the hearing, and any person permitted to intervene in accordance with paragraph (c) of this section.

(4) The Deputy General Counsel or the Deputy General Counsel's representative will represent EPA in any hearing under this section.

(5) Each party other than EPA may be represented by counsel or by any other duly authorized representative.

(b)(1) Upon appointment, the presiding officer will establish a hearing file. The file shall contain copies of the notices issued by the Administrator pursuant to §53.11(b)(1), together with any accompanying material, the request for a hearing and supporting data submitted therewith, the notice of hearing published in accordance with paragraph (a)(2) of this section, and correspondence and other material data relevant to the hearing.

(2) The hearing file shall be available for inspection by the parties or their representatives at the office of the presiding officer, except to the extent that it contains information identified in accordance with §53.15.

(c) The presiding officer may permit any interested person to intervene in the hearing upon such a showing of interest as the presiding officer may require; provided that permission to intervene may be denied in the interest of expediting the hearing where it appears that the interests of the person seeking to intervene will be adequately represented by another party (or by other parties), including EPA.

(d)(1) The presiding officer, upon the request of any party or at the officer's discretion, may arrange for a prehearing conference at a time and place specified by the officer to consider the following:

(i) Simplification of the issues.

(ii) Stipulations, admissions of fact, and the introduction of documents.

(iii) Limitation of the number of expert witnesses.

(iv) Possibility of agreement on disposing of all or any of the issues in dispute.

(v) Such other matters as may aid in the disposition of the hearing, including such additional tests as may be agreed upon by the parties.

(2) The results of the conference shall be reduced to writing by the presiding officer and made part of the record.

(e)(1) Hearings shall be conducted by the presiding officer in an informal but orderly and expeditious manner. The parties may offer oral or written evidence, subject to exclusion by the presiding officer of irrelevant, immaterial, or repetitious evidence.

(2) Witnesses shall be placed under oath.

(3) Any witness may be examined or cross-examined by the presiding officer, the parties, or their representatives. The presiding officer may, at his/her discretion, limit cross-examination to relevant and material issues.

(4) Hearings shall be reported verbatim. Copies of transcripts of proceedings may be purchased from the reporter.

(5) All written statements, charts, tabulations, and data offered in evidence at the hearing shall, upon a showing satisfactory to the presiding officer of their authenticity, relevancy, and materiality, be received in evidence and shall constitute part of the record.

(6) Oral argument shall be permitted. The presiding officer may limit oral presentations to relevant and material issues and designate the amount of time allowed for oral argument.

(f)(1) The presiding officer shall make an initial decision which shall include written findings and conclusions and the reasons therefore on all the material issues of fact, law, or discretion presented on the record. The findings, conclusions, and written decision shall be provided to the parties and made part of the record. The initial decision

shall become the decision of the Administrator without further proceedings unless there is an appeal to, or review on motion of, the Administrator within 30 calendar days after the initial decision is filed.

(2) On appeal from or review of the initial decision, the Administrator will have all the powers consistent with making the initial decision, including the discretion to require or allow briefs, oral argument, the taking of additional evidence or the remanding to the presiding officer for additional proceedings. The decision by the Administrator will include written findings and conclusions and the reasons or basis therefore on all the material issues of fact, law, or discretion presented on the appeal or considered in the review.

§ 53.14 Modification of a reference or equivalent method.

(a) An applicant who offers a method for sale as a reference or equivalent method shall report to the EPA Administrator prior to implementation any intended modification of the method, including but not limited to modifications of design or construction or of operational and maintenance procedures specified in the operation manual (see § 53.9(g)). The report shall be signed by an authorized representative of the applicant, marked in accordance with § 53.15 (if applicable), and addressed as specified in § 53.4(a).

(b) A report submitted under paragraph (a) of this section shall include:

(1) A description, in such detail as may be appropriate, of the intended modification.

(2) A brief statement of the applicant's belief that the modification will, will not, or may affect the performance characteristics of the method.

(3) A brief statement of the probable effect if the applicant believes the modification will or may affect the performance characteristics of the method.

(4) Such further information, including test data, as may be necessary to explain and support any statement required by paragraphs (b)(2) and (b)(3) of this section.

(c) Within 30 calendar days after receiving a report under paragraph (a) of this section, the Administrator will take one or more of the following actions:

(1) Notify the applicant that the designation will continue to apply to the method if the modification is implemented.

(2) Send notice to the applicant that a new designation will apply to the method (as modified) if the modification is implemented, submit notice of the determination for publication in the FEDERAL REGISTER, and revise or supplement the list referred to in § 53.8(c) to reflect the determination.

(3) Send notice to the applicant that the designation will not apply to the method (as modified) if the modification is implemented and submit notice of the determination for publication in the FEDERAL REGISTER.

(4) Send notice to the applicant that additional information must be submitted before a determination can be made and specify the additional information that is needed (in such cases, the 30-day period shall commence upon receipt of the additional information).

(5) Send notice to the applicant that additional tests are necessary and specify what tests are necessary and how they shall be interpreted (in such cases, the 30-day period shall commence upon receipt of the additional test data).

(6) Send notice to the applicant that additional tests will be conducted by the Administrator and specify the reasons for and the nature of the additional tests (in such cases, the 30-day period shall commence 1 calendar day after the additional tests are completed).

(d) An applicant who has received a notice under paragraph (c)(3) of this section may appeal the Administrator's action as follows:

(1) The applicant may submit new or additional information pertinent to the intended modification.

(2) The applicant may request the Administrator to reconsider data and information already submitted.

(3) The applicant may request that the Administrator repeat any test conducted that was a material factor in the Administrator's determination. A representative of the applicant may be present during the performance of any such retest.

§53.15 Trade secrets and confidential or privileged information.

Any information submitted under this part that is claimed to be a trade secret or confidential or privileged information shall be marked or otherwise clearly identified as such in the submittal. Information so identified will be treated in accordance with part 2 of this chapter (concerning public information).

§53.16 Supersession of reference methods.

(a) This section prescribes procedures and criteria applicable to requests that the Administrator specify a new reference method, or a new measurement principle and calibration procedure on which reference methods shall be based, by revision of the appropriate appendix to part 50 of this chapter. Such action will ordinarily be taken only if the Administrator determines that a candidate method or a variation thereof is substantially superior to the existing reference method(s).

(b) In exercising discretion under this section, the Administrator will consider:

(1) The benefits, in terms of the requirements and purposes of the Act, that would result from specifying a new reference method or a new measurement principle and calibration procedure.

(2) The potential economic consequences of such action for State and local control agencies.

(3) Any disruption of State and local air quality monitoring programs that might result from such action.

(c) An applicant who wishes the Administrator to consider revising an appendix to part 50 of this chapter on the ground that the applicant's candidate method is substantially superior to the existing reference method(s) shall submit an application for a reference or equivalent method determination in accordance with §53.4 and shall indicate therein that such consideration is desired. The application shall include, in addition to the information required by §53.4, data and any other information supporting the applicant's claim that the candidate method is substantially superior to the existing reference method(s).

(d) After receiving an application under paragraph (c) of this section, the Administrator will publish notice of its receipt in the FEDERAL REGISTER and, within 120 calendar days after receipt of the application, take one of the following actions:

(1) Determine that it is appropriate to propose a revision of the appendix to part 50 of this chapter in question and send notice of the determination to the applicant.

(2) Determine that it is inappropriate to propose a revision of the appendix to part 50 of this chapter in question, determine whether the candidate method is a reference or equivalent method, and send notice of the determinations, including a statement of reasons for the determination not to propose a revision, to the applicant.

(3) Send notice to the applicant that additional information must be submitted before a determination can be made and specify the additional information that is needed (in such cases, the 120-day period shall commence upon receipt of the additional information).

(4) Send notice to the applicant that additional tests are necessary, specifying what tests are necessary and how the test shall be interpreted (in such cases, the 120-day period shall commence upon receipt of the additional test data).

(5) Send notice to the applicant that additional tests will be conducted by the Administrator, specifying the nature of and reasons for the additional tests and the estimated time required (in such cases, the 120-day period shall commence 1 calendar day after the additional tests have been completed).

(e)(1)(i) After making a determination under paragraph (d)(1) of this section, the Administrator will publish a notice of proposed rulemaking in the FEDERAL REGISTER. The notice of proposed rulemaking will indicate that the Administrator proposes:

(A) To revise the appendix to part 50 of this chapter in question.

(B) Where the appendix specifies a measurement principle and calibration procedure, to cancel reference method designations based on the appendix.

(C) To cancel equivalent method designations based on the existing reference method(s).

(ii) The notice of proposed rulemaking will include the terms or substance of the proposed revision, will indicate what period(s) of time the Administrator proposes to allow for replacement of existing methods under section 2.3 of appendix C to part 58 of this chapter, and will solicit public comments on the proposal with particular reference to the considerations set forth in paragraphs (a) and (b) of this section.

(2)(i) If, after consideration of comments received, the Administrator determines that the appendix to part 50 in question should be revised, the Administrator will, by publication in the FEDERAL REGISTER:

(A) Promulgate the proposed revision, with such modifications as may be appropriate in view of comments received.

(B) Where the appendix to part 50 (prior to revision) specifies a measurement principle and calibration procedure, cancel reference method designations based on the appendix.

(C) Cancel equivalent method designations based on the existing reference method(s).

(D) Specify the period(s) that will be allowed for replacement of existing methods under section 2.3 of appendix C to part 58 of this chapter, with such modifications from the proposed period(s) as may be appropriate in view of comments received.

(3) Canceled designations will be deleted from the list maintained under § 53.8(c). The requirements and procedures for cancellation set forth in § 53.11 shall be inapplicable to cancellation of reference or equivalent method designations under this section.

(4) If the appendix to part 50 of this chapter in question is revised to specify a new measurement principle and calibration procedure on which the applicant's candidate method is based, the Administrator will take appropriate action under § 53.5 to determine whether the candidate method is a reference method.

(5) Upon taking action under paragraph (e)(2) of this section, the Administrator will send notice of the action to all applicants for whose methods reference and equivalent method designations are canceled by such action.

(f) An applicant who has received notice of a determination under paragraph (d)(2) of this section may appeal the determination by taking one or more of the following actions:

(1) The applicant may submit new or additional information in support of the application.

(2) The applicant may request that the Administrator reconsider the data and information already submitted.

(3) The applicant may request that any test conducted by the Administrator that was a material factor in making the determination be repeated.

TABLE A–1 TO SUBPART A—SUMMARY OF APPLICABLE REQUIREMENTS FOR REFERENCE AND EQUIVALENT METHODS FOR AIR MONITORING OF CRITERIA POLLUTANTS

Pollutant	Ref. or Equivalent	Manual or Automated	Applicable Part 50 Appendix	Applicable Subparts of Part 53					
				A	B	C	D	E	F
SO_2	Reference	Manual	A						
	Manual		✔		✔				
	Equivalent	Automated		✔	✔	✔			
CO	Reference	Automated	C	✔	✔				
	Manual		✔		✔				
	Equivalent	Automated		✔	✔	✔			
O_3	Reference	Automated	D	✔	✔				
	Manual		✔		✔				
	Equivalent	Automated		✔	✔	✔			
NO_2	Reference	Automated	F	✔	✔				
	Manual		✔		✔				
	Equivalent	Automated		✔	✔	✔			
Pb	Reference	Manual	G						
	Equivalent	Manual		✔		✔			
PM_{10}	Reference	Manual	J	✔			✔		
	Manual		✔		✔	✔			
	Equivalent	Automated		✔		✔	✔		

Pollutant	Ref. or Equivalent	Manual or Automated	Applicable Part 50 Appendix	Applicable Subparts of Part 53					
				A	B	C	D	E	F
$PM_{2.5}$	Reference	Manual	L	✔				✔	
	Equivalent Class I	Manual	L	✔		✔		✔	
	Equivalent Class II	Manual	L	✔		✔		✔	✔
	Equivalent Class III	Manual or Automated		✔		✔[1]		✔[1]	✔[1]

[1] NOTE: Because of the wide variety of potential devices possible, the specific requirements applicable to a Class III candidate equivalent method for $PM_{2.5}$ are not specified explicitly in this part but, instead, shall be determined on a case-by-case basis for each such candidiate method.

APPENDIX A TO SUBPART A—REFERENCES

(1) American National Standard Quality Systems-Model for Quality Assurance in Design, Development, Production, Installation, and Servicing, ANSI/ISO/ASQC Q9001-1994. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

(2) American National Standard—Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, ANSI/ASQC E41994. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

(3) Dimensioning and Tolerancing, ASME Y14.5M-1994. Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

(4) Mathematical Definition of Dimensioning and Tolerancing Principles, ASME Y14.5.1M-1994. Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

(5) ISO 10012, Quality Assurance Requirements for Measuring Equipment-Part 1: Meteorological confirmation system for measuring equipment):1992(E). Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

(6) Copies of section 2.12 of the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Specific Methods, EPA/600/R-94/038b, are available from Department E (MD-77B), U.S. EPA, Research Triangle Park, NC 27711.

Subpart B—Procedures for Testing Performance Characteristics of Automated Methods SO_2, CO, O_3, and NO_2

§ 53.20 General provisions.

(a) The test procedures given in this subpart shall be used to test the performance of candidate automated methods against the performance specifications given in table B–1. A test analyzer representative of the candidate automated method must exhibit performance better than, or equal to, the specified value for each such specification (except Range) to satisfy the requirements of this subpart. Except as provided in paragraph (b) of this section, the range of the candidate method must be the range specified in table B–1 to satisfy the requirements of this subpart.

(b) For a candidate method having more than one selectable range, one range must be that specified in table B–1 and a test analyzer representative of the method must pass the tests required by this subpart while operated in that range. The tests may be repeated for a broader range (i.e., one extending to higher concentrations) than that specified in table B–1 provided that the range does not extend to concentrations more than two times the upper range limit specified in table B–1. If the application is for a reference method determination, the tests may be repeated for a narrower range (one extending to lower concentrations) than that specified in table B–1.

If the tests are conducted or passed only for the specified range, any reference or equivalent method determination with respect to the method will be limited to that range. If the tests are passed for both the specified range and a broader range (or ranges), any such determination will include the broader range(s) as well as the specified range, provided that the tests required by subpart C of this part (if applicable) are met for the broader range(s). If the tests are passed for both the specified range and a narrower range, a reference method determination for the method will include the narrower range as well as the specified range. Appropriate test data shall be submitted for each range sought to be included in a reference or equivalent

method determination under this paragraph (b).

(c) For each performance specification (except Range), the test procedure shall be initially repeated seven (7) times to yield 7 test results. Each result shall be compared with the corresponding specification in table B–1; a value higher than or outside that specified constitutes a failure. These 7 results for each parameter shall be interpreted as follows:

(1) Zero (0) failures: Candidate method passes the performance parameter.

(2) Three (3) or more failures: Candidate method fails the performance parameter.

(3) One (1) or two (2) failures: Repeat the test procedures for the parameter eight (8) additional times yielding a total of fifteen (15) test results. The combined total of 15 test results shall then be interpreted as follows:

(i) One (1) or two (2) failures: Candidate method passes the performance parameter.

(ii) Three (3) or more failures: Candidate method fails the performance parameter.

TABLE B–1—PERFORMANCE SPECIFICATIONS FOR AUTOMATED METHODS

Performance parameter	Units [1]	Sulfur dioxide	Photochemical oxidants	Carbon monoxide	Nitrogen dioxide	Definitions and test procedures
1. Range	Parts per million	0–0.5	0–0.5	0–50	0–0.5	Sec. 53.23(a).
2. Noise	do	.005	.005	.50	.005	Sec. 53.23(b).
3. Lower detectable limit	Parts per million	.01	.01	1.0	.01	Sec. 53.23(c).
4. Interference equivalent						Sec. 53.23(d).
Each interferant	Parts per million	±.02	±.02	±1.0	±0.02	
Total interferant	do	.06	.06	1.5	.04	
5. Zero drift, 12 and 24 hour	do	±.02	±.02	±1.0	±.02	Sec. 52.23(e).
6. Span drift, 24 hour						Do.
20 percent of upper range limit	Percent	±20.0	±20.0	±10.0	±20.0	
80 percent of upper range limit	do	±5.0	±5.0	±2.5	±5.0	
7. Lag time	Minutes	20	20	10	20	Do.
8. Rise time	do	15	15	5	15	Do.
9. Fall time	do	15	15	5	15	Do.
10. Precision						Do.
20 percent of upper range limit	Parts per million	.01	.01	.5	.02	
80 percent of upper range limit	do	.015	.01	.5	.03	

[1] To convert from parts per million to μ g/m^3 at 25 °C and 760 mm Hg, multiply by M/0.02447, where *M* is the molecular weight of the gas.

(d) The tests for *zero drift*, *span drift*, *lag time*, *rise time*, *fall time*, and *precision* shall be combined into a single sequential procedure to be conducted at various line voltages and ambient temperatures specified in § 53.23(e). The tests for *noise*, *lower detectable limit*, and *interference equivalents* shall be made at any temperature between 20 °C. and 30 °C. and at any normal line voltage between 105 and 125 volts, and shall be conducted such that not more than three (3) test results for each parameter are obtained per 24 hours.

(e) All response readings to be recorded shall first be converted to concentration units according to the calibration curve constructed in accordance with § 53.21(b).

(f) All recorder chart tracings, records, test data and other documentation obtained from or pertinent to these tests shall be identified, dated, signed by the analyst performing the test, and submitted.

NOTE: Suggested formats for reporting the test results and calculations are provided in Figures B–2, B–3, B–4, B–5, and B–6 in appendix A. Symbols and abbreviations used in this subpart are listed in table B–5, appendix A.

[40 FR 7049, Feb. 18, 1975, as amended at 40 FR 18168, Apr. 25, 1975; 41 FR 52694, Dec. 1, 1976]

§ 53.21 Test conditions.

(a) *Set-up and start-up* of the test analyzer shall be in strict accordance with the operating instructions specified in the manual referred to in § 53.4(b)(3). Allow adequate warm-up or stabilization time as indicated in the operating instructions before beginning the tests. If the candidate method does not include an integral strip chart recorder,

connect the output signal of the test analyzer to a suitable strip chart recorder of the servo, null-balance type. This recorder shall have a chart width of at least 25 centimeters, chart speeds up to 10 cm per hour, a response time of 1 second or less, a deadband of not more than 0.25 percent of full scale, and capability either of reading measurements at least 5 percent below zero or of offsetting the zero by at least 5 percent.

NOTE: Other data acquisition components may be used along with the chart recorder during conduct of these tests. Use of the chart recorder is intended only to facilitate evaluation of data submitted.

(b) *Calibration* of the test analyzer shall be as indicated in the manual referred to in § 53.4(b)(3) and as follows: If the chart recorder does not have below zero capability, adjust either the controls of the test analyzer or the chart recorder to obtain a +5% offset zero reading on the recorder chart to facilitate observing negative response or drift. If the candidate method is not capable of negative response, the test analyzer (not recorder) shall be operated with an offset zero. Construct and submit a calibration curve showing a plot of recorder scale readings (ordinate) against pollutant concentrations (abscissa). A plot of output units (volts, millivolts, milliamps, etc.) against pollutant concentrations shall also be shown for methods not including an integral chart recorder. All such plots shall consist of at least seven (7) approximately equally spaced, identifiable points, including 0 and 90±5 percent of full scale.

(c) Once the test analyzer has been set up and calibrated and the tests started, manual adjustment or normal periodic maintenance is permitted only every 3 days. Automatic adjustments which the test analyzer performs by itself are permitted at any time. The submitted records shall show clearly when any manual adjustment or periodic maintenance was made and describe the operations performed.

(d) If the test analyzer should malfunction during any of the performance tests, the tests for that parameter shall be repeated. A detailed explanation of the malfunction, remedial action taken, and whether recalibration was necessary (along with all pertinent records and charts) shall be submitted. If more than one malfunction occurs, all performance test procedures for all parameters shall be repeated.

(e) Tests for all performance parameters shall be completed on the same test analyzer, except that use of multiple test analyzers to accelerate testing will be permitted when alternate ranges of a multi-range candidate method are being tested.

§ 53.22 Generation of test atmospheres.

(a) Table B–2 specifies preferred methods for generating test atmospheres and suggested methods of verifying the concentrations. Only one means of establishing the concentration of a test atmosphere is normally required. If the method of generation can produce reproducible concentrations, verification is optional. If the method of generation is not reproducible, then establishment of the concentration by some verification method is required. However, when a method of generation other than that given in table B–2 is used, the test concentration shall be verified.

(b) The test atmosphere delivery system shall be designed and constructed so as not to significantly alter the test atmosphere composition or concentration during the period of the test. The delivery system shall be fabricated from borosilicate glass or FEP Teflon.

(c) The output of the test atmosphere generation system shall be sufficiently stable to obtain stable response during the required tests. If a permeation device is used for generation of a test atmosphere, the device, as well as the air passing over it, shall be controlled to ±0.1 °C.

(d) All diluent air shall be zero air free of contaminants likely to cause a detectable response on the test analyzer.

TABLE B–2—TEST ATMOSPHERES

Test gas	Generation	Verification
Ammonia	Permeation device. Similar to system described in references 1 and 2.	Indophenol method, reference 3.
Carbon dioxide	Cylinder of zero air or nitrogen containing CO_2 as required to obtain the concentration specified in table B–3.	Use NBS-certified standards whenever possible. If NBS standards are not available, obtain 2 standards from independent sources which agree within 2 percent; or obtain one standard and submit it to an independent laboratory for analysis which must agree within 2 percent of the supplier's nominal analysis.
Carbon monoxide.	Cylinder of zero air or nitrogen containing CO as required to obtain the concentration specified in table B–3.	Do.
Ethane	Cylinder of zero air or nitrogen containing ethane as required to obtain the concentration specified in table B–3.	Do.
Ethylene	Cylinder of prepurified nitrogen containing ethylene as required to obtain the concentration specified in table B–3.	Do.
Hydrogen chloride.	Cylinder[1] of prepurified nitrogen containing approximately 100 p/m of gaseous HCl. Dilute with zero air to concentration specified in table B–3.	Collect samples in bubbler containing distilled water and analyze by the mercuric thiocyanate method, ASTM (D512), p. 29, reference 4.
Hydrogen sulfide.	Permeation device system described in references 1 and 2.	Tentative method of analysis for H_2S content of the atmosphere, p. 426, reference 5.
Methane	Cylinder of zero air containing methane as required to obtain the concentration specified in table B–3.	Use NBS-certified standards whenever possible. If NBS standards are not available, obtain 2 standards from independent sources which agree within 2 percent; or obtain one standard and submit it to an independent laboratory for an analysis which must agree within 2 percent of the supplier's nominal analysis.
Nitric oxide	Cylinder[1] of prepurified nitrogen containing approximately 100 p/m NO. Dilute with zero air to required concentration.	Gas-phase titration as described in reference 6, section 7.1.
Nitrogen dioxide.	1. Gas phase titration as described in reference 6 2. Permeation device, similar to system described in references 1 and 2.	1. Use an NO_2 analyzer calibrated with a gravimetrically calibrated permeation device. 2. Use an NO_2 analyzer calibrated by gas-phase titration as described in reference 6.
Ozone	Calibrated ozone generator as described in reference 7, appendix D.	Use an ozone analyzer calibrated by gas-phase titration as described in reference 6.
Sulfur dioxide	Permeation device Similar to system described in reference method for SO_2, reference 7, appendix A.	P-rosaniline method. Reference 7, appendix A.
Water	Pass zero air through distilled water at a fixed known temperature between 20° and 30 °C. such that the air stream becomes saturated. Dilute with zero air to concentration specified in table B–3.	Measure relative humidity by means of a dew-point indicator, calibrated electrolytic or piezo electric hygrometer, or wet/dry bulb thermometer.
Xylene	Cylinder of prepurified nitrogen containing 100 p/m xylene. Dilute with zero air to concentration specified in table B–3.	Use NBS-certified standards whenever possible. If NBS standards are not available, obtain 2 standards from independent sources which agree within 2 percent; or obtain one standard and submit it to an independent laboratory for an analysis which must agree within 2 percent of the supplier's nominal analysis.
Zero air	1. Ambient air purified by appropriate scrubbers or other devices such that it is free of contaminants likely to cause a detectable response on the analyzer. 2. Cylinder of compressed zero air certified by the supplier or an independent laboratory to be free of contaminants likely to cause a detectable response on the analyzer.	

[1] Use stainless steel pressure regulator dedicated to the pollutant measured.

Reference 1. O'Keeffe, A. E., and Ortaman, G. C. ''Primary Standards for Trace Gas Analysis,'' *Anal. Chem.* 38, 760 (1966).
Reference 2. Scaringelli, F. P., A. E., Rosenberg, E., and Bell, J. P., ''Primary Standards for Trace Gas Analysis.'' *Anal. Chem.* 42, 871 (1970).
Reference 3. ''Tentative Method of Analysis for Ammonia in the Atmosphere (Indophenol Method)'', *Health Lab Sciences,* vol. 10, No. 2, 115–118, April 1973.
Reference 4. *1973 Annual Book of ASTM Standards,* American Society for Testing and Materials, 1916 Race St., Philadelphia, PA.
Reference 5. *Methods for Air Sampling and Analysis,* Intersociety Committee, 1972, American Public Health Association, 1015.
Reference 6. *Federal Register,* vol. 38, No. 110, Tentative Method for the Continuous Measurement of Nitrogen Dioxide (Chemiluminescent) addenda C. (June 8, 1973).
Reference 7. *Federal Register,* vol. 36, No. 228, National Primary and Secondary Ambient Air Quality Standards, Nov. 25, 1971.

(e) The concentration of each test atmosphere shall be established and/or verified before or during each series of tests. Samples for verifying test concentrations shall be collected from the test atmosphere delivery system as close as possible to the sample intake port of the test analyzer.

(f) The accuracy of all flow measurements used to calculate test atmosphere concentrations shall be documented and referenced to a primary standard (such as a spirometer, bubble meter, etc.). Any corrections shall be clearly shown. All flow measurements given in volume units shall be standardized to 25 °C. and 760 mm Hg.

(g) Schematic drawings and other information showing complete procedural details of the test atmosphere generation, verification, and delivery system shall be provided. All pertinent calculations shall be clearly indicated.

[40 FR 7049, Feb. 18, 1975, as amended at 40 FR 18168, Apr. 25, 1975]

§ 53.23 Test procedures.

(a) *Range*—(1) *Technical definition*. Nominal minimum and maximum concentrations which a method is capable of measuring.

NOTE: The nominal range is specified at the lower and upper range limits in concentration units, for example, 0–0.5 p/m.

(2) *Test procedure*. Submit a suitable calibration curve, as specified in § 53.21(b), showing the test analyzer's response over at least 95 percent of the required range.

NOTE: A single calibration curve will normally suffice.

(b) *Noise*—(1) *Technical definition*. Spontaneous, short duration deviations in output, about the mean output, which are not caused by input concentration changes. Noise is determined as the standard deviation about the mean and is expressed in concentration units.

(2) *Test procedure*. (i) Allow sufficient time for the test analyzer to warm up and stabilize. Determine at two concentrations, first using zero air and then a pollutant test gas concentration as indicated below. The noise specification in table B–1 shall apply to both of these tests.

(ii) Connect an integrating-type digital meter (DM) suitable for the test analyzer's output and accurate to three significant digits, to measure the analyzer's output signal.

NOTE: Use of a chart recorder in addition to the DM is optional.

(iii) Measure zero air for 60 minutes. During this 60-minute interval, record twenty-five (25) readings at 2-minute intervals. (See Figure B–2 in appendix A.)

(iv) Convert each DM reading to concentration units (p/m) by reference to the test analyzer's calibration curve as determined in § 53.21(b). Label the converted DM readings r_1, r_2, r_3 . . . r_i . . . r_{25}.

(v) Calculate the standard deviation, S, as follows:

$$S=\sqrt{\frac{\sum_{i=1}^{25}(r_i)^2-\frac{1}{25}\left(\sum_{i=1}^{25}r_i\right)^2}{24}}\,(p/m)$$

where i indicates the i-th DM reading in ppm.

(vi) Let S at 0 ppm be identified as S_o; compare S_o to the noise specification given in table B–1.

(vii) Repeat steps (iii) through (vi) of this section using a pollutant test atmosphere concentration of 80±5 percent of the upper range limit (URL) instead of zero gas, and let S at 80 percent of the URL be identified as S_{80}. Compare S_{80} to the noise specification given in table B–1.

(viii) Both S_0 and S_{80} must be less than or equal to the specification for noise to pass the test for the noise parameter.

(c) *Lower detectable limit*—(1) *Technical definition*. The minimum pollutant concentration which produces a signal of twice the noise level.

(2) *Test procedure*. (i) Allow sufficient time for the test analyzer to warm up and stabilize. Measure zero air and record the stable reading in ppm as B_Z. (See Figure B–3 in appendix A.)

(ii) Generate and measure a pollutant test atmosphere concentration equal to the value for the lower detectable limit specified in table B–1.

NOTE: If necessary, the test atmosphere concentration may be generated or verified at a higher concentration, then accurately diluted with zero air to the final required concentration.

(iii) Record the test analyzer's stable indicated reading, in ppm, as B_L.

(iv) Determine the Lower Detectable Limit (LDL) as LDL = $B_L - B_Z$. Compare this LDL value with the noise level, S_0, determined in § 53.23(b), for 0 concentration test atmosphere. LDL must be equal to or higher than $2S_0$ to pass this test.

(d) *Interference equivalent*—(1) *Technical definition*. Positive or negative response caused by a substance other than the one being measured.

(2) *Test procedure*. The test analyzer shall be tested for all substances likely to cause a detectable response. The test analyzer shall be challenged, in turn, with each interfering agent specified in table B–3. In the event that there are substances likely to cause a significant interference which have not been specified in table B–3, these substances shall be tested at a concentration substantially higher than that normally found in the ambient air. The interference may be either positive or negative, depending on whether the test analyzer's response is increased or decreased by the presence of the interferent. Interference equivalents shall be determined by mixing each interferent, one at a time, with the pollutant at the concentrations specified in table B–3, and comparing the test analyzer's response to the response caused by the pollutant alone. Known gas-phase reactions that might occur between an interferent and the pollutant are designated by footnote 3 in table B–3. In these cases, the interference equivalent shall be determined in the absence of the pollutant.

(i) Allow sufficient time for warm-up and stabilization of the test analyzer.

(ii) For a candidate method using a prefilter or scrubber based upon a chemical reaction to derive part of its specificity, and which requires periodic service or maintenance, the test analyzer shall be ''conditioned'' prior to each interference test as follows:

TABLE B–3—INTERFERANT TEST CONCENTRATION,[1] PARTS PER MILLION

Pollutant	Analyzer type[2]	Hydrochloric acid	Ammonia	Hydrogen sulfide	Sulfur dioxide	Nitrogen dioxide	Nitric oxide	Carbon dioxide	Ethylene	Ozone	M-xylene	Water vapor	Carbon monoxide	Methane	Ethane
SO_2	Flame photometric (FPD)	.....	.....	0.1	[1] 0.14	.....	.....	750	.....	.....	.....	[3] 20,000	50	.....	.....
SO_2	Gas chromatography (FPD).	.....	.....	.1	[4] .14	.....	.....	750	.....	.....	.....	[3] 20,000	50	.....	.....
SO_2	Spectrophotometric-wet chemical (pararosaniline reaction).	0.2	[3] 0.1	.1	[4] .14	0.5	.....	750	.....	0.5	.....	.....	.....	.....	.....
SO_2	Electrochemical	.2	[3] .1	.1	[4] .14	.5	0.5	.....	0.2	.5	.....	[3] 20,000	.....	.....	.....
SO_2	Conductivity	.2	[3] .1	.....	[4] .14	.5	.....	750	.....	.....	.....	.....	.....	.....	.....
SO_2	Spectrophotometric-gas phase.	.....	.....	.....	[4] .14	.5	.5	.....	.....	.5	0.2	.....	.....	.....	.....
O_3	Chemiluminescent	.....	.....	[3] .1	.....	.....	.....	750	.....	[4] .08	.....	[3] 20,000	.....	.....	.....
O_3	Electrochemical	.....	[3] .1	.....	.5	.5	.....	.....	.....	[4] .08	.....	[3] 20,000	.....	.....	.....
O_3	Spectrophotometric-wet chemical (potassium iodide reaction).	.....	[3] .1	.....	.5	.5	[3] .5	.....	.....	[4] .08	.....	.....	.....	.....	.....
O_3	Spectrophotometric-gas phase.	.....	.....	.....	.5	.5	[3] .5	.....	.....	[4] .08	.....	.....	.....	.....	.....
CO	Infrared	.....	.....	.....	.....	.....	.....	750	.....	.....	.....	20,000	[4] 10	.....	.....
CO	Gas chromatography with flame ionization detector.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,000	[4] 10	.....	0.5
CO	Electrochemical	.....	.....	.....	.....	.....	.5	.....	.2	.....	.....	20,000	[4] 10	.....	.....
CO	Catalytic combustion-thermal detection.	.....	.1	.....	.....	.....	.....	750	.2	.....	.....	20,000	[4] 10	5.0	.5
CO	IR fluorescence	.....	.....	.....	.....	.....	.....	750	.....	.....	.....	20,000	[4] 10	.....	.5
CO	Mercury replacement UV photometric.	.....	.....	.....	.....	.....	.....	.....	.2	.....	.....	.....	[4] 10	.....	.5
NO_2	Chemiluminescent	.....	[3] .1	.....	.5	[4] .1	.5	.....	.....	.....	.....	20,000	.....	.....	.....
NO_2	Spectrophotometric-wet chemical (azo-dye reaction).	.....	.....	.....	.5	[4] .1	.5	750	.....	.5	.....	.....	.....	.....	.....
NO_2	Electrochemical	0.2	[3] .1	.....	.5	[4] .1	.5	750	.....	.5	.....	20,000	50	.....	.....
NO_2	Spectrophotometric-gas phase.	.....	[3] .1	.....	.5	[4] .1	.5	.....	.....	.5	.....	20,000	50	.....	.....

[1] Concentrations of interferant listed must be prepared and controlled to ± 10 percent of the state value.
[2] Analyzer types not listed will be considered by the administrator as special cases.
[3] Do not mix with pollutant.
[4] Concentration of pollutant used for test. These pollutant concentrations must be prepared to ± 10 percent of the stated value.

(A) Service or perform the indicated maintenance on the scrubber or prefilter as directed in the manual referred to in § 53.4(b)(3).

(B) Before testing for each interferent, allow the test analyzer to sample through the scrubber a test atmosphere containing the interferent at a concentration equal to the value specified in table B–3. Sampling shall be at the normal flow rate and shall be continued for 6 continuous hours prior to testing.

(iii) Generate three test atmosphere streams as follows:

(A) Test atmosphere *P:* Pollutant concentration.

(B) Test atmosphere *I:* Interference concentration.

(C) Test atmosphere *Z:* Zero air.

(iv) Adjust the individual flow rates and the pollutant or interferent generators for the three test atmospheres as follows:

(A) The flow rates of test atmospheres *I* and *Z* shall be identical.

(B) The concentration of pollutant in test atmosphere *P* shall be adjusted such that when *P* is mixed (diluted) with either test atmosphere *I* or *Z*, the resulting concentration of pollutant shall be as specified in table B–3.

(C) The concentration of interferent in test atmosphere *I* shall be adjusted such that when *I* is mixed (diluted) with test atmosphere *P*, the resulting concentration of interferent shall be equal to the value specified in table B–3.

(D) To minimize concentration errors due to flow rate differences between *I* and *Z*, it is recommended that, when possible, the flow rate of *P* be from 10 to 20 times larger than the flow rates of *I* and *Z*.

(v) Mix test atmospheres *P* and *Z* by passing the total flow of both atmospheres through a mixing flask.

(vi) Sample and measure the mixture of test atmospheres *P* and *Z* with the test analyzer. Allow for a stable reading, and record the reading, in concentration units, as *R* (see Figure B–3).

(vii) Mix test atmospheres *P* and *I* by passing the total flow of both atmospheres through a mixing flask.

(viii) Sample and measure this mixture. Record the stable reading, in concentration units, as R_I.

(ix) Calculate the interference equivalent (*IE*) as:

$$IE = R_I - R$$

IE must be equal to or less than the specification given in table B–1 for each interferent to pass the test.

(x) Follow steps (iii) through (ix) of this section, in turn, to determine the interference equivalent for each interferent.

(xi) For those interferents which cannot be mixed with the pollutant, as indicated by footnote (3) in table B–3, adjust the concentration of test atmosphere *I* to the specified value without being mixed or diluted by the pollutant test atmosphere. Determine *IE* as follows:

(A) Sample and measure test atmosphere *Z* (zero air). Allow for a stable reading and record the reading, in concentration units, as *R*.

(B) Sample and measure the interferent test atmosphere *I*. If the test analyzer is not capable of negative readings, adjust the analyzer (not the recorder) to give an offset zero. Record the stable reading in concentration units as R_I, extrapolating the calibration curve, if necessary, to represent negative readings.

(C) Calculate $IE = R_I - R$. *IE* must be equal to or less than the specification in table B–1 to pass the test.

(xii) Sum the absolute value of all the individual interference equivalents. This sum must be equal to or less than the total interferent specification given in table B–1 to pass the test.

(e) *Zero drift, span drift, lag time, rise time, fall time, and precision*—(1) *Technical definitions*—(i) *Zero drift:* The change in response to zero pollutant concentration, over 12- and 24-hour periods of continuous unadjusted operation.

(ii) *Span drift:* The percent change in response to an up-scale pollutant concentration over a 24-hour period of continuous unadjusted operation.

(iii) *Lag time:* The time interval between a step change in input concentration and the first observable corresponding change in response.

(iv) *Rise time:* The time interval between initial response and 95 percent of final response after a step increase in input concentration.

(v) *Fall time:* The time interval between initial response and 95 percent of final response after a step decrease in input concentration.

(vi) *Precision:* Variation about the mean of repeated measurements of the same pollutant concentration, expressed as one standard deviation about the mean.

(2) Tests for these performance parameters shall be accomplished over a period of seven (7) or more days. During this time, the line voltage supplied to the test analyzer and the ambient temperature surrounding the analyzer shall be varied from day to day. One test result for each performance parameter shall be obtained each test day, for seven (7) or fifteen (15) test days as necessary. The tests are performed sequentially in a single procedure.

(3) The 24-hour test day may begin at any clock hour. The first 12 hours out of each test day are required for testing 12-hour zero drift. Tests for the other parameters shall be conducted during the remaining 12 hours.

(4) Table B–4 specifies the line voltage and room temperature to be used for each test day. The line voltage and temperature shall be changed to the specified values at the start of each test day (i.e., at the start of the 12-hour zero test). Initial adjustments (day zero) shall be made at a line voltage of 115 volts (rms) and a room temperature of 25 °C.

(5) The tests shall be conducted in blocks consisting of 3 test days each until 7 or 15 test results have been obtained. (The final block may contain fewer than three test days.) If a test is interrupted by an occurrence other than a malfunction of the test analyzer, only the block during which the interruption occurred shall be repeated.

(6) During each block, manual adjustments to the electronics, gas, or reagent flows or periodic maintenance shall not be permitted. Automatic adjustments which the test analyzer performs by itself are permitted at any time.

(7) At least 4 hours prior to the start of the first test day of each block, the test analyzer may be adjusted and/or serviced according to the periodic maintenance procedures specified in the manual referred to in §53.4(b)(3). If a new block is to immediately follow a previous block, such adjustments or servicing may be done immediately after completion of the day's tests for the last day of the previous block and at the voltage and temperature specified for that day, but only on test days 3, 6, 9, and 12.

NOTE: If necessary, the beginning of the test days succeeding such maintenance or adjustment may be delayed as necessary to complete the service or adjustment operation.

(8) All response readings to be recorded shall first be converted to concentration units according to the calibration curve. Whenever a test atmosphere is to be measured but a stable reading is not required, the test atmosphere shall be measured long enough to cause a change in response of at least 10% of full scale. Identify all readings and other pertinent data on the strip chart. (See Figure B–1 illustrating the pattern of the required readings.)

TABLE B–4—LINE VOLTAGE AND ROOM TEMPERATURE TEST CONDITIONS

Test day	Line voltage,[1] rms	Room temperature,[2] °C	Comments
0	115	25	Initial set-up and adjustments.
1	125	20	
2	105	20	
3	125	30	Adjustments and/or periodic maintenance permitted at end of tests.
4	105	30	
5	125	20	
6	105	20	Adjustments and/or periodic maintenance permitted at end of tests.
7	125	30	Examine test results to ascertain if further testing is required.
8	105	30	
9	125	20	Adjustments and/or periodic maintenance permitted at end of tests.
10	105	20	
11	125	30	
12	105	30	Adjustments and/or periodic maintenance permitted at end of tests.
13	125	20	

TABLE B–4—LINE VOLTAGE AND ROOM TEMPERATURE TEST CONDITIONS—Continued

Test day	Line voltage,[1] rms	Room temperature,[2] °C	Comments
14	105	20	
15	125	30	

[1] Voltage specified shall be controlled to ± 1 volt.
[2] Temperature specified shall be controlled to ± 1 °C.

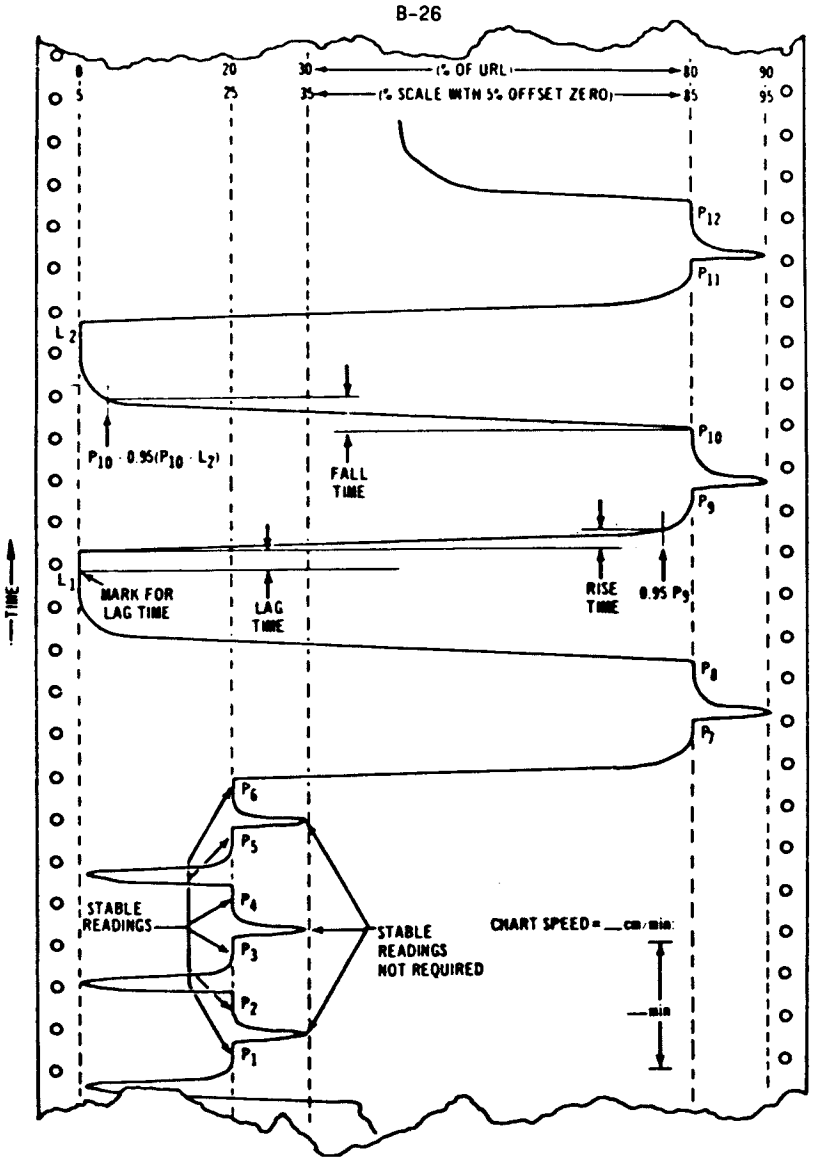


Figure B-1. Example showing the nature of the tracing obtained during the test for drift, lag time, rise time, fall time, and precision. The time scale has been greatly compressed.

(9) *Test procedure.* (i) Arrange to generate pollutant test atmospheres as follows:

Test atmosphere	Pollutant concentration (percent)
A_0	Zero air.
A_{20}	20±5 of the upper range limit.
A_{30}	30±5 of the upper range limit.

Test atmosphere	Pollutant concentration (percent)
A_{80}	80±5 of the upper range limit.
A_{90}	90±5 of the upper range limit.

Test atmospheres A_0, A_{20}, and A_{80} shall be consistent during the tests and from day to day.

(ii) For steps (xxv) through (xxxi) of this section, a chart speed of at least 10 centimeters per hour shall be used. The actual chart speed, chart speed changes, and time checks shall be clearly marked on the chart.

(iii) Allow sufficient time for test analyzer to warm up and stabilize at a line voltage of 115 volts and a room temperature of 25 °C. Recalibrate, if necessary, and adjust the zero baseline to 5 percent of chart. No further adjustments shall be made to the analyzer until the end of the tests on the third day.

(iv) Measure test atmosphere A_0 until a stable reading is obtained, and record this reading (in ppm) as Z'_n, where n = 0 (see Figure B–4 in appendix A).

(v) Measure test atmosphere A_{20}. Allow for a stable reading and record it as M'_n, where n = 0.

(vi) Measure test atmosphere A_{80}. Allow for a stable reading and record it as S'_n, where n = 0.

(vii) The above readings for Z'_0, M'_0, and S'_0 should be taken at least four (4) hours prior to the beginning of test day 1.

(viii) At the beginning of each test day, adjust the line voltage and room temperature to the values given in table B–4.

(ix) Measure test atmosphere A_0 continuously for at least twelve (12) continuous hours during each test day.

(x) After the 12-hour zero drift test (step ix), sample test atmosphere A_0. A stable reading is not required.

(xi) Measure test atmosphere A_{20} and record the stable reading (in ppm) as P_1. (See Figure B–4 in appendix A.)

(xii) Sample test atmosphere A_{30}; a stable reading is not required.

(xiii) Measure test atmosphere A_{20} and record the stable reading as P_2.

(xiv) Sample test atmosphere A_0; a stable reading is not required.

(xv) Measure test atmosphere A_{20} and record the stable reading as P_3.

(xvi) Sample test atmosphere A_{30}; a stable reading is not required.

(xvii) Measure test atmosphere A_{20} and record the stable reading as P_4.

(xviii) Sample test atmosphere A_0; a stable reading is not required.

(xix) Measure test atmosphere A_{20} and record the stable reading as P_5.

(xx) Sample test atmosphere A_{30}; a stable reading is not required.

(xxi) Measure test atmosphere A_{20} and record the stable reading as P_6.

(xxii) Measure test atmosphere A_{30} and record the stable reading as P_7.

(xxiii) Sample test atmosphere A_{90}; a stable reading is not required.

(xxiv) Measure test atmosphere A_{80} and record the stable reading as P_8. Increase chart speed to at least 10 centimeters per hour.

(xxv) Measure test atmosphere A_0. Record the stable reading as L_1.

(xxvi) Quickly switch the test analyzer to measure test atmosphere A_{80} and mark the recorder chart to show the exact time when the switch occurred.

(xxvii) Measure test atmosphere A_{90} and record the stable reading as P_{80}.

(xxviii) Sample test atmosphere A_{90}; a stable reading is not required.

(xxix) Measure test atmosphere A_{80} and record the stable reading as P_{10}.

(xxx) Measure test atmosphere A_0 and record the stable reading as L_2.

(xxxi) Measure test atmosphere A_{80} and record the stable reading as P_{11}.

(xxxii) Sample test atmosphere A_{90}; a stable reading is not required.

(xxxiii) Measure test atmosphere A_{80} and record the stable reading as P_{12}.

(xxxiv) Repeat steps (viii) through (xxxiii) of this section, each test day.

(xxxv) If zero and span adjustments are made after the readings are taken on test days 3, 6, 9, or 12, complete all adjustments; then measure test atmospheres A_0, A_{80}, and A_{20}. Allow for a stable reading on each, and record the readings as $Z'_nS'_n$, and M_n respectively, where n = the test day number.

(10) Determine the results of each day's tests as follows. Mark the recorder chart to show readings and determinations.

(i) *Zero drift.* (A) 12-hour. Examine the strip chart pertaining to the 12-

hour continuous zero air test. Determine the minimum (Cmin.) and maximum (Cmax.) readings (in p/m) during this period of 12 consecutive hours, extrapolating the calibration curve to negative concentration units if necessary. Determine the 12-hour zero drift (12*ZD*) as $12ZD = C^{max.} - C^{min.}$. (See Figure B–5 in appendix A.)

(B) Calculate the 24-hour zero drift (24*ZD*) for the *n*-th test day as $24ZD_n = Z_n - Z_{n-1}$, or $24ZD_n = Z_n - Z'_{n-1}$ if zero adjustment was made on the previous day, where $Z_n = ½(L_1+L_2)$ for L_1 and L_2 taken on the *n*-th test day.

(C) Compare 12*ZD* and 24*ZD* to the zero drift specification in table B–1. Both 12*ZD* and 24*ZD* must be equal to or less than the specified value to pass the test for zero drift.

(ii) *Span drift*. (A) Span drift at 20 percent of URL (MSD)

$$MSD_n = \frac{M_n - M_{n-1}}{M_{n-1}} \times 100\%$$

$$MSD_n = \frac{M_n - M'_{n-1}}{M'_{n-1}} \times 100\%$$

If span adjustment was made on the previous day, where

$$M_n = \frac{1}{6}\sum_{i=1}^{6} P_i$$

n indicates the *n*-th test day, and *i* indicates the *i*-th reading on the *n* th day.

(B) Span drift at 80 percent of URL (USD):

$$USD_n = \frac{S_n - S_{n-1}}{S_{n-1}} \times 100\%$$

or

$$USD_n = \frac{S_n - S'_{n-1}}{S'_{n-1}} \times 100\%$$

If span adjustment was made on the previous day, where

$$S_n = \frac{1}{6}\sum_{i=7}^{12} P_i$$

n indicates the *n*-th test day, and *i* indicates the *i*-th reading on the *n*-th test day.

(C) Both USD and MSD must be equal to or less than the respective specifications given in table B–1 to pass the test for span draft.

(iii) *Lag time*. Determine, from the strip chart, the elapsed time in minutes between the mark made in step (xxvi) and the first observable (two times the noise level) response. This time must be equal to or less than the time specified in table B–1 to pass the test for lag time.

(iv) *Rise time*. Calculate 95 percent of reading P_9 and determine from the recorder chart, the elapsed time between the first observable (two times noise level) response and a response equal to 95 percent of the P_9 reading. This time must be equal to or less than the rise time specified in table B–1 to pass the test for rise time.

(v) *Fall time*. Calculate five percent of $(P_{10} - L_2)$ and determine, from the strip chart, the elapsed time in minutes between the first observable decrease in response following reading P_{10} and a response equal to five percent of $(P_{10} - L_2)$. This time must be equal to or less than the fall time specification in table B–1 to pass the test for fall time.

(vi) *Precision*. Calculate precision (P_{20} and P_{80}) for each day's test as follows:

(A)

$$P_{30} = \sqrt{\frac{1}{5}\left[\sum_{i=1}^{6} P_i^2 - \frac{1}{6}\left(\sum_{i=1}^{6} P_i\right)^2\right]}$$

(B)

$$P_{30} = \sqrt{\frac{1}{5}\left[\sum_{i=7}^{12} P_i^2 - \frac{1}{6}\left(\sum_{i=7}^{12} P_i\right)^2\right]}$$

(C) Both P_{20} and P_{80} must be equal to or less than the specification given in table B–1 to pass the test for precision.

[40 FR 7049, Feb. 18, 1975, as amended at 41 FR 52694, Dec. 1, 1976]

APPENDIX A TO SUBPART B—OPTIONAL FORMS FOR REPORTING TEST RESULTS

TABLE B–5—SYMBOLS AND ABBREVIATIONS

B_L	Analyzer reading at specified *LDL* concentration.
B_z	Analyzer reading at 0 concentration for *LDL* test.
DM	Digital meter.
C_{max}	Maximum analyzer reading during 12*ZD* test.
C_{min}	Minimum analyzer reading during 12*ZD* test.
i	Subscript indicating the *i*-th quantity in a series.
IE	Interference equivalent.
L_1	First analyzer zero reading for 24*ZD* test.
L_2	Second analyzer zero reading for 24*ZD* test.
M_n	Average of $P_1 \ldots P_6$ for the *n*-th test day.
M'_n	Adjusted span reading at 20 percent of *URL* on the *n*-th test day.
MSD	Span drift at 20 percent of *URL*.

TABLE B–5—SYMBOLS AND ABBREVIATIONS—Continued

n	Subscript indicating the test day number.
P	Analyzer reading for precision test.
P_i	The *i*-th analyzer reading for precision test.
P_{20}	Precision at 20 percent of *URL*.
P_{80}	Precision at 80 percent of *URL*.
R	Analyzer reading of pollutant alone for *IE* test.
R_I	Analyzer reading with interferent added for *IE* test.
r_i	The *i*-th *DM* reading for noise test.
S	Standard deviation of noise readings.
S_0	Noise value (*S*) measured at 0 concentration.
S_{80}	Noise value (*S*) measured at 80 percent of *URL*.
S_n	Average of $P_7 \ldots P_{12}$ for the *n*-th test day.
S'_n	Adjusted span reading at 80 percent of *URL* on the *n*-th test day.
URL	Upper range limit.
USD	Span drift at 80 percent o
Z	Average of L_1 and L_2.
Z_n	Average of L_1 and L_2 on the *n*-th test day.
Z'_n	Adjusted zero reading on the *n*-th test day.
ZD	Zero drift.
12*ZD*	12-hour zero drift.
24*ZD*	24-hour zero drift.

Applicant _____ Date _____

Test No. _____

Analyzer _____ Range _____

READING NUMBER (i)	TIME	0% of URL		80% of URL	
		DM READING	r_i, ppm	DM READING	r_i, ppm
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
$\sum_{i=1}^{25} r_i$					
$\sum_{i=1}^{25} r_i^2$					
S			S_0 =		S_{80} =

Figure B-2. Form for noise data.

Applicant _____

Analyzer _____ Range _____

TEST PARAMETER	READING OR CALCULATION	TEST NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LOWER DETECTABLE LIMIT	B_Z															
	B_L															
	$LDL = B_L - B_Z$															
INTERFERENCE EQUIVALENT 1	R_1															
	R_{11}															
	$IE_1 = R_{11} - R_1$															
2	R_2															
	R_{12}															
	$IE_2 = R_{12} - R_2$															
3	R_3															
	R_{13}															
	$IE_3 = R_{13} - R_3$															
4	R_4															
	R_{14}															
	$IE_4 = R_{14} - R_4$															
5	R_5															
	R_{15}															
	$IE_5 = R_{15} - R_5$															
TOTAL	$IE_T = \sum_{i=1}^{n} \lvert E_i \rvert$															

Figure B-3. Form for data and calculations for lower detectable limit and interference equivalent.

Applicant _____

Analyzer _____ Range _____

TEST DAY (n)	ANALYZER READING, ppm															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DATE																
P_1																
P_2																
P_3																
P_4																
P_5																
P_6																
$\sum_{i=1}^{6} P_i^2$																
P_7																
P_8																
P_9																
P_{10}																
P_{11}																
P_{12}																
$\sum_{i=7}^{12} P_i^2$																
L_1																
L_2																
Z_n'																
M_n'																
S_n'																
C_{max}																
C_{min}																

Figure B-4. Form recording data for drift and precision.

Applicant _____

Analyzer _____ Range _____

TEST PARAMETER		CALCULATION	n - th TEST DAY														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Zero drift	12 hour	$12ZD = C_{max} - C_{min}$															
	24 hour	$Z = \frac{1}{2}(L_1 + L_2)$															
		$24ZD_n = Z_n - Z_{n-1}$															
		$24ZD_n = Z_n - Z'_{n-1}$															
Span drift	20% URL	$M_n = \frac{1}{6}\sum_{i=1}^{6} P_i$															
		$MSD_n = \frac{M_n - M_{n-1}}{M_{n-1}} \times 100\%$															
		$MSD_n = \frac{M_n - M'_{n-1}}{M'_{n-1}} \times 100\%$															
	80% URL	$S_n = \frac{1}{6}\sum_{i=7}^{12} P_i$															
		$USD_n = \frac{S_n - S_{n-1}}{S_{n-1}} \times 100\%$															
		$USD_n = \frac{S_n - S'_{n-1}}{S'_{n-1}} \times 100\%$															
Precision	20% URL	$P_{20} = \sqrt{\frac{1}{5}\left[\sum_{i=1}^{6} P_i^2 - \frac{1}{6}\left(\sum_{i=1}^{6} P_i\right)^2\right]}$															
	80% URL	$P_{80} = \sqrt{\frac{1}{5}\left[\sum_{i=7}^{12} P_i^2 - \frac{1}{6}\left(\sum_{i=7}^{12} P_i\right)^2\right]}$															

Figure B-5. Form for calculating zero drift, span drift and precision.

Applicant _____ Analysis _____

Analyzer _____ Range _____

PERFORMANCE PARAMETER		Table B-1 spec.	TEST 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	No. of test failures	Pass or fail
NOISE, ppm	0% URL (S_0)																		
	80% URL (S_{80})																		
LDL (must be 2 × noise)																			
INTERFERENCE EQUIVALENT, ppm	IE_1																		
	IE_2																		
	IE_3																		
	IE_4																		
	IE_5																		
	TOTAL (IE_T)																		
ZERO DRIFT, ppm	12 hour (12ZD)																		
	24 hour (24ZD)																		
SPAN DRIFT, %	20% URL (MSD)																		
	80% URL (USD)																		
LAG TIME, min																			
RISE TIME, min																			
FALL TIME, min																			
PRECISION, ppm	20% URL (P_{20})																		
	80% URL (P_{80})																		

[a]Compare each test LDL reading with the corresponding noise measurements; LDL reading must exceed the 0% URL noise value by a factor of 2 to pass the test for LDL.

Figure B-6. Form for summary of test results.

[40 FR 7049, Feb. 18, 1975, as amended at 40 FR 18169, Apr. 25, 1975]

Subpart C—Procedures for Determining Comparability Between Candidate Methods and Reference Methods

SOURCE: 62 FR 38792, July 18, 1997, unless otherwise noted.

§ 53.30 General provisions.

(a) *Determination of comparability*. The test procedures prescribed in this subpart shall be used to determine if a candidate method is comparable to a reference method when both methods measure pollutant concentrations in ambient air.

(1) Comparability is shown for SO_2, CO, O_3, and NO_2 methods when the differences between:

(i) Measurements made by a candidate manual method or by a test analyzer representative of a candidate automated method.

(ii) Measurements made simultaneously by a reference method, are less than or equal to the values specified in the last column of table C–1 of this subpart.

(2) Comparability is shown for lead methods when the differences between:

(i) Measurements made by a candidate method.

(ii) Measurements made by the reference method on simultaneously collected lead samples (or the same sample, if applicable), are less than or equal to the value specified in table C–3 of this subpart.

(3) Comparability is shown for PM_{10} and $PM_{2.5}$ methods when the relationship between:

(i) Measurements made by a candidate method.

(ii) Measurements made by a reference method on simultaneously collected samples (or the same sample, if applicable) at each of two test sites, is such that the linear regression parameters (slope, intercept, and correlation coefficient) describing the relationship meet the values specified in table C–4 of this subpart.

(b) *Selection of test sites*—(1) *All methods*. Each test site shall be in a predominately urban area which can be shown to have at least moderate concentrations of various pollutants. The site shall be clearly identified and shall be justified as an appropriate test site with suitable supporting evidence such as maps, population density data, vehicular traffic data, emission inventories, pollutant measurements from previous years, concurrent pollutant measurements, and meteorological data. If approval of a proposed test site is desired prior to conducting the tests, a written request for approval of the test site or sites must be submitted prior to conducting the tests and must include the supporting and justification information required. The Administrator may exercise discretion in selecting a different site (or sites) for any additional tests the Administrator decides to conduct.

(2) *Methods for SO_2, CO, O_3, and NO_2*. All test measurements are to be made at the same test site. If necessary, the concentration of pollutant in the sampled ambient air may be augmented with artificially generated pollutant to facilitate measurements in the specified ranges described under paragraph (d)(2) of this section.

(3) *Methods for Pb*. Test measurements may be made at any number of test sites. Augmentation of pollutant concentrations is not permitted, hence an appropriate test site or sites must be selected to provide lead concentrations in the specified range.

(4) *Methods for PM_{10}*. Test measurements must be made, or derived from particulate samples collected, at not less than two test sites, each of which must be located in a geographical area characterized by ambient particulate matter that is significantly different in nature and composition from that at the other test site(s). Augmentation of pollutant concentrations is not permitted, hence appropriate test sites must be selected to provide PM_{10} concentrations in the specified range. The tests at the two sites may be conducted in different calendar seasons, if appropriate, to provide PM_{10} concentrations in the specified ranges.

(5) *Methods for $PM_{2.5}$*. Augmentation of pollutant concentrations is not permitted, hence appropriate test sites must be selected to provide $PM_{2.5}$ concentrations and $PM_{2.5}/PM_{10}$ ratios (if applicable) in the specified ranges.

(i) Where only one test site is required, as specified in table C–4 of this subpart, the site need only meet the $PM_{2.5}$ ambient concentration levels required by § 53.34(c)(3).

(ii) Where two sites are required, as specified in table C–4 of this subpart, each site must be selected to provide the ambient concentration levels required by § 53.34(c)(3). In addition, one site must be selected such that all acceptable test sample sets, as defined in § 53.34(c)(3), have a $PM_{2.5}/PM_{10}$ ratio of more than 0.75; the other site must be selected such that all acceptable test sample sets, as defined in § 53.34(c)(3), have a $PM_{2.5}/PM_{10}$ ratio of less than 0.40. At least two reference method

PM_{10} samplers shall be collocated with the candidate and reference method $PM_{2.5}$ samplers and operated simultaneously with the other samplers at each test site to measure concurrent ambient concentrations of PM_{10} to determine the $PM_{2.5}/PM_{10}$ ratio for each sample set. The $PM_{2.5}/PM_{10}$ ratio for each sample set shall be the average of the $PM_{2.5}$ concentration, as determined in §53.34(c)(1), divided by the average PM_{10} concentration, as measured by the PM_{10} samplers. The tests at the two sites may be conducted in different calendar seasons, if appropriate, to provide $PM_{2.5}$ concentrations and $PM_{2.5}/PM_{10}$ ratios in the specified ranges.

(c) *Test atmosphere.* Ambient air sampled at an appropriate test site or sites shall be used for these tests. Simultaneous concentration measurements shall be made in each of the concentration ranges specified in tables C–1, C–3, or C–4 of this subpart, as appropriate.

(d) *Sample collection*—(1) *All methods.* All test concentration measurements or samples shall be taken in such a way that both the candidate method and the reference method receive air samples that are homogenous or as nearly identical as practical.

(2) *Methods for SO_2, CO, O_3, and NO_2.* Ambient air shall be sampled from a common intake and distribution manifold designed to deliver homogenous air samples to both methods. Precautions shall be taken in the design and construction of this manifold to minimize the removal of particulates and trace gases, and to ensure that identical samples reach the two methods. If necessary, the concentration of pollutant in the sampled ambient air may be augmented with artificially-generated pollutant. However, at all times the air sample measured by the candidate and reference methods under test shall consist of not less than 80 percent ambient air by volume. Schematic drawings, physical illustrations, descriptions, and complete details of the manifold system and the augmentation system (if used) shall be submitted.

(3) *Methods for Pb, PM_{10} and $PM_{2.5}$.* The ambient air intake points of all the candidate and reference method collocated samplers for lead, PM_{10} or $PM_{2.5}$ shall be positioned at the same height above the ground level, and between 2 and 4 meters apart. The samplers shall be oriented in a manner that will minimize spatial and wind directional effects on sample collection.

(4) *PM_{10} methods employing the same sampling procedure as the reference method but a different analytical method.* Candidate methods for PM_{10} which employ a sampler and sample collection procedure that are identical to the sampler and sample collection procedure specified in the reference method, but use a different analytical procedure, may be tested by analyzing common samples. The common samples shall be collected according to the sample collection procedure specified by the reference method and shall be analyzed in accordance with the analytical procedures of both the candidate method and the reference method.

(e) *Submission of test data and other information.* All recorder charts, calibration data, records, test results, procedural descriptions and details, and other documentation obtained from (or pertinent to) these tests shall be identified, dated, signed by the analyst performing the test, and submitted. For candidate methods for $PM_{2.5}$, all submitted information must meet the requirements of the ANSI/ASQC E4 Standard, sections 3.3.1, paragraphs 1 and 2 (reference 1 of appendix A of this subpart).

§53.31 Test conditions.

(a) *All methods.* All test measurements made or test samples collected by means of a sample manifold as specified in §53.30(d)(2) shall be at a room temperature between 20 °C and 30 °C, and at a line voltage between 105 and 125 volts. All methods shall be calibrated as specified in paragraph (c) of this section prior to initiation of the tests.

(b) *Samplers and automated methods.* (1) Setup and start-up of the test analyzer, test sampler(s), and reference method (if applicable) shall be in strict accordance with the applicable operation manual(s). If the test analyzer does not have an integral strip chart or digital data recorder, connect the analyzer output to a suitable strip chart or digital data recorder. This recorder shall have a chart width of at least 25

centimeters, a response time of 1 second or less, a deadband of not more than 0.25 percent of full scale, and capability of either reading measurements at least 5 percent below zero or offsetting the zero by at least 5 percent. Digital data shall be recorded at appropriate time intervals such that trend plots similar to a strip chart recording may be constructed with a similar or suitable level of detail.

(2) Other data acquisition components may be used along with the chart recorder during the conduct of these tests. Use of the chart recorder is intended only to facilitate visual evaluation of data submitted.

(3) Allow adequate warmup or stabilization time as indicated in the applicable operation manual(s) before beginning the tests.

(c) *Calibration*. The reference method shall be calibrated according to the appropriate appendix to part 50 of this chapter (if it is a manual method) or according to the applicable operation manual(s) (if it is an automated method). A candidate manual method (or portion thereof) shall be calibrated, according to the applicable operation manual(s), if such calibration is a part of the method.

(d) *Range*. (1) Except as provided in paragraph (d)(2) of this section, each method shall be operated in the range specified for the reference method in the appropriate appendix to part 50 of this chapter (for manual reference methods), or specified in table B–1 of subpart B of this part (for automated reference methods).

(2) For a candidate method having more than one selectable range, one range must be that specified in table B–1 of subpart B of this part and a test analyzer representative of the method must pass the tests required by this subpart while operated on that range. The tests may be repeated for a broader range (i.e., one extending to higher concentrations) than the one specified in table B–1 of subpart B of this part, provided that the range does not extend to concentrations more than two times the upper range limit specified in table B–1 of subpart B of this part and that the test analyzer has passed the tests required by subpart B of this part (if applicable) for the broader range. If the tests required by this subpart are conducted or passed only for the range specified in table B–1 of subpart B of this part, any equivalent method determination with respect to the method will be limited to that range. If the tests are passed for both the specified range and a broader range (or ranges), any such determination will include the broader range(s) as well as the specified range. Appropriate test data shall be submitted for each range sought to be included in such a determination.

(e) *Operation of automated methods*. (1) Once the test analyzer has been set up and calibrated and tests started, manual adjustment or normal periodic maintenance as specified in the manual referred to in § 53.4(b)(3) is permitted only every 3 days. Automatic adjustments which the test analyzer performs by itself are permitted at any time. The submitted records shall show clearly when manual adjustments were made and describe the operations performed.

(2) All test measurements shall be made with the same test analyzer; use of multiple test analyzers is not permitted. The test analyzer shall be operated continuously during the entire series of test measurements.

(3) If a test analyzer should malfunction during any of these tests, the entire set of measurements shall be repeated, and a detailed explanation of the malfunction, remedial action taken, and whether recalibration was necessary (along with all pertinent records and charts) shall be submitted.

§ 53.32 Test procedures for methods for SO_2, CO, O_3, and NO_2.

(a) Conduct the first set of simultaneous measurements with the candidate and reference methods:

(1) Table C–1 of this subpart specifies the type (1- or 24-hour) and number of measurements to be made in each of the three test concentration ranges.

(2) The pollutant concentration must fall within the specified range as measured by the reference method.

(3) The measurements shall be made in the sequence specified in table C–2 of this subpart, except for the 1-hour SO_2 measurements, which are all in the high range.

(b) For each pair of measurements, determine the difference (discrepancy) between the candidate method measurement and reference method measurement. A discrepancy which exceeds the discrepancy specified in table C–1 of this subpart constitutes a failure. Figure C–1 of this subpart contains a suggested format for reporting the test results.

(c) The results of the first set of measurements shall be interpreted as follows:

(1) Zero failures. The candidate method passes the test for comparability.

(2) Three or more failures. The candidate method fails the test for comparability.

(3) One or two failures. Conduct a second set of simultaneous measurements as specified in table C–1 of this subpart. The results of the combined total of first-set and second-set measurements shall be interpreted as follows:

(i) One or two failures. The candidate method passes the test for comparability.

(ii) Three or more failures. The candidate method fails the test for comparability.

(4) For SO_2, the 1-hour and 24-hour measurements shall be interpreted separately, and the candidate method must pass the tests for both 1- and 24-hour measurements to pass the test for comparability.

(d) A 1-hour measurement consists of the integral of the instantaneous concentration over a 60-minute continuous period divided by the time period. Integration of the instantaneous concentration may be performed by any appropriate means such as chemical, electronic, mechanical, visual judgment, or by calculating the mean of not less than 12 equally spaced instantaneous readings. Appropriate allowances or corrections shall be made in cases where significant errors could occur due to characteristic lag time or rise/fall time differences between the candidate and reference methods. Details of the means of integration and any corrections shall be submitted.

(e) A 24-hour measurement consists of the integral of the instantaneous concentration over a 24-hour continuous period divided by the time period. This integration may be performed by any appropriate means such as chemical, electronic, mechanical, or by calculating the mean of 24 sequential 1-hour measurements.

(f) For ozone and carbon monoxide, no more than six 1-hour measurements shall be made per day. For sulfur dioxide, no more than four 1-hour measurements or one 24-hour measurement shall be made per day. One-hour measurements may be made concurrently with 24-hour measurements if appropriate.

(g) For applicable methods, control or calibration checks may be performed once per day without adjusting the test analyzer or method. These checks may be used as a basis for a linear interpolation-type correction to be applied to the measurements to correct for drift. If such a correction is used, it shall be applied to all measurements made with the method, and the correction procedure shall become a part of the method.

§ 53.33 Test procedure for methods for lead.

(a) *Sample collection*. Collect simultaneous 24-hour samples (filters) of lead at the test site or sites with both the reference and candidate methods until at least 10 filter pairs have been obtained. If the conditions of § 53.30(d)(4) apply, collect at least 10 common samples (filters) in accordance with § 53.30(d)(4) and divide each to form the filter pairs.

(b) *Audit samples*. Three audit samples must be obtained from the address given in § 53.4(a). The audit samples are 3/4×8-inch glass fiber strips containing known amounts of lead at the following nominal levels: 100 μg/strip; 300 μg/strip; 750 μg/strip. The true amount of lead, in total μg/strip, will be provided with each audit sample.

(c) *Filter analysis*. (1) For both the reference method samples and the audit samples, analyze each filter extract three times in accordance with the reference method analytical procedure. The analysis of replicates should not be performed sequentially, i.e., a single sample should not be analyzed three

times in sequence. Calculate the indicated lead concentrations for the reference method samples in μg/m³ for each analysis of each filter. Calculate the indicated total lead amount for the audit samples in μg/strip for each analysis of each strip. Label these test results as R_{1A}, R_{1B}, R_{1C}, R_{2A}, R_{2B}, ..., Q_{1A}, Q_{1B}, Q_{1C}, ..., where R denotes results from the reference method samples; Q denotes results from the audit samples; 1, 2, 3 indicate the filter number, and A, B, C indicate the first, second, and third analysis of each filter, respectively.

(2) For the candidate method samples, analyze each sample filter or filter extract three times and calculate, in accordance with the candidate method, the indicated lead concentrates in μg/m³ for each analysis of each filter. Label these test results as C_{1A}, C_{1B}, C_{2C}, ..., where C denotes results from the candidate method. For candidate methods which provide a direct measurement of lead concentrations without a separable procedure, $C_{1A} = C_{1B} = C_{1C}$, $C_{2A} = C_{2B} = C_{2C}$, etc.

(d) *Average lead concentration*. For the reference method, calculate the average lead concentration for each filter by averaging the concentrations calculated from the three analyses:

Equation 1

$$R_{i\ ave} = \frac{R_{iA} + R_{iB} + R_{iC}}{3}$$

where:

i is the filter number.

(e) *Acceptable filter pairs*. Disregard all filter pairs for which the lead concentration as determined in the previous paragraph (d) of this section by the average of the three reference method determinations, falls outside the range of 0.5 to 4.0 μg/m³. All remaining filter pairs must be subjected to both of the following tests for precision and comparability. At least five filter pairs must be within the 0.5 to 4.0 μg/m³ range for the tests to be valid.

(f) *Test for precision*. (1) Calculate the precision (P) of the analysis (in percent) for each filter and for each method, as the maximum minus the minimum divided by the average of the three concentration values, as follows:

Equation 2

$$P_{Ri} = \frac{R_{i\ max} - R_{i\ min}}{R_{i\ ave}} \text{ x } 100\%$$

or

Equation 3

$$P_{Ci} = \frac{C_{i\ max} - C_{i\ min}}{C_{i\ ave}} \text{ x } 100\%$$

where:

i indicates the filter number.

(2) If any reference method precision value (P_{Ri}) exceeds 15 percent, the precision of the reference method analytical procedure is out of control. Corrective action must be taken to determine the source(s) of imprecision and the reference method determinations must be repeated according to paragraph (c) of this section, or the entire test procedure (starting with paragraph (a) of this section) must be repeated.

(3) If any candidate method precision value (P_{Ci}) exceeds 15 percent, the candidate method fails the precision test.

(4) The candidate method passes this test if all precision values (i.e., all P_{Ri}'s and all P_{Ci}'s) are less than 15 percent.

(g) *Test for accuracy*. (1)(i) For the audit samples calculate the average lead concentration for each strip by averaging the concentrations calculated from the three analyses:

Equation 4

$$Q_{i\ ave} = \frac{Q_{iA} + Q_{iB} + Q_{iC}}{3}$$

where:

i is audit sample number.

(ii) Calculate the percent difference (D_q) between the indicated lead concentration for each audit sample and the true lead concentration (T_q) as follows:

Equation 5

$$D_{qi} = \frac{Q_{i\ ave} - T_{qi}}{T_{qi}} \text{ x } 100\%$$

(2) If any difference value (D_{qi}) exceeds ±5 percent, the accuracy of the

reference method analytical procedure is out of control. Corrective action must be taken to determine the source of the error(s) (e.g., calibration standard discrepancies, extraction problems, etc.) and the reference method and audit sample determinations must be repeated according to paragraph (c) of this section, or the entire test procedure (starting with paragraph (a) of this section) must be repeated.

(h) *Test for comparability.* (1) For each filter pair, calculate all nine possible percent differences (D) between the reference and candidate methods, using all nine possible combinations of the three determinations (A, B, and C) for each method, as:

Equation 6

$$D_{in} = \frac{C_{ij} - R_{ik}}{R_{ik}} \text{ x } 100\%$$

where:

i is the filter number, and n numbers from 1 to 9 for the nine possible difference combinations for the three determinations for each method (j = A, B, C, candidate; k = A, B, C, reference).

(2) If none of the percent differences (D) exceeds ±20 percent, the candidate method passes the test for comparability.

(3) If one or more of the percent differences (D) exceeds ±20 percent, the candidate method fails the test for comparability.

(i) The candidate method must pass both the precision test (paragraph (f) of this section) and the comparability test (paragraph (h) of this section) to qualify for designation as an equivalent method.

§ 53.34 Test procedure for methods for PM_{10} and $PM_{2.5}$.

(a) *Collocated measurements.* Set up three reference method samplers collocated with three candidate method samplers or analyzers at each of the number of test sites specified in table C–4 of this subpart. At each site, obtain as many sets of simultaneous PM_{10} or $PM_{2.5}$ measurements as necessary (see paragraph (c)(3) of this section), each set consisting of three reference method and three candidate method measurements, all obtained simultaneously. For $PM_{2.5}$ candidate Class II equivalent methods, at least two collocated PM_{10} reference method samplers are also required to obtain $PM_{2.5}/PM_{10}$ ratios for each sample set. Candidate PM_{10} method measurements shall be 24-hour integrated measurements; $PM_{2.5}$ measurements may be either 24- or 48-hour integrated measurements. All collocated measurements in a sample set must cover the same 24- or 48-hour time period. For samplers, retrieve the samples promptly after sample collection and analyze each sample according to the reference method or candidate method, as appropriate, and determine the PM_{10} or $PM_{2.5}$ concentration in μg/m³. If the conditions of § 53.30(d)(4) apply, collect sample sets only with the three reference method samplers. Guidance for quality assurance procedures for $PM_{2.5}$ methods is found in section 2.12 of the Quality Assurance Handbook (reference 6 of appendix A to subpart A of this part).

(b) *Sequential samplers.* For sequential samplers, the sampler shall be configured for the maximum number of sequential samples and shall be set for automatic collection of all samples sequentially such that the test samples are collected equally, to the extent possible, among all available sequential channels or utilizing the full available sequential capability.

(c) *Test for comparability and precision.* (1) For each of the measurement sets, calculate the average PM_{10} or $PM_{2.5}$ concentration obtained with the reference method samplers:

Equation 7

$$\overline{R}_j = \frac{\sum_{i=1}^{3} R_{ij}}{3}$$

where:

R denotes results from the reference method;
i is the sampler number; and
j is the set.

(2)(i) For each of the measurement sets, calculate the precision of the reference method PM_{10} or $PM_{2.5}$ measurements as:

Equation 8

$$P_j = \sqrt{\frac{\sum_{i=1}^{3} R_{ij}^2 - \frac{1}{3}\left(\sum_{i=1}^{3} R_{ij}\right)^2}{2}}$$

If the corresponding $\bar{R}_j$ is below:

80 μg/m³ for PM_{10} methods.
40 μg/m³ for 24-hour $PM_{2.5}$ at single test sites for Class I candidate methods.
40 μg/m³ for 24-hour $PM_{2.5}$ at sites having $PM_{2.5}/PM_{10}$ ratios >0.75.
30 μg/m³ for 48-hour $PM_{2.5}$ at single test sites for Class I candidate methods.
30 μg/m³ for 48-hour $PM_{2.5}$ at sites having $PM_{2.5}/PM_{10}$ ratios >0.75.
30 μg/m³ for 24-hour $PM_{2.5}$ at sites having $PM_{2.5}/PM_{10}$ ratios <0.40.
20 μg/m³ for 48-hour $PM_{2.5}$ at sites having $PM_{2.5}/PM_{10}$ ratios >0.75.

(ii) Otherwise, calculate the precision of the reference method PM_{10} or $PM_{2.5}$ measurements as:

Equation 9

$$Rp_j = \frac{1}{\bar{R}_j}\sqrt{\frac{\sum_{i=1}^{3} R_{ij}^2 - \frac{1}{3}\left(\sum_{i=1}^{3} R_{ij}\right)^2}{2}} \times 100\%$$

(3) If $\bar{R}_j$ falls outside the acceptable concentration range specified in table C–4 of this subpart for any set, or if P_j RP_j as applicable, exceeds the value specified in table C–4 of this subpart for any set, that set of measurements shall be discarded. For each site, table C–4 of this subpart specifies the minimum number of sample sets required for various conditions, and §53.30(b)(5) specifies the $PM_{2.5}/PM_{10}$ ratio requirements applicable to Class II candidate equivalent methods. Additional measurement sets shall be collected and analyzed, as necessary, to provide a minimum of 10 acceptable measurement sets for each test site. If more than 10 measurement sets are collected that meet the above criteria, all such measurement sets shall be used to demonstrate comparability.

(4) For each of the acceptable measurement sets, calculate the average PM_{10} or $PM_{2.5}$ concentration obtained with the candidate method samplers:

Equation 10

$$\bar{C}_j = \frac{\sum_{i=1}^{3} C_{ij}}{3}$$

where:

C denotes results from the candidate method;
i is the sampler number; and
j is the set.

(5) For each site, plot the average PM_{10} or $PM_{2.5}$ measurements obtained with the candidate method ($\bar{R}_j$) against the corresponding average PM_{10} or $PM_{2.5}$ measurements obtained with the reference method ($\bar{R}_j$). For each site, calculate and record the linear regression slope and intercept, and the correlation coefficient.

(6) If the linear regression parameters calculated under paragraph (c)(5) of this section meet the values specified in table C–4 of this subpart for all test sites, the candidate method passes the test for comparability.

[62 FR 38792, July 19, 1997; 63 FR 7714, Feb. 17, 1998]

TABLE C–1 TO SUBPART C—TEST CONCENTRATION RANGES, NUMBER OF MEASUREMENTS REQUIRED, AND MAXIMUM DISCREPANCY SPECIFICATION

Pollutant	Concentration Range Parts per Million	Simultaneous Measurements Required				Maximum Discrepancy Specification, Parts per Million
		1–hr		24–hr		
		First Set	Second Set	First Set	Second Set	
Ozone	Low 0.06 to 0.10	5	6			0.02
	Med 0.15 to 0.25	5	6			.03
	High 0.35 to 0.45	4	6			.04
	Total	14	18			
Carbon Monoxide	Low 7 to 11	5	6			1.5
	Med 20 to 30	5	6			2.0

Pollutant	Concentration Range Parts per Million	Simultaneous Measurements Required				Maximum Discrepancy Specification, Parts per Million
		1–hr		24–hr		
		First Set	Second Set	First Set	Second Set	
	High 35 to 45	4	6	.....	.....	3.0
	Total	14	18			
Sulfur Dioxide	Low 0.02 to 0.05	.....	.....	3	3	0.02
	Med 0.10 to 0.15	.....	.....	2	3	.03
	High 0.30 to 0.50	7	8	2	2	.04
	Total	7	8	7	8	
Nitrogen Dioxide	Low 0.02 to 0.08	.....	.....	3	3	0.02
	Med 0.10 to 0.20	.....	.....	2	3	.03
	High 0.25 to 0.35	.....	.....	2	2	.03
	Total	.....	.....	7	8	

Table C–2 to Subpart C—Sequence of Test Measurements

Measurement	Concentration Range	
	First Set	Second Set
1	Low	Medium
2	High	High
3	Medium	Low
4	High	High
5	Low	Medium
6	Medium	Low
7	Low	Medium
8	Medium	Low
9	High	High
10	Medium	Low
11	High	Medium
12	Low	High
13	Medium	Medium
14	Low	High
15	.....	Low
16	.....	Medium
17	.....	Low
18	.....	High

Table C–3 to Subpart C—Test Specifications for Lead Methods

Concentration range, μg/m³	0.5–4.0
Minimum number of 24-hr measurements	5
Maximum analytical precision, percent	5
Maximum analytical accuracy, percent	±5
Maximum difference, percent of reference method	±20

Table C–4 to Subpart C—Test Specifications for PM_{10} and $PM_{2.5}$ Methods

Specification	PM_{10}	$PM_{2.5}$	
		Class I	Class II
Acceptable concentration range ($\bar{R}_j$), μg/m³	30–300	10–200	10–200
Minimum number of test sites	2	1	2
Number of candidate method samplers per site	3	3	3
Number of reference method samplers per site	3	3	3
Minimum number of acceptable sample sets per site for PM_{10}:			
$\bar{R}_j$ < 80 μg/m³	3		
$\bar{R}_j$ > 80 μg/m³	3		
Total	10		

Specification	PM_{10}	$PM_{2.5}$	
		Class I	Class II
Minimum number of acceptable sample sets per site for $PM_{2.5}$:			
Single test site for Class I candidate equivalent methods:			
$\bar{R}_j$ < 40 μg/m³ for 24-hr or $\bar{R}_j$ < 30 μg/m³ for 48-hr samples		3	
$\bar{R}_j$ > 40 μg/m³ for 24-hr or $\bar{R}_j$ > 30 μg/m³ for 48-hr samples		3	
Sites at which the $PM_{2.5}/PM_{10}$ ratio must be > 0.75:			
$\bar{R}_j$ < 40 μg/m³ for 24-hr or $\bar{R}_j$ < 30 μg/m³ for 48-hr samples			3
$\bar{R}_j$ > 40 μg/m³ for 24-hr or $\bar{R}_j$ > 30 μg/m³ for 48-hr samples			3
Sites at which the $PM_{2.5}/PM_{10}$ ratio must be < 0.40:			
$\bar{R}_j$ < 30 μg/m³ for 24-hr or $\bar{R}_j$ < 20 μg/m³ for 48-hr samples			3
$\bar{R}_j$ > 30 μg/m³ for 24-hr or $\bar{R}_j$ > 20 μg/m³ for 48-hr samples			3
Total, each site		10	10
Precision of replicate reference method measurements, P_j or RP_j respectively, maximum	5 μg/m³ or 7%	2 μg/m³ or 5%	2 μg/m³ or 5%
Slope of regression relationship	1±0.1	1±0.05	1±0.05
Intercept of regression relationship, μg/m³	0±5	0±1	0±1
Correlation of reference method and candidate method measurements	≥0.97	≥0.97	≥0.97

[62 FR 38792, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

FIGURE C–1 TO SUBPART C—SUGGESTED FORMAT FOR REPORTING TEST RESULTS

Candidate Method_____

Reference Method_____

Applicant_____

☐ First Set ☐ Second Set ☐ Type ☐ 1 Hour ☐ 24 Hour

Concentration Range		Date	Time	Concentration, ppm		Difference	Table C–1 Spec.	Pass or Fail
				Candidate	Reference			
Low _____ ppm to _____ ppm1	1							
	2							
	3							
	4							
	5							
	6							
Medium _____ ppm to _____ ppm1	1							
	2							
	3							
	4							
	5							
	6							
High _____ ppm to _____ ppm1	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
							Total Failures:	

APPENDIX A TO SUBPART C—REFERENCES

(1) American National Standard—Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, ANSI/ASQC E4-1994. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

Subpart D—Procedures for Testing Performance Characteristics of Methods for PM_{10}

SOURCE: 52 FR 24729, July 1, 1987, unless otherwise noted.

§ 53.40 General provisions.

(a) The test procedures prescribed in this subpart shall be used to test the performance of candidate methods for PM_{10} against the performance specifications given in table D–1. Except as provided in paragraph (b) of this section, a test sampler or samplers representative of the sampler described in the candidate method must exhibit performance better than, or equal to, the specified value for each performance parameter, to satisfy the requirements of this subpart.

(b) For a candidate method using a PM_{10} sampler previously approved as part of a designated PM_{10} method, only the test for precision need be conducted and passed to satisfy the requirements of this subpart. For a candidate method using a PM_{10} sampler inlet previously approved as part of a designated PM_{10} method, the tests for precision and flow rate stability must be conducted and passed to satisfy the requirements of this subpart; the tests for sampling effectiveness and 50 percent cutpoint need not be conducted if suitable rationale is provided to demonstrate that test results submitted for the previously approved method are applicable to the candidate method.

(c) The liquid particle sampling effectiveness and 50 percent cutpoint of a test sampler shall be determined in a wind tunnel using 10 particle sizes and three wind speeds as specified in table D–2. A minimum of 3 replicate measurements of sampling effectiveness shall be required for each of the 30 test conditions for a minimum of 90 test measurements.

(d) For the liquid particle sampling effectiveness parameter, a smooth curve plot shall be constructed of sampling effectiveness (percent) versus aerodynamic particle diameter (μm) for each of the three wind speeds. These plots shall be used to calculate the expected mass concentration for the test sampler, using the procedure in § 53.43(a). The candidate method passes the liquid particle sampling effectiveness test if the expected mass concentration calculated for the test sampler at each wind speed differs by no more than ±10 percent from that predicted for the ''ideal'' sampler.*

(e) For the 50 percent cutpoint parameter, the test result for each wind speed shall be reported as the particle size at which the curve specified in § 53.40(d) crosses the 50 percent effectiveness line. The candidate method passes the 50 percent cutpoint test if the test result at each wind speed falls within 10±0.5 μm.

(f) The solid particle sampling effectiveness of a test sampler shall be determined in a wind tunnel using 25 μm particles at 2 wind speeds as specified in table D–2. A minimum of three replicate measurements of sampling effectiveness for the 25 μm solid particles shall be required at both wind speeds for a minimum of 6 test measurements.

(g) For the solid particle sampling effectiveness parameter, the test result for each wind speed shall be reported as the difference between the average of the replicate sampling effectiveness measurements obtained for the 25 μm solid particles and the average of the replicate measurements obtained for the 25 μm liquid particles. The candidate method passes the solid particle sampling effectiveness test if the test result for each wind speed is less than, or equal to, 5 percent.

(h) The precision and flow rate stability of three identical test samplers shall be determined at a suitable test site by simultaneously sampling the PM_{10} concentration of the atmosphere for 10 periods of 24 hours.

(i) For the precision parameter, the test result for each of the 10 periods of 24 hours shall be calculated using the procedure in § 53.43(c). The candidate method passes the precision test if all of the test results meet the specifications in table D–1.

---

*The sampling effectiveness curve for this ''ideal'' sampler is described by column 5 of table D–3 and is based on a model that approximates the penetration of particles into the human respiratory tract. Additional information on this model may be found in a document entitled, ''Particle Collection Criteria for 10 Micrometer Samplers,'' which is available from the Quality Assurance Division (MD–77), Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

(j) For the flow rate stability parameter, the test results for each of the three test samplers and for each of the 10 periods of 24 hours shall be calculated using the procedure in § 53.43(d). The candidate method passes the flow rate stability test if all of the test results meet the specifications in table D–1.

(k) All test data and other documentation obtained from or pertinent to these tests shall be identified, dated, signed by the analyst performing the test, and submitted to EPA.

TABLE D–1—PERFORMANCE SPECIFICATIONS FOR PM_{10} SAMPLERS

Performance parameter	Units	Specification
1. Sampling effectiveness:		
A. Liquid particles	Percent	Such that the expected mass concentration is within ±10 percent of that predicted for the ideal sampler.
B. Solid particles	Percent	Sampling effectiveness is no more than 5 percent above that obtained for liquid particles of same size.
2. 50 Percent cutpoint	µm	10±µ.5 µm aerodynamic diameter.
3. Precision	µg/m³ or percent	5 µg/m³ or 7 percent for three collocated samplers.
4. Flow rate stability	Percent	Average flow rate over 24 hours within ±5 percent of initial flow rate; all measured flow rates over 24 hours within ±10 percent of initial flow rate.

§ 53.41 Test conditions.

(a) Set-up and start-up of all test samplers shall be in strict accordance with the operating instructions specified in the manual referred to in § 53.4(b)(3).

(b) If the internal surface or surfaces of the candidate method's sampler inlet on which the particles removed by the inlet are collected is a dry surface (i.e., not normally coated with oil or grease), those surfaces shall be cleaned prior to conducting wind tunnel tests with solid particles.

(c) Once the test sampler or samplers have been set up and the performance tests started, manual adjustment shall be permitted only between test points for the sampling effectiveness and 50 percent cutpoint tests or between test days for the precision and flow rate stability tests. The manual adjustments and any periodic maintenance shall be limited to only those procedures prescribed in the manual referred to in § 53.4(b)(3). The submitted records shall show clearly when any manual adjustment or periodic maintenance was made and shall describe the operations performed.

(d) If a test sampler malfunctions during any of the sampling effectiveness and 50 percent cutpoint tests, that test run shall be repeated. If a test sampler malfunctions during any of the precision and flow rate stability tests, that day's test shall be repeated. A detailed explanation of all malfunctions and the remedial actions taken shall be submitted to EPA with the application.

§ 53.42 Generation of test atmospheres for wind tunnel tests.

(a) A vibrating orifice aerosol generator shall be used to produce monodispersed liquid particles of oleic acid tagged with uranine dye and monodispersed solid particles of ammonium fluoroscein with equivalent aerodynamic diameters as specified in table D–2. The geometric standard deviation for each particle size and type generated shall not exceed 1.1 (for primary particles) and the proportion of multiplets (doublets and triplets) in a test particle atmosphere shall not exceed 10 percent. The particle delivery system shall consist of a blower system and a wind tunnel having a test section of sufficiently large cross-sectional area such that the test sampler, or portion thereof, as installed in the test section for testing, blocks no more than 15 percent of that area. To be acceptable, the blower system must be capable of achieving uniform wind speeds at the speeds specified in table D–2.

TABLE D–2—PARTICLE SIZES AND WIND SPEEDS FOR SAMPLING EFFECTIVENESS TESTS

Particle size (µm) [a]	Wind speed (km/hr)		
	2	8	24
3±0.5	/	/	/
5±0.5	/	/	/
7±0.5	/	/	/

TABLE D–2—PARTICLE SIZES AND WIND SPEEDS FOR SAMPLING EFFECTIVENESS TESTS—Continued

Particle size (μm) [a]	Wind speed (km/hr)		
	2	8	24
9±0.5	/	/	/
10±0.5	/	/	/
11±0.5	/	/	/
13±1.0	/	/	/
15±1.0	/	/	/
20±1.0	/	/	/
25±1.0	/	//s	//s

a&thnsp≅ Mass median aerodynamic diameter.
/ = liquid particle.
s=solid particle.
Number of liquid particle test points (minimum of 3 replicates for each combination of particle size and wind speed): 90.
Number of solid particle test points (minimum of 3 replicates for each combination of particle size and wind speed): 6.
Total number of test points: 96.

(b) The size of the test particles delivered to the test section of the wind tunnel shall be established using the operating parameters of the vibrating orifice aerosol generator and shall be verified during the tests by microscopic examination of samples of the particles collected on glass slides or other suitable substrates. When sizing liquid particles on glass slides, the slides should be pretreated with an oleophobic surfactant and an appropriate flattening factor shall be used in the calculation of aerodynamic diameter. The particle size, as established by the operating parameters of the vibrating orifice aerosol generator, shall be within the tolerance specified in table D–2. The precision of the particle size verification technique shall be 0.5 μm or better, and particle size determined by the verification technique shall not differ by more than 0.5 μm or 10 percent, whichever is higher, from that established by the operating parameters of the vibrating orifice aerosol generator.

(c) The population of multiplets in a test particle atmosphere shall be determined during the tests and shall not exceed 10 percent. Solid particles shall be checked for dryness and evidence of breakage or agglomeration during the microscopic examination. If the solid particles in a test atmosphere are wet or show evidence of significant breakage or agglomeration (μ5 percent), the solid particle test atmosphere is unacceptable for purposes of these tests.

(d) The concentration of particles in the wind tunnel is not critical. However, the cross-sectional uniformity of the particle concentration in the sampling zone of the test section shall be established during the tests using isokinetic samplers. An array of not less than five evenly spaced isokinetic samplers shall be used to determine the particle concentration uniformity in the sampling zone. If the particle concentration measured by any single isokinetic sampler in the sampling zone differs by more than 10 percent from the mean concentration, the particle delivery system is unacceptable in terms of uniformity of particle concentration. The sampling zone shall be a rectangular area having a horizontal dimension not less than 1.2 times the width of the test sampler at its inlet opening and a vertical dimension not less than 25 centimeters. The sampling zone is an area in the test section of the wind tunnel that is horizontally and vertically symmetrical with respect to the test sampler inlet opening.

(e) The wind speed in the wind tunnel shall be determined during the tests using an appropriate technique capable of a precision of 5 percent or better (e.g., hot-wire anemometry). The mean wind speed in the test section of the wind tunnel during the tests shall be within 10 percent of the value specified in table D–2. The wind speed measured at any test point in the test section shall not differ by more than 10 percent from the mean wind speed in the test section. The turbulence intensity (longitudinal component and macroscale) in the test section shall be determined during the tests using an appropriate technique (e.g., hot-wire anemometry).

(f) The accuracy of all flow measurements used to calculate the test atmosphere concentrations and the test results shall be documented to be within ±2 percent, referenced to a primary standard. Any flow measurement corrections shall be clearly shown. All flow measurements shall be given in actual volumetric units.

(g) Schematic drawings of the particle delivery system (wind tunnel and blower system) and other information showing complete procedural details of the test atmosphere generation, verification, and delivery techniques

shall be submitted to EPA. All pertinent calculations shall be clearly presented.

§53.43 Test procedures.

(a) *Sampling effectiveness*—(1) *Technical definition*. The ratio (expressed as a percentage) of the mass concentration of particles of a given size reaching the sampler filter or filters to the mass concentration of particles of the same size approaching the sampler.

(2) *Test procedure*. (i) Establish a wind speed specified in table D–2 and measure the wind speed and turbulence intensity (longitudinal component and macroscale) at a minimum of 12 test points in a cross-sectional area of the test section of the wind tunnel. The mean wind speed in the test section must be within ±10 percent of the value specified in table D–2 and the variation at any test point in the test section may not exceed 10 percent of the mean.

(ii) Generate particles of a size and type specified in table D–2 using a vibrating orifice aerosol generator. Check for the presence of satellites and adjust the generator as necessary. Calculate the aerodynamic particle size using the operating parameters of the vibrating orifice aerosol generator and record. The calculated aerodynamic diameter must be within the tolerance specified in table D–2.

(iii) Collect a sample of the particles on a glass slide or other suitable substrate at the particle injection point. If a glass slide is used, it should be pretreated with an appropriate oleophobic surfactant when collecting liquid particles. Use a microscopic technique to size a minimum of 25 primary particles in three viewing fields (do not include multiplets). Determine the geometric mean aerodynamic diameter and geometric standard deviation using the bulk density of the particle type (and an appropriate flattening factor for liquid particles if collected on a glass slide). The measured geometric mean aerodynamic diameter must be within 0.5 μm or 10 percent of the aerodynamic diameter calculated from the operating parameters of the vibrating orifice aerosol generator. The geometric standard deviation must not exceed 1.1.

(iv) Determine the population of multiplets (doublets and triplets) in the collected sample by counting a minimum of 100 particles in three viewing fields. The multiplet population of the particle test atmosphere must not exceed 10 percent.

(v) Introduce the particles into the wind tunnel and allow the particle concentration to stabilize.

(vi) Install an array of five or more evenly spaced isokinetic samplers in the sampling zone (see §53.42(d)) of the wind tunnel. Collect particles on appropriate filters (e.g., glass fiber) over a time period such that the relative error of the measured particle concentration is less than 5 percent. Relative error is defined as (p×100%)/(X), where p is the precision of the fluorometer on the appropriate range, X is the measured concentration, and the units of p and X are the same.

(vii) Determine the quantity of material collected with each isokinetic sampler in the array using a calibrated fluorometer. Calculate and record the mass concentration for each isokinetic sampler as:

$$C_{iso(ij)} = \frac{\text{mass of material collected with isokinetic sampler}}{\text{sample flow rate} \times \text{sampling time}}$$

where
i = replicate number and j = isokinetic sampler number.

(viii) Calculate and record the mean mass concentration as:

$$C_{iso(i)} = \frac{\sum_{j=1}^{n} C_{iso(ij)}}{n}$$

where
n = total number of isokinetic samplers.

(ix) Calculate and record the coefficient of variation of the mass concentration measurements as:

$$CV_{iso(i)} = \sqrt{\frac{\sum_{j=1}^{n} C^2 iso(ij) - \sum_{j=1}^{n} C_{iso(ij)}^{2/n}}{n-1}} \Big/ \overline{C}_{iso(i)}$$

If the value of $CV_{iso(i)}$ exceeds 0.10, the particle concentration uniformity is unacceptable and steps (vi) through (ix) must be repeated. If adjustment of the vibrating orifice aerosol generator or changes in the particle delivery system are necessary to achieve uniformity, steps (ii) through (ix) must be repeated. Remove the array of isokinetic samplers from the wind tunnel. NOTE: A single isokinetic sampler, operated at the same nominal flow rate as the test sampler, may be used in place of the array of isokinetic samplers for the determination of particle mass concentration used in the calculation of sampling effectiveness of the test sampler in step (xiii). In this case, the array of isokinetic samplers must be used to demonstrate particle concentration uniformity prior to the replicate measurements of sampling effectiveness.

(x) If a single isokinetic sampler is used, install the sampler in the wind tunnel with the sampler nozzle centered in the sampling zone (see § 53.42(d)). Collect particles on an appropriate filter (e.g., glass fiber) for a time period such that the relative error of the measured concentration (as defined in step (vi)) is less than 5 percent. Determine the quantity of material collected with the isokinetic sampler using a calibrated fluorometer. Calculate and record the mass concentration as $C_{iso(i)}$ as in step vii. Remove the isokinetic sampler from the wind tunnel.

(xi) Install the test sampler (or portion thereof) in the wind tunnel with the sampler inlet opening centered in the sampling zone (see § 53.42(d)). To meet the maximum blockage limit of § 53.42(a) or for convenience, part of the test sampler may be positioned external to the wind tunnel provided that neither the geometry of the sampler nor the length of any connecting tube or pipe is altered. Collect particles on an appropriate filter or filters (e.g., glass fiber) for a time period such that the relative error of the measured concentration (as defined in step (vi)) is less than 5 percent.

(xii) Determine the quantity of material collected with the test sampler using a calibrated fluorometer. Calculate and record the mass concentration as:

$$C_{sam(i)} = \frac{\text{mass of material collected with test sampler}}{\text{sample flow rate} \times \text{sampling time}}$$

where i=replicate number.

(xiii) Calculate and record the sampling effectiveness of the test sampler as:

$$E_{(i)} = \frac{C_{sam(i)}}{C_{iso(i)}} \times 100\%$$

where i = replicate number.

NOTE: If a single isokinetic sampler is used for the determination of particle mass concentration, replace $C_{iso(i)}$ with $C_{iso(i)}$.

(xiv) Remove the test sampler from the wind tunnel. Repeat steps (vi) through (xiii), as appropriate, to obtain a minimum of three replicate measurements of sampling effectiveness.

(xv) Calculate and record the average sampling effectiveness of the test sampler as:

$$\overline{E} = \frac{\sum_{i=1}^{n} E_{(i)}}{n}$$

where n=number of replicates.

(xvi) Calculate and record the coefficient of variation for the replicate sampling effectiveness measurements of the test sampler as:

$$CV_E = \sqrt{\frac{\sum_{i=1}^{n} E^2{}_{(i)} - \left(\sum_{i=1}^{n} E_{(i)}\right)^{2/n}}{n-1}} \Big/ \overline{E}$$

If the value of CV_E exceeds 0.10, the test run (steps (ii) through (xvi)) must be repeated.

(xvii) Repeat steps i through xvi for each wind speed, particle size, and particle type specified in table D–2.

(xviii) For each of the three wind speeds (nominally 2, 8, and 24 km/hr), correct the liquid particle sampling effectiveness data for the presence of multiplets (doublets and triplets) in the test particle atmospheres.

(xix) For each wind speed, plot the corrected liquid particle sampling effectiveness of the test sampler (E_{corr}) as a function of particle size (d_p) on semilogarithmic graph paper where d_p is the particle size established by the operating parameters of the vibrating orifice aerosol generator. Construct a smooth curve through the data.

(xx) For each wind speed, calculate the expected mass concentration for the test sampler under the assumed particle size distribution and compare it to the mass concentration predicted for the ideal sampler, as follows:

(A) Extrapolate the upper and lower ends of the corrected liquid particle sampling effectiveness curve to 100 percent and 0 percent, respectively, using smooth curves. Assume that E_{corr} = 100 percent at a particle size of 1.0 μm and E_{corr} = 0 percent at a particle size of 50 μm.

(B) Determine the value of E_{corr} at each of the particle sizes specified in the first column of table D–3. Record each E_{corr} value as a decimal between 0 and 1 in the second column of table D–3.

(C) Multiply the values of E_{corr} in column 2 by the interval mass concentration values in column 3 and enter the products in column 4 of table D–3.

(D) Sum the values in column 4 and enter the total as the expected mass concentration for the test sampler at the bottom of column 4 of table D–3.

(E) Calculate and record the percent difference in expected mass concentration between the test sampler and the ideal sampler as:

$$\Delta C = \frac{C_{sam(exp)} - C_{ideal(exp)}}{C_{ideal(exp)}} \times 100\%$$

where:

$C_{sam(exp)}$ = expected mass concentration for the test sampler, μg/m³

$C_{ideal(exp)}$ = expected mass concentration for the ideal sampler, μg/m³ (calculated for the ideal sampler and given at the bottom of column 7 of table D–3.)

(F) The candidate method passes the liquid particle sampling effectiveness test if the Δ C value for each wind speed meets the specification in table D–1.

(xxi) For each of the two wind speeds (nominally 8 and 24 km/hr), calculate the difference between the average sampling effectiveness value for the 25 μm solid particles and the average sampling effectiveness value for the 25 μm liquid particles (uncorrected for multiplets).

(xxii) The candidate method passes the solid particle sampling effectiveness test if each such difference meets the specification in table D–1.

TABLE D–3—EXPECTED MASS CONCENTRATION FOR PM_{10} SAMPLERS

Particle size (um)	Test sampler			Ideal Sampler		
	Sampling effectiveness	Interval mass concentration (μg/m³)	Expected mass concentration (μg/m³)	Sampling effectiveness	Interval mass concentration (μg/m³)	Expected mass concentration (μg/m³)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<1.0	1.000	62.813	62.813	1.000	62.813	62.813
1.5		9.554		0.949	9.554	9.067
02.0		2.164		0.942	2.164	2.038
02.5		1.785		0.933	1.785	1.665
03.0		2.084		0.922	2.084	1.921
03.5		2.618		0.909	2.618	2.380
04.0		3.211		0.893	3.211	2.867
04.5		3.784		0.876	3.784	3.315
05.0		4.300		0.857	4.300	3.685
05.5		4.742		0.835	4.742	3.960
06.0		5.105		0.812	5.105	4.145
06.5		5.389		0.786	5.389	4.236
07.0		5.601		0.759	5.601	4.251
07.5		5.746		0.729	5.746	4.189
08.0		5.834		0.697	5.834	4.066
08.5		5.871		0.664	5.871	3.898
09.0		5.864		0.628	5.864	3.683
09.5		5.822		0.590	5.822	3.435
10.0		5.750		0.551	5.750	3.168
10.5		5.653		0.509	5.653	2.877
11.0		8.257		0.465	8.257	3.840
12.0		10.521		0.371	10.521	3.903
13.0		9.902		0.269	9.902	2.664
14.0		9.250		0.159	9.250	1.471
15.0		8.593		0.041	8.593	0.352
16.0		7.948		0.000	7.948	0.000
17.0		7.329		0.000	7.329	0.000
18.0		9.904		0.000	9.904	0.000
20.0		11.366		0.000	11.366	0.000
22.0		9.540		0.000	9.540	0.000
24.0		7.997		0.000	7.997	0.000
26.0		6.704		0.000	6.704	0.000
28.0		5.627		0.000	5.627	0.000
30.0		7.785		0.000	7.785	0.000
35.0		7.800		0.000	7.800	0.000
40.0		5.192		0.000	5.192	0.000
45.0		4.959		0.000	4.959	0.000
		$C_{sam(exp)}$ = D			$C_{ideal(exp)}$ =	143.889

(b) *50 Percent cutpoint*—(1) *Technical definition*. The particle size for which the sampling effectiveness of the sampler is 50 percent.

(2) *Test procedure*. (i) From the corrected liquid particle sampling effectiveness curves for each of the three wind speeds, determine the particle size at which the curve crosses the 50 percent effectiveness line and record as D_{50} on the corresponding sampling effectiveness plot.

(ii) The candidate method passes the 50 percent cutpoint test if the D_{50} value at each wind speed meets the specification in table D–1.

(c) *Precision*—(1) *Technical definition*. The variation in the measured particle concentration among identical samplers under typical sampling conditions.

(2) *Test procedure*. (i) Set up three identical test samplers at the test site in strict accordance with the instructions in the manual referred to in § 53.4(b)(3). Locate the test sampler inlet openings at the same height and between 2 and 4 meters apart. The samplers shall be oriented in a manner that will minimize spatial and wind directional effects on sample collection. Perform a flow calibration for each test sampler in accordance with the instructions given in the instruction manual and/or appendix J to part 50 of this chapter. Set the operating flow rate to the value prescribed in the sampler instruction manual.

NOTE: For candidate equivalent methods, this test may be used to satisfy part of the requirements of subpart C of this chapter. In that case, three reference method samplers are also used at the test site, measurements with the candidate and reference methods are compared as specified in § 53.34, and the test site must meet the requirements of § 53.30(b).

(ii) Measure the PM_{10} concentration of the atmosphere using the three test samplers for 10 periods (test days) of 24 hours each. On each of the 10 test days, measure the initial and final flow rates of each test sampler. On three of the test days, measure the flow rate of each test sampler after 6, 12, and 18 hours of operation. All measurements of flow rate and mass collected must be made in accordance with the procedures prescribed in the sampler instruction manual and/or appendix J to part 50 of this chapter. All measurements of flow rate must be in actual volumetric units. Record the PM_{10} concentration for each sampler and each test day as $C_{(i)(j)}$ where i is the sampler number and j is the test day.

(iii) For each test day, calculate and record the average of the three measured PM_{10} concentrations as $C_{(j)}$ where j is the test day. If $C_{(j)}<30\ \mu g/m^3$ for any test day, data from that test day are unacceptable and the tests for that day must be repeated.

(iv) Calculate and record the precision for each of the 10 test days as:

$$P_j = \sqrt{\frac{\sum_{i=1}^{3} C^2{}_{(i)(j)} - \left(\sum_{i=1}^{3} C_{(i)(j)}\right)^{2/3}}{2}}$$

if $\overline{C}j$ is below 80 $\mu g/m^3$, or

$$RP_j = 100\% \times \sqrt{\frac{\sum_{i=1}^{3} C^2{}_{(i)(j)} - \left(\sum_{i=1}^{3} C_{(i)(j)}\right)^{2/3}}{2}} \quad \overline{C}_{(j)}$$

if $\overline{C}j$ is above 80 $\mu g/m^3$.

(v) The candidate method passes the precision test if all 10 P_j or RP_j values meet the specifications in table D–1.

(d) *Flow rate stability*—(1) *Technical definition*. Freedom from variation in the operating flow rate of the sampler under typical sampling conditions.

(2) *Test procedure*. (i) For each of the three test samplers and each of the 10 test days of the precision test, record each measured flow rate as $F_{(i)(j)(t)}$, where i is the sampler number, j is the test day, and t is the time of flow rate measurement (t=0, 6, 12, 18, or 24 hours).

(ii) For each sampler and for each test day, calculate and record the average flow rate as:

$$\overline{F}_{(i)(j)} = \frac{\sum_{t=0}^{24} F_{(i)(j)(t)}}{n}$$

where n = number of flow rate measurements during the 24-hour test day.

(iii) For each sampler and for each test day, calculate and record the percent difference between the average flow rate and the initial flow rate as:

$$\Delta F_{(i)(j)} = \frac{\overline{F}_{(i)(j)} - F_{(i)(j)(0)}}{F_{(i)(j)(0)}} \times 100\%$$

where $F_{(i)(j)(0)}$ is the initial flow rate (t=0).

(iv) For each sampler and for each of the 3 test days on which flow measurements were obtained at 6-hour intervals throughout the 24-hour sampling period, calculate and record the percent differences between each measured flow rate and the initial flow rate as:

$$\Delta F_{(i)(j)(t)} = \frac{F_{(i)(j)} - F_{(i)(j)(0)}}{F_{(i)(j)(0)}} \times 100\%$$

where t = 6, 12, 18, or 24 hours.

(v) The candidate method passes the flow rate stability test if all of the $\Delta F_{(i)(j)}$ and $\Delta F_{(i)(j)(t)}$ values meet the specifications in table D–1.

Subpart E—Procedures for Testing Physical (Design) and Performance Characteristics of Reference Methods and Class I Equivalent Methods for $PM_{2.5}$

SOURCE: 62 FR 38799, July 18, 1997, unless otherwise noted.

§ 53.50 General provisions.

(a) This subpart sets forth the specific tests that must be carried out and the test results, evidence, documentation, and other materials that must be provided to EPA to demonstrate that a $PM_{2.5}$ sampler associated with a candidate reference method or Class I equivalent method meets all design and performance specifications set forth in 40 CFR part 50, appendix L, as well as additional requirements specified in this subpart E. Some of these tests may also be applicable to portions of a candidate Class II equivalent method sampler, as determined under subpart F of this part. Some or all of these tests may also be applicable to a candidate Class III equivalent method sampler, as may be determined under § 53.3(a)(4) or § 53.3(b)(3).

(b) Samplers associated with candidate reference methods for $PM_{2.5}$ shall be subject to the provisions, specifications, and test procedures prescribed in §§ 53.51 through 53.58. Samplers associated with candidate Class I equivalent methods for $PM_{2.5}$ shall be subject to the provisions, specifications, and test procedures prescribed in all sections of this subpart. Samplers associated with candidate Class II equivalent methods for $PM_{2.5}$ shall be subject to the provisions, specifications, and test procedures prescribed in all applicable sections of this subpart, as specified in subpart F of this part.

(c) The provisions of § 53.51 pertain to test results and documentation required to demonstrate compliance of a candidate method sampler with the design specifications set forth in 40 CFR part 50, appendix L. The test procedures prescribed in §§ 53.52 through 53.59 pertain to performance tests required to demonstrate compliance of a candidate method sampler with the performance specifications set forth in 40 CFR part 50, appendix L, as well as additional requirements specified in this subpart E. These latter test procedures shall be used to test the performance of candidate samplers against the performance specifications and requirements specified in each procedure and summarized in table E–1 of this subpart.

(d) Test procedures prescribed in § 53.59 do not apply to candidate reference method samplers. These procedures apply primarily to candidate Class I equivalent method samplers for $PM_{2.5}$ which have a sample air flow path configuration upstream of the sample filter that is modified with respect to that specified for the reference method sampler, as set forth in 40 CFR part 50, appendix L, figures L–1 to L–29, such as might be necessary to provide for sequential sample capability. The additional tests determine the adequacy of aerosol transport through any altered components or supplemental devices that are used in a candidate sampler upstream of the sample filter. In addition to the other test procedures in this subpart, these test procedures shall be used to further test the performance of such an equivalent method sampler against the performance specifications given in the procedure and summarized in table E–1 of this subpart.

(e) A 10–day operational field test of measurement precision is required under § 53.58 for both candidate reference and equivalent method samplers. This test requires collocated operation of three candidate method samplers at a field test site. For candidate

equivalent method samplers, this test may be combined and carried out concurrently with the test for comparability to the reference method specified under §53.34, which requires collocated operation of three reference method samplers and three candidate equivalent method samplers.

(f) All tests and collection of test data shall be performed in accordance with the requirements of reference 1, section 4.10.5 (ISO 9001) and reference 2, part B, section 3.3.1, paragraphs 1 and 2 and part C, section 4.6 (ANSI/ASQC E4) in appendix A of this subpart. All test data and other documentation obtained specifically from or pertinent to these tests shall be identified, dated, signed by the analyst performing the test, and submitted to EPA in accordance with subpart A of this part.

§53.51 Demonstration of compliance with design specifications and manufacturing and test requirements.

(a) *Overview*. (1) The subsequent paragraphs of this section specify certain documentation that must be submitted and tests that are required to demonstrate that samplers associated with a designated reference or equivalent method for $PM_{2.5}$ are properly manufactured to meet all applicable design and performance specifications and have been properly tested according to all applicable test requirements for such designation. Documentation is required to show that instruments and components of a $PM_{2.5}$ sampler are manufactured in an ISO 9001-registered facility under a quality system that meets ISO-9001 requirements for manufacturing quality control and testing.

(2) In addition, specific tests are required to verify that two critical features of reference method samplers impactor jet diameter and the surface finish of surfaces specified to be anodized meet the specifications of 40 CFR part 50, appendix L. A checklist is required to provide certification by an ISO-certified auditor that all performance and other required tests have been properly and appropriately conducted, based on a reasonable and appropriate sample of the actual operations or their documented records. Following designation of the method, another checklist is required, initially and annually, to provide an ISO-certified auditor's certification that the sampler manufacturing process is being implemented under an adequate and appropriate quality system.

(3) For the purposes of this section, the definitions of ISO 9001-registered facility and ISO-certified auditor are found in §53.1. An exception to the reliance by EPA on ISO-certified auditors is the requirement for the submission of the operation or instruction manual associated with the candidate method to EPA as part of the application. This manual is required under §53.4(b)(3). EPA has determined that acceptable technical judgment for review of this manual may not be assured by ISO-certified auditors, and approval of this manual will therefore be performed by EPA.

(b) *ISO registration of manufacturing facility*. (1) The applicant must submit documentation verifying that the samplers identified and sold as part of a designated $PM_{2.5}$ reference or equivalent method will be manufactured in an ISO 9001-registered facility and that the manufacturing facility is maintained in compliance with all applicable ISO 9001 requirements (reference 1 in appendix A of this subpart). The documentation shall indicate the date of the original ISO 9001 registration for the facility and shall include a copy of the most recent certification of continued ISO 9001 facility registration. If the manufacturer does not wish to initiate or complete ISO 9001 registration for the manufacturing facility, documentation must be included in the application to EPA describing an alternative method to demonstrate that the facility meets the same general requirements as required for registration to ISO-9001. In this case, the applicant must provide documentation in the application to demonstrate, by required ISO-certified auditor's inspections, that a quality system is in place which is adequate to document and monitor that the sampler system components and final assembled samplers all conform to the design, performance and other requirements specified in this part and in 40 CFR part 50, appendix L.

(2) Phase-in period. For a period of 1 year following the effective date of this

subpart, a candidate reference or equivalent method for $PM_{2.5}$ that utilizes a sampler manufactured in a facility that is not ISO 9001-registered or otherwise approved by EPA under paragraph (b)(1) of this section may be conditionally designated as a reference or equivalent method under this part. Such conditional designation will be considered on the basis of evidence submitted in association with the candidate method application showing that appropriate efforts are currently underway to seek ISO 9001 registration or alternative approval of the facility's quality system under paragraph (b)(1) of this section within the next 12 months. Such conditional designation shall expire 1 year after the date of the FEDERAL REGISTER notice of the conditional designation unless documentation verifying successful ISO 9001 registration for the facility or other EPA-acceptable quality system review and approval process of the production facility that will manufacture the samplers is submitted at least 30 days prior to the expiration date.

(c) *Sampler manufacturing quality control*. The manufacturer must ensure that all components used in the manufacture of $PM_{2.5}$ samplers to be sold as part of a reference or equivalent method and that are specified by design in 40 CFR part 50, appendix L, are fabricated or manufactured exactly as specified. If the manufacturer's quality records show that its quality control (QC) and quality assurance (QA) system of standard process control inspections (of a set number and frequency of testing that is less than 100 percent) complies with the applicable QA provisions of section 4 of reference 4 in appendix A of this subpart and prevents nonconformances, 100 percent testing shall not be required until that conclusion is disproved by customer return or other independent manufacturer or customer test records. If problems are uncovered, inspection to verify conformance to the drawings, specifications, and tolerances shall be performed. Refer also to paragraph (e) of this section—final assembly and inspection requirements.

(d) *Specific tests and supporting documentation required to verify conformance to critical component specifications*—(1) *Verification of $PM_{2.5}$ impactor jet diameter*. The diameter of the jet of each impactor manufactured for a $PM_{2.5}$ sampler under the impactor design specifications set forth in 40 CFR part 50, appendix L, shall be verified against the tolerance specified on the drawing, using standard, NIST-traceable ZZ go/no go plug gages. This test shall be a final check of the jet diameter following all fabrication operations, and a record shall be kept of this final check. The manufacturer shall submit evidence that this procedure is incorporated into the manufacturing procedure, that the test is or will be routinely implemented, and that an appropriate procedure is in place for the disposition of units that fail this tolerance test.

(2) *Verification of surface finish*. The anodization process used to treat surfaces specified to be anodized shall be verified by testing treated specimen surfaces for weight and corrosion resistance to ensure that the coating obtained conforms to the coating specification. The specimen surfaces shall be finished in accordance with military standard specification 8625F, Type II, Class I (reference 4 in appendix A of this subpart) in the same way the sampler surfaces are finished, and tested, prior to sealing, as specified in section 4.5.2 of reference 4 in appendix A of this subpart.

(e) *Final assembly and inspection requirements*. Each sampler shall be tested after manufacture and before delivery to the final user. Each manufacturer shall document its post-manufacturing test procedures. As a minimum, each test shall consist of the following: Tests of the overall integrity of the sampler, including leak tests; calibration or verification of the calibration of the flow measurement device, barometric pressure sensor, and temperature sensors; and operation of the sampler with a filter in place over a period of at least 48 hours. The results of each test shall be suitably documented and shall be subject to review by an ISO-certified auditor.

(f) *Manufacturer's audit checklists*. Manufacturers shall require an ISO-certified auditor to sign and date a statement indicating that the auditor

is aware of the appropriate manufacturing specifications contained in 40 CFR part 50, appendix L, and the test or verification requirements in this subpart. Manufacturers shall also require an ISO-certified auditor to complete the checklists, shown in figures E–1 and E–2 of this subpart, which describe the manufacturer's ability to meet the requirements of the standard for both designation testing and product manufacture.

(1) *Designation testing checklist.* The completed statement and checklist as shown in figure E–1 of this subpart shall be submitted with the application for reference or equivalent method determination.

(2) *Product manufacturing checklist.* Manufacturers shall require an ISO-certified auditor to complete a Product Manufacturing Checklist (figure E–2 of this subpart), which evaluates the manufacturer on its ability to meet the requirements of the standard in maintaining quality control in the production of reference or equivalent devices. The initial completed checklist shall be submitted with the application for reference or equivalent method determination. Also, this checklist (figure E–2 of this subpart) must be completed and submitted annually to retain a reference or equivalent method designation for a $PM_{2.5}$ method.

(3) *Phase-in period.* If the conditions of paragraph (b)(2) of this section apply, a candidate reference or equivalent method for $PM_{2.5}$ may be conditionally designated as a reference or equivalent method under this part 53 without the submission of the checklists described in paragraphs (f)(1) and (f)(2) of this section. Such conditional designation shall expire 1 year after the date of the FEDERAL REGISTER notice of the conditional designation unless the checklists are submitted at least 30 days prior to the expiration date.

[62 FR 38799, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 53.52 Leak check test.

(a) *Overview.* In section 7.4.6 of 40 CFR part 50, appendix L, the sampler is required to include the facility, including components, instruments, operator controls, a written procedure, and other capabilities as necessary, to allow the operator to carry out a leak test of the sampler at a field monitoring site without additional equipment. This test procedure is intended to test the adequacy and effectiveness of the sampler's leak check facility. Because of the variety of potential sampler configurations and leak check procedures possible, some adaptation of this procedure may be necessary to accommodate the specific sampler under test. The test conditions and performance specifications associated with this test are summarized in table E–1 of this subpart. The candidate test sampler must meet all test parameters and test specifications to successfully pass this test.

(b) *Technical definitions.* (1) External leakage includes the total flow rate of external ambient air which enters the sampler other than through the sampler inlet and which passes through any one or more of the impactor, filter, or flow rate measurement components.

(2) Internal leakage is the total sample air flow rate that passes through the filter holder assembly without passing through the sample filter.

(c) *Required test equipment.* (1) Flow rate measurement device, range 70 mL/min to 130 mL/min, 2 percent certified accuracy, NIST-traceable.

(2) Flow rate measurement adaptor (40 CFR part 50, appendix L, figure L-30) or equivalent adaptor to facilitate measurement of sampler flow rate at the top of the downtube.

(3) Impermeable membrane or disk, 47 mm nominal diameter.

(4) Means, such as a micro-valve, of providing a simulated leak flow rate through the sampler of approximately 80 mL/min under the conditions specified for the leak check in the sampler's leak check procedure.

(5) Teflon sample filter, as specified in section 6 of 40 CFR part 50, appendix L.

(d) *Calibration of test measurement instruments.* Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests. The accuracy of flow rate meters shall be verified at the highest and lowest

pressures and temperatures used in the tests and shall be checked at zero and one or more non-zero flow rates within 7 days of use for this test.

(e) *Test setup.* (1) The test sampler shall be set up for testing as described in the sampler's operation or instruction manual referred to in § 53.4(b)(3). The sampler shall be installed upright and set up in its normal configuration for collecting $PM_{2.5}$ samples, except that the sample air inlet shall be removed and the flow rate measurement adaptor shall be installed on the sampler's downtube.

(2) The flow rate control device shall be set up to provide a constant, controlled flow rate of 80 mL/min into the sampler downtube under the conditions specified for the leak check in the sampler's leak check procedure.

(3) The flow rate measurement device shall be set up to measure the controlled flow rate of 80 mL/min into the sampler downtube under the conditions specified for the leak check in the sampler's leak check procedure.

(f) *Procedure.* (1) Install the impermeable membrane in a filter cassette and install the cassette into the sampler. Carry out the internal leak check procedure as described in the sampler's operation/instruction manual and verify that the leak check acceptance criterion specified in table E–1 of this subpart is met.

(2) Replace the impermeable membrane with a Teflon filter and install the cassette in the sampler. Remove the inlet from the sampler and install the flow measurement adaptor on the sampler's downtube. Close the valve of the adaptor to seal the flow system. Conduct the external leak check procedure as described in the sampler's operation/instruction manual and verify that the leak check acceptance criteria specified in table E–1 of this subpart are met.

(3) Arrange the flow control device, flow rate measurement device, and other apparatus as necessary to provide a simulated leak flow rate of 80 mL/min into the test sampler through the downtube during the specified external leak check procedure. Carry out the external leak check procedure as described in the sampler's operation/instruction manual but with the simulated leak of 80 mL/min.

(g) *Test results.* The requirements for successful passage of this test are:

(1) That the leak check procedure indicates no significant external or internal leaks in the test sampler when no simulated leaks are introduced.

(2) That the leak check procedure properly identifies the occurrence of the simulated external leak of 80 mL/min.

§ 53.53 Test for flow rate accuracy, regulation, measurement accuracy, and cut-off.

(a) *Overview.* This test procedure is designed to evaluate a candidate sampler's flow rate accuracy with respect to the design flow rate, flow rate regulation, flow rate measurement accuracy, coefficient of variability measurement accuracy, and the flow rate cut-off function. The tests for the first four parameters shall be conducted over a 6-hour time period during which reference flow measurements are made at intervals not to exceed 5 minutes. The flow rate cut-off test, conducted separately, is intended to verify that the sampler carries out the required automatic sample flow rate cut-off function properly in the event of a low-flow condition. The test conditions and performance specifications associated with this test are summarized in table E–1 of this subpart. The candidate test sampler must meet all test parameters and test specifications to successfully pass this test.

(b) *Technical definitions.* (1) Sample flow rate means the quantitative volumetric flow rate of the air stream caused by the sampler to enter the sampler inlet and pass through the sample filter, measured in actual volume units at the temperature and pressure of the air as it enters the inlet.

(2) The flow rate cut-off function requires the sampler to automatically stop sample flow and terminate the current sample collection if the sample flow rate deviates by more than the variation limits specified in table E–1 of this subpart (±10 percent from the nominal sample flow rate) for more than 60 seconds during a sample collection period. The sampler is also required to properly notify the operator

with a flag warning indication of the out-of-specification flow rate condition and if the flow rate cut-off results in an elapsed sample collection time of less than 23 hours.

(c) *Required test equipment.* (1) Flow rate meter, suitable for measuring and recording the actual volumetric sample flow rate at the sampler downtube, with a minimum range of 10 to 25 L/min, 2 percent certified, NIST-traceable accuracy. Optional capability for continuous (analog) recording capability or digital recording at intervals not to exceed 30 seconds is recommended. While a flow meter which provides a direct indication of volumetric flow rate is preferred for this test, an alternative certified flow measurement device may be used as long as appropriate volumetric flow rate corrections are made based on measurements of actual ambient temperature and pressure conditions.

(2) Ambient air temperature sensor, with a resolution of 0.1 °C and certified to be accurate to within 0.5 °C (if needed). If the certified flow meter does not provide direct volumetric flow rate readings, ambient air temperature measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(3) Barometer, range 600 mm Hg to 800 mm Hg, certified accurate to 2 mm Hg (if needed). If the certified flow meter does not provide direct volumetric flow rate readings, ambient pressure measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(4) Flow measurement adaptor (40 CFR part 50, appendix L, figure L-30) or equivalent adaptor to facilitate measurement of sample flow rate at the sampler downtube.

(5) Valve or other means to restrict or reduce the sample flow rate to a value at least 10 percent below the design flow rate (16.67 L/min). If appropriate, the valve of the flow measurement adaptor may be used for this purpose.

(6) Means for creating an additional pressure drop of 55 mm Hg in the sampler to simulate a heavily loaded filter, such as an orifice or flow restrictive plate installed in the filter holder or a valve or other flow restrictor temporarily installed in the flow path near the filter.

(7) Teflon sample filter, as specified in section 6 of 40 CFR part 50, appendix L (if required).

(d) *Calibration of test measurement instruments.* Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests. The accuracy of flow-rate meters shall be verified at the highest and lowest pressures and temperatures used in the tests and shall be checked at zero and at least one flow rate within ±3 percent of 16.7 L/min within 7 days prior to use for this test. Where an instrument's measurements are to be recorded with an analog recording device, the accuracy of the entire instrument-recorder system shall be calibrated or verified.

(e) *Test setup.* (1) Setup of the sampler shall be as required in this paragraph (e) and otherwise as described in the sampler's operation or instruction manual referred to in §53.4(b)(3). The sampler shall be installed upright and set up in its normal configuration for collecting $PM_{2.5}$ samples. A sample filter and (or) the device for creating an additional 55 mm Hg pressure drop shall be installed for the duration of these tests. The sampler's ambient temperature, ambient pressure, and flow rate measurement systems shall all be calibrated per the sampler's operation or instruction manual within 7 days prior to this test.

(2) The inlet of the candidate sampler shall be removed and the flow measurement adaptor installed on the sampler's downtube. A leak check as described in the sampler's operation or instruction manual shall be conducted and must be properly passed before other tests are carried out.

(3) The inlet of the flow measurement adaptor shall be connected to the outlet of the flow rate meter.

(4) For the flow rate cut-off test, the valve or means for reducing sampler flow rate shall be installed between the flow measurement adaptor and the downtube or in another location within the sampler such that the sampler flow

rate can be manually restricted during the test.

(f) *Procedure.* (1) Set up the sampler as specified in paragraph (e) of this section and otherwise prepare the sampler for normal sample collection operation as directed in the sampler's operation or instruction manual. Set the sampler to automatically start a 6-hour sample collection period at a convenient time.

(2) During the 6-hour operational flow rate portion of the test, measure and record the sample flow rate with the flow rate meter at intervals not to exceed 5 minutes. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, ambient temperature and pressure shall be measured at the same frequency as that of the certified flow rate measurements. Note and record the actual start and stop times for the 6-hour flow rate test period.

(3) Following completion of the 6-hour flow rate test period, install the flow rate reduction device and change the sampler flow rate recording frequency to intervals of not more than 30 seconds. Reset the sampler to start a new sample collection period. Manually restrict the sampler flow rate such that the sampler flow rate is decreased slowly over several minutes to a flow rate slightly less than the flow rate cut-off value (15.0 L/min). Maintain this flow rate for at least 2.0 minutes or until the sampler stops the sample flow automatically. Manually terminate the sample period, if the sampler has not terminated it automatically.

(g) *Test results.* At the completion of the test, validate the test conditions and determine the test results as follows:

(1) *Mean sample flow rate.* (i) From the certified measurements (Q_{ref}) of the test sampler flow rate obtained by use of the flow rate meter, tabulate each flow rate measurement in units of L/min. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, each measured flow rate shall be corrected using its corresponding temperature and pressure measurement values. Calculate the mean flow rate for the sample period ($Q_{ref,ave}$) as follows:

Equation 1

$$Q_{ref,ave} = \frac{\sum_{i=1}^{n} Q_{ref,i}}{n}$$

where:

n equals the number of discrete certified flow rate measurements over the 6-hour test period.

(ii)(A) Calculate the percent difference between this mean flow rate value and the design value of 16.67 L/min, as follows:

Equation 2

$$\%\ \text{Difference} = \frac{Q_{ref,ave} - 16.67}{16.67} \text{ x } 100\%$$

(B) To successfully pass the mean flow rate test, the percent difference calculated in Equation 2 of this paragraph (g)(1)(ii) must be within ±5 percent.

(2) *Sample flow rate regulation.* (i) From the certified measurements of the test sampler flow rate, calculate the sample coefficient of variation (CV) of the discrete measurements as follows:

Equation 3

$$\%CV_{ref} = \frac{1}{Q_{ref,ave}} \text{ x } \sqrt{\frac{\sum_{i=1}^{n} Q_{ref,i}^2 - \frac{1}{n}\left(\sum_{i-1}^{n} Q_{ref,i}\right)^2}{n-1}} \text{ x } 100\%$$

(ii) To successfully pass the flow rate regulation test, the calculated coefficient of variation for the certified flow rates must not exceed 2 percent.

(3) *Flow rate measurement accuracy.* (i) Using the mean volumetric flow rate reported by the candidate test sampler at the completion of the 6-hour test period ($Q_{ind,ave}$), determine the accuracy of the reported mean flow rate as:

Equation 4

$$\%\ \text{Difference} = \frac{|Q_{ind,ave} - Q_{ref,ave}|}{Q_{ref,ave}} \text{ x } 100\%$$

(ii) To successfully pass the flow rate measurement accuracy test, the percent difference calculated in Equation

4 of this paragraph (g)(3) shall not exceed 2 percent.

(4) *Flow rate coefficient of variation measurement accuracy*. (i) Using the flow rate coefficient of variation indicated by the candidate test sampler at the completion of the 6-hour test ($\%CV_{ind}$), determine the accuracy of this reported coefficient of variation as:

Equation 5

$$\text{Difference}\ (\%) = |\%CV_{ind} - \%CV_{ref}|$$

(ii) To successfully pass the flow rate CV measurement accuracy test, the absolute difference in values calculated in Equation 5 of this paragraph (g)(4) must not exceed 0.3 (CV%).

(5) *Flow rate cut-off*. (i) Inspect the measurements of the sample flow rate during the flow rate cut-off test and determine the time at which the sample flow rate decreased to a value less than the cut-off value specified in table E–1 of this subpart. To pass this test, the sampler must have automatically stopped the sample flow at least 30 seconds but not more than 90 seconds after the time at which the sampler flow rate was determined to have decreased to a value less than the cut-off value.

(ii) At the completion of the flow rate cut-off test, download the archived data from the test sampler and verify that the sampler's required Flow-out-of-spec and Incorrect sample period flag indicators are properly set.

§ 53.54 Test for proper sampler operation following power interruptions.

(a) *Overview*. (1) This test procedure is designed to test certain performance parameters of the candidate sampler during a test period in which power interruptions of various duration occur. The performance parameters tested are:

(i) Proper flow rate performance of the sampler.

(ii) Accuracy of the sampler's average flow rate, CV, and sample volume measurements.

(iii) Accuracy of the sampler's reported elapsed sampling time.

(iv) Accuracy of the reported time and duration of power interruptions.

(2) This test shall be conducted during operation of the test sampler over a continuous 6-hour test period during which the sampler's flow rate shall be measured and recorded at intervals not to exceed 5 minutes. The performance parameters tested under this procedure, the corresponding minimum performance specifications, and the applicable test conditions are summarized in table E–1 of this subpart. Each performance parameter tested, as described or determined in the test procedure, must meet or exceed the associated performance specification to successfully pass this test.

(b) *Required test equipment*. (1) Flow rate meter, suitable for measuring and recording the actual volumetric sample flow rate at the sampler downtube, with a minimum range of 10 to 25 L/min, 2 percent certified, NIST-traceable accuracy. Optional capability for continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes is recommended. While a flow meter which provides a direct indication of volumetric flow rate is preferred for this test, an alternative certified flow measurement device may be used as long as appropriate volumetric flow rate corrections are made based on measurements of actual ambient temperature and pressure conditions.

(2) Ambient air temperature sensor (if needed for volumetric corrections to flow rate measurements), with a resolution of 0.1 °C, certified accurate to within 0.5 °C, and continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(3) Barometer (if needed for volumetric corrections to flow rate measurements), range 600 mm Hg to 800 mm Hg, certified accurate to 2 mm Hg, with continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(4) Flow measurement adaptor (40 CFR part 50, appendix L, figure L-30) or equivalent adaptor to facilitate measurement of sample flow rate at the sampler downtube.

(5) Means for creating an additional pressure drop of 55 mm Hg in the sampler to simulate a heavily loaded filter, such as an orifice or flow restrictive

plate installed in the filter holder or a valve or other flow restrictor temporarily installed in the flow path near the filter.

(6) Teflon sample filter, as specified in section 6 of 40 CFR part 50, appendix L (if required).

(7) Time measurement system, accurate to within 10 seconds per day.

(c) *Calibration of test measurement instruments.* Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests. The accuracy of flow rate meters shall be verified at the highest and lowest pressures and temperatures used in the tests and shall be checked at zero and at least one flow rate within ±3 percent of 16.7 L/min within 7 days prior to use for this test. Where an instrument's measurements are to be recorded with an analog recording device, the accuracy of the entire instrument-recorder system shall be calibrated or verified.

(d) *Test setup.* (1) Setup of the sampler shall be performed as required in this paragraph (d) and otherwise as described in the sampler's operation or instruction manual referred to in § 53.4(b)(3). The sampler shall be installed upright and set up in its normal configuration for collecting $PM_{2.5}$ samples. A sample filter and (or) the device for creating an additional 55 mm Hg pressure drop shall be installed for the duration of these tests. The sampler's ambient temperature, ambient pressure, and flow measurement systems shall all be calibrated per the sampler's operating manual within 7 days prior to this test.

(2) The inlet of the candidate sampler shall be removed and the flow measurement adaptor installed on the sample downtube. A leak check as described in the sampler's operation or instruction manual shall be conducted and must be properly passed before other tests are carried out.

(3) The inlet of the flow measurement adaptor shall be connected to the outlet of the flow rate meter.

(e) *Procedure.* (1) Set up the sampler as specified in paragraph (d) of this section and otherwise prepare the sampler for normal sample collection operation as directed in the sampler's operation or instruction manual. Set the sampler to automatically start a 6-hour sample collection period at a convenient time.

(2) During the entire 6-hour operational flow rate portion of the test, measure and record the sample flow rate with the flow rate meter at intervals not to exceed 5 minutes. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, ambient temperature and pressure shall be measured at the same frequency as that of the certified flow rate measurements. Note and record the actual start and stop times for the 6-hour flow rate test period.

(3) During the 6-hour test period, interrupt the AC line electrical power to the sampler 5 times, with durations of 20 seconds, 40 seconds, 2 minutes, 7 minutes, and 20 minutes (respectively), with not less than 10 minutes of normal electrical power supplied between each power interruption. Record the hour and minute and duration of each power interruption.

(4) At the end of the test, terminate the sample period (if not automatically terminated by the sampler) and download all archived instrument data from the test sampler.

(f) *Test results.* At the completion of the sampling period, validate the test conditions and determine the test results as follows:

(1) *Mean sample flow rate.* (i) From the certified measurements (Q_{ref}) of the test sampler flow rate, tabulate each flow rate measurement in units of L/min. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, each measured flow rate shall be corrected using its corresponding temperature and pressure measurement values. Calculate the mean flow rate for the sample period ($Q_{ref,ave}$) as follows:

Equation 6

$$Q_{ref,ave} = \frac{\sum_{i=1}^{n} Q_{ref,i}}{n}$$

where:

n equals the number of discrete certified flow rate measurements over the 6-hour

test period, excluding flow rate values obtained during periods of power interruption.

(ii)(A) Calculate the percent difference between this mean flow rate value and the design value of 16.67 L/min, as follows:

Equation 7

$$\%\ \text{Difference} = \frac{Q_{ref,ave} - 16.67}{16.67} \text{ x } 100\%$$

(B) To successfully pass this test, the percent difference calculated in Equation 7 of this paragraph (f)(1)(ii) must be within ±5 percent.

(2) *Sample flow rate regulation.* (i) From the certified measurements of the test sampler flow rate, calculate the sample coefficient of variation of the discrete measurements as follows:

Equation 8

$$\%CV_{ref} = \frac{1}{Q_{ref,ave}} \text{ x} \sqrt{\frac{\sum_{i=1}^{n} Q_{ref,i}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} Q_{ref,i}\right)^2}{n-1}} \text{ x } 100\%$$

(ii) To successfully pass this test, the calculated coefficient of variation for the certified flow rates must not exceed 2 percent.

(3) *Flow rate measurement accuracy.* (i) Using the mean volumetric flow rate reported by the candidate test sampler at the completion of the 6-hour test ($Q_{ind,ave}$), determine the accuracy of the reported mean flow rate as:

Equation 9

$$\%\ \text{Difference} = \frac{|Q_{ind,ave} - Q_{ref,ave}|}{Q_{ref,ave}} \text{ x } 100\%$$

(ii) To successfully pass this test, the percent difference calculated in Equation 9 of this paragraph (f)(3) shall not exceed 2 percent.

(4) *Flow rate CV measurement accuracy.* (i) Using the flow rate coefficient of variation indicated by the candidate test sampler at the completion of the 6-hour test ($\%CV_{ind}$), determine the accuracy of the reported coefficient of variation as:

Equation 10

$$\text{Difference } (\%) = |\%CV_{ind} - \%CV_{ref}|$$

(ii) To successfully pass this test, the absolute difference in values calculated in Equation 10 of this paragraph (f)(4) must not exceed 0.3 (CV%).

(5) Verify that the sampler properly provided a record and visual display of the correct year, month, day-of-month, hour, and minute with an accuracy of ±2 minutes, of the start of each power interruption of duration greater than 60 seconds.

(6) Calculate the actual elapsed sample time, excluding the periods of electrical power interruption. Verify that the elapsed sample time reported by the sampler is accurate to within ±20 seconds for the 6-hour test run.

(7) Calculate the sample volume as $Q_{ref,ave}$ multiplied by the sample time, excluding periods of power interruption. Verify that the sample volume reported by the sampler is within 2 percent of the calculated sample volume to successfully pass this test.

(8) Inspect the downloaded instrument data from the test sampler and verify that all data are consistent with normal operation of the sampler.

[62 FR 38799, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 53.55 Test for effect of variations in power line voltage and ambient temperature.

(a) *Overview.* (1) This test procedure is a combined procedure to test various performance parameters under variations in power line voltage and ambient temperature. Tests shall be conducted in a temperature controlled environment over four 6-hour time periods during which reference temperature and flow rate measurements shall be made at intervals not to exceed 5 minutes. Specific parameters to be evaluated at line voltages of 105 and 125 volts and temperatures of −20 °C and =40 °C are as follows:

(i) Sample flow rate.

(ii) Flow rate regulation.

(iii) Flow rate measurement accuracy.

(iv) Coefficient of variability measurement accuracy.

(v) Ambient air temperature measurement accuracy.

(vi) Proper operation of the sampler when exposed to power line voltage and ambient temperature extremes.

(2) The performance parameters tested under this procedure, the corresponding minimum performance specifications, and the applicable test conditions are summarized in table E–1 of this subpart. Each performance parameter tested, as described or determined in the test procedure, must meet or exceed the associated performance specification given. The candidate sampler must meet all specifications for the associated $PM_{2.5}$ method to pass this test procedure.

(b) *Technical definition.* Sample flow rate means the quantitative volumetric flow rate of the air stream caused by the sampler to enter the sampler inlet and pass through the sample filter, measured in actual volume units at the temperature and pressure of the air as it enters the inlet.

(c) *Required test equipment.* (1) Environmental chamber or other temperature-controlled environment or environments, capable of obtaining and maintaining temperatures at −20 °C and =40 °C as required for the test with an accuracy of ±2 °C. The test environment(s) must be capable of maintaining these temperatures within the specified limits continuously with the additional heat load of the operating test sampler in the environment. Henceforth, where the test procedures specify a test or environmental ''chamber,'' an alternative temperature-controlled environmental area or areas may be substituted, provided the required test temperatures and all other test requirements are met.

(2) Variable voltage AC power transformer, range 100 Vac to 130 Vac, with sufficient current capacity to operate the test sampler continuously under the test conditions.

(3) Flow rate meter, suitable for measuring and recording the actual volumetric sample flow rate at the sampler downtube, with a minimum range of 10 to 25 actual L/min, 2 percent certified, NIST-traceable accuracy. Optional capability for continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes is recommended. While a flow meter which provides a direct indication of volumetric flow rate is preferred for this test, an alternative certified flow measurement device may be used as long as appropriate volumetric flow rate corrections are made based on measurements of actual ambient temperature and pressure conditions.

(4) Ambient air temperature recorder, range −30 °C to =50 °C, with a resolution of 0.1 °C and certified accurate to within 0.5 °C. Ambient air temperature measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(5) Barometer, range 600 mm Hg to 800 mm Hg, certified accurate to 2 mm Hg. If the certified flow rate meter does not provide direct volumetric flow rate readings, ambient pressure measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(6) Flow measurement adaptor (40 CFR part 50, appendix L, figure L-30) or equivalent adaptor to facilitate measurement of sampler flow rate at the sampler downtube.

(7) Means for creating an additional pressure drop of 55 mm Hg in the sampler to simulate a heavily loaded filter, such as an orifice or flow restrictive plate installed in the filter holder or a valve or other flow restrictor temporarily installed in the flow path near the filter.

(8) AC RMS voltmeter, accurate to 1.0 volt.

(9) Teflon sample filter, as specified in section 6 of 40 CFR part 50, appendix L (if required).

(d) *Calibration of test measurement instruments.* Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests. The accuracy of flow rate meters shall be verified at the highest and lowest pressures and temperatures used in the tests and shall be checked at zero and at least one flow rate within ±3 percent of 16.7 L/min within 7 days prior to use for this test. Where an instrument's

measurements are to be recorded with an analog recording device, the accuracy of the entire instrument-recorder system shall be calibrated or verified.

(e) *Test setup.* (1) Setup of the sampler shall be performed as required in this paragraph (e) and otherwise as described in the sampler's operation or instruction manual referred to in §53.4(b)(3). The sampler shall be installed upright and set up in the temperature-controlled chamber in its normal configuration for collecting $PM_{2.5}$ samples. A sample filter and (or) the device for creating an additional 55 mm Hg pressure drop shall be installed for the duration of these tests. The sampler's ambient temperature, ambient pressure, and flow measurement systems shall all be calibrated per the sampler's operating manual within 7 days prior to this test.

(2) The inlet of the candidate sampler shall be removed and the flow measurement adaptor installed on the sampler's downtube. A leak check as described in the sampler's operation or instruction manual shall be conducted and must be properly passed before other tests are carried out.

(3) The inlet of the flow measurement adaptor shall be connected to the outlet of the flow rate meter.

(4) The ambient air temperature recorder shall be installed in the test chamber such that it will accurately measure the temperature of the air in the vicinity of the candidate sampler without being unduly affected by the chamber's air temperature control system.

(f) *Procedure.* (1) Set up the sampler as specified in paragraph (e) of this section and otherwise prepare the sampler for normal sample collection operation as directed in the sampler's operation or instruction manual.

(2) The test shall consist of four test runs, one at each of the following conditions of chamber temperature and electrical power line voltage (respectively):

(i) −20 °C ±2 °C and 105 ±1 Vac.

(ii) −20 °C ±2 °C and 125 ±1 Vac.

(iii) =40 °C ±2 °C and 105 ±1 Vac.

(iv) =40 °C ±2 °C and 125 ±1 Vac.

(3) For each of the four test runs, set the selected chamber temperature and power line voltage for the test run. Upon achieving each temperature setpoint in the chamber, the candidate sampler and flow meter shall be thermally equilibrated for a period of at least 2 hours prior to the test run. Following the thermal conditioning time, set the sampler to automatically start a 6-hour sample collection period at a convenient time.

(4) During each 6-hour test period:

(i) Measure and record the sample flow rate with the flow rate meter at intervals not to exceed 5 minutes. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, ambient temperature and pressure shall be measured at the same frequency as that of the certified flow rate measurements. Note and record the actual start and stop times for the 6-hour flow rate test period.

(ii) Determine and record the ambient (chamber) temperature indicated by the sampler and the corresponding ambient (chamber) temperature measured by the ambient temperature recorder specified in paragraph (c)(4) of this section at intervals not to exceed 5 minutes.

(iii) Measure the power line voltage to the sampler at intervals not greater than 1 hour.

(5) At the end of each test run, terminate the sample period (if not automatically terminated by the sampler) and download all archived instrument data from the test sampler.

(g) *Test results.* For each of the four test runs, examine the chamber temperature measurements and the power line voltage measurements. Verify that the temperature and line voltage met the requirements specified in paragraph (f) of this section at all times during the test run. If not, the test run is not valid and must be repeated. Determine the test results as follows:

(1) *Mean sample flow rate.* (i) From the certified measurements (Q_{ref}) of the test sampler flow rate, tabulate each flow rate measurement in units of L/min. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, each measured flow rate shall be corrected using its corresponding temperature

and pressure measurement values. Calculate the mean flow rate for each sample period ($Q_{ref,ave}$) as follows:

Equation 11

$$Q_{ref,ave} = \frac{\sum_{i=1}^{n} Q_{ref,i}}{n}$$

where:

n equals the number of discrete certified flow rate measurements over each 6-hour test period.

(ii)(A) Calculate the percent difference between this mean flow rate value and the design value of 16.67 L/min, as follows:

Equation 12

$$\%\ \text{Difference} = \frac{Q_{ref,ave} - 16.67}{16.67} \text{ x } 100\%$$

(B) To successfully pass this test, the percent difference calculated in Equation 12 of this paragraph (g)(1)(ii) must be within ±5 percent for each test run.

(2) *Sample flow rate regulation*. (i) From the certified measurements of the test sampler flow rate, calculate the sample coefficient of variation of the discrete measurements as follows:

Equation 13

$$\%CV_{ref} = \frac{1}{Q_{ref,ave}} \text{ x} \sqrt{\frac{\sum_{i=1}^{n} Q_{ref,i}^2 - \frac{1}{n}\left(\sum_{i-1}^{n} Q_{ref,i}\right)^2}{n-1}} \text{ x } 100\%$$

(ii) To successfully pass this test, the calculated coefficient of variation for the certified flow rates must not exceed 2 percent.

(3) *Flow rate measurement accuracy*. (i) Using the mean volumetric flow rate reported by the candidate test sampler at the completion of each 6-hour test ($Q_{ind,ave}$), determine the accuracy of the reported mean flow rate as:

Equation 14

$$\%\ \text{Difference} = \frac{|Q_{ind,ave} - Q_{ref,ave}|}{Q_{ref,ave}} \text{ x } 100\%$$

(ii) To successfully pass this test, the percent difference calculated in Equation 14 of this paragraph (g)(3) shall not exceed 2 percent for each test run.

(4) *Flow rate coefficient of variation measurement accuracy*. (i) Using the flow rate coefficient of variation indicated by the candidate test sampler ($\%CV_{ind}$), determine the accuracy of the reported coefficient of variation as:

Equation 15

$$\text{Difference}\ \% = |\%CV_{ind} - \%CV_{ref}|$$

(ii) To successfully pass this test, the absolute difference calculated in Equation 15 of this paragraph (g)(4) must not exceed 0.3 (CV%) for each test run.

(5) *Ambient temperature measurement accuracy*. (i) Calculate the absolute value of the difference between the mean ambient air temperature indicated by the test sampler and the mean ambient (chamber) air temperature measured with the ambient air temperature recorder as:

Equation 16

$$T_{diff} = |T_{ind,ave} - T_{ref,ave}|$$

where:

$T_{ind,ave}$ = mean ambient air temperature indicated by the test sampler, °C; and

$_{ref,ave}$ = mean ambient air temperature measured by the reference temperature instrument, °C.

(ii) The calculated temperature difference must be less than 2 °C for each test run.

(6) *Sampler functionality*. To pass the sampler functionality test, the following two conditions must both be met for each test run:

(i) The sampler must not shutdown during any portion of the 6-hour test.

(ii) An inspection of the downloaded data from the test sampler verifies that all the data are consistent with normal operation of the sampler.

§ 53.56 Test for effect of variations in ambient pressure.

(a) *Overview*. (1) This test procedure is designed to test various sampler performance parameters under variations in ambient (barometric) pressure. Tests shall be conducted in a pressure-controlled environment over two 6-hour time periods during which reference pressure and flow rate measurements

shall be made at intervals not to exceed 5 minutes. Specific parameters to be evaluated at operating pressures of 600 and 800 mm Hg are as follows:

(i) Sample flow rate.

(ii) Flow rate regulation.

(iii) Flow rate measurement accuracy.

(iv) Coefficient of variability measurement accuracy.

(v) Ambient pressure measurement accuracy.

(vi) Proper operation of the sampler when exposed to ambient pressure extremes.

(2) The performance parameters tested under this procedure, the corresponding minimum performance specifications, and the applicable test conditions are summarized in table E–1 of this subpart. Each performance parameter tested, as described or determined in the test procedure, must meet or exceed the associated performance specification given. The candidate sampler must meet all specifications for the associated $PM_{2.5}$ method to pass this test procedure.

(b) *Technical definition.* Sample flow rate means the quantitative volumetric flow rate of the air stream caused by the sampler to enter the sampler inlet and pass through the sample filter, measured in actual volume units at the temperature and pressure of the air as it enters the inlet.

(c) *Required test equipment.* (1) Hypobaric chamber or other pressure-controlled environment or environments, capable of obtaining and maintaining pressures at 600 mm Hg and 800 mm Hg required for the test with an accuracy of 5 mm Hg. Henceforth, where the test procedures specify a test or environmental chamber, an alternative pressure-controlled environmental area or areas may be substituted, provided the test pressure requirements are met. Means for simulating ambient pressure using a closed-loop sample air system may also be approved for this test; such a proposed method for simulating the test pressure conditions may be described and submitted to EPA at the address given in §53.4(a) prior to conducting the test for a specific individual determination of acceptability.

(2) Flow rate meter, suitable for measuring and recording the actual volumetric sampler flow rate at the sampler downtube, with a minimum range of 10 to 25 L/min, 2 percent certified, NIST-traceable accuracy. Optional capability for continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes is recommended. While a flow meter which provides a direct indication of volumetric flow rate is preferred for this test, an alternative certified flow measurement device may be used as long as appropriate volumetric flow rate corrections are made based on measurements of actual ambient temperature and pressure conditions.

(3) Ambient air temperature recorder (if needed for volumetric corrections to flow rate measurements) with a range −30 °C to =50 °C, certified accurate to within 0.5 °C. If the certified flow meter does not provide direct volumetric flow rate readings, ambient temperature measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(4) Barometer, range 600 mm Hg to 800 mm Hg, certified accurate to 2 mm Hg. Ambient air pressure measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(5) Flow measurement adaptor (40 CFR part 50, appendix L, figure L–30) or equivalent adaptor to facilitate measurement of sampler flow rate at the sampler downtube.

(6) Means for creating an additional pressure drop of 55 mm Hg in the sampler to simulate a heavily loaded filter, such as an orifice or flow restrictive plate installed in the filter holder or a valve or other flow restrictor temporarily installed in the flow path near the filter.

(7) Teflon sample filter, as specified in section 6 of 40 CFR part 50, appendix L (if required).

(d) *Calibration of test measurement instruments.* Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests.

The accuracy of flow rate meters shall be verified at the highest and lowest pressures and temperatures used in the tests and shall be checked at zero and at least one flow rate within ±3 percent of 16.7 L/min within 7 days prior to use for this test. Where an instrument's measurements are to be recorded with an analog recording device, the accuracy of the entire instrument-recorder system shall be calibrated or verified.

(e) *Test setup.* (1) Setup of the sampler shall be performed as required in this paragraph (e) and otherwise as described in the sampler's operation or instruction manual referred to in § 53.4(b)(3). The sampler shall be installed upright and set up in the pressure-controlled chamber in its normal configuration for collecting $PM_{2.5}$ samples. A sample filter and (or) the device for creating an additional 55 mm Hg pressure drop shall be installed for the duration of these tests. The sampler's ambient temperature, ambient pressure, and flow measurement systems shall all be calibrated per the sampler's operating manual within 7 days prior to this test.

(2) The inlet of the candidate sampler shall be removed and the flow measurement adaptor installed on the sampler's downtube. A leak check as described in the sampler's operation or instruction manual shall be conducted and must be properly passed before other tests are carried out.

(3) The inlet of the flow measurement adaptor shall be connected to the outlet of the flow rate meter.

(4) The barometer shall be installed in the test chamber such that it will accurately measure the air pressure to which the candidate sampler is subjected.

(f) *Procedure.* (1) Set up the sampler as specified in paragraph (e) of this section and otherwise prepare the sampler for normal sample collection operation as directed in the sampler's operation or instruction manual.

(2) The test shall consist of two test runs, one at each of the following conditions of chamber pressure:

(i) 600 mm Hg.

(ii) 800 mm Hg.

(3) For each of the two test runs, set the selected chamber pressure for the test run. Upon achieving each pressure setpoint in the chamber, the candidate sampler shall be pressure-equilibrated for a period of at least 30 minutes prior to the test run. Following the conditioning time, set the sampler to automatically start a 6-hour sample collection period at a convenient time.

(4) During each 6-hour test period:

(i) Measure and record the sample flow rate with the flow rate meter at intervals not to exceed 5 minutes. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, ambient temperature and pressure shall be measured at the same frequency as that of the certified flow rate measurements. Note and record the actual start and stop times for the 6-hour flow rate test period.

(ii) Determine and record the ambient (chamber) pressure indicated by the sampler and the corresponding ambient (chamber) pressure measured by the barometer specified in paragraph (c)(4) of this section at intervals not to exceed 5 minutes.

(5) At the end of each test period, terminate the sample period (if not automatically terminated by the sampler) and download all archived instrument data for the test run from the test sampler.

(g) *Test results.* For each of the two test runs, examine the chamber pressure measurements. Verify that the pressure met the requirements specified in paragraph (f) of this section at all times during the test. If not, the test run is not valid and must be repeated. Determine the test results as follows:

(1) *Mean sample flow rate.* (i) From the certified measurements (Q_{ref}) of the test sampler flow rate, tabulate each flow rate measurement in units of L/min. If ambient temperature and pressure corrections are necessary to calculate volumetric flow rate, each measured flow rate shall be corrected using its corresponding temperature and pressure measurement values. Calculate the mean flow rate for the sample period ($Q_{ref,ave}$) as follows:

Equation 17

$$Q_{ref,ave} = \frac{\sum_{i=1}^{n} Q_{ref,i}}{n}$$

where:

n equals the number of discrete certified flow measurements over the 6-hour test period.

(ii)(A) Calculate the percent difference between this mean flow rate value and the design value of 16.67 L/min, as follows:

Equation 18

$$\%\ \text{Difference} = \frac{Q_{ref,ave} - 16.67}{16.67} \text{ x } 100\%$$

(B) To successfully pass this test, the percent difference calculated in Equation 18 of this paragraph (g)(1) must be within ±5 percent for each test run.

(2) *Sample flow rate regulation*. (i) From the certified measurements of the test sampler flow rate, calculate the sample coefficient of variation of the discrete measurements as follows:

Equation 19

$$\%CV_{ref} = \frac{1}{Q_{ref,ave}} \text{ x} \sqrt{\frac{\sum_{i=1}^{n} Q_{ref,i}^2 - \frac{1}{n}\left(\sum_{i-1}^{n} Q_{ref,i}\right)^2}{n-1}} \text{ x } 100\%$$

(ii) To successfully pass this test, the calculated coefficient of variation for the certified flow rates must not exceed 2 percent.

(3) *Flow rate measurement accuracy*. (i) Using the mean volumetric flow rate reported by the candidate test sampler at the completion of each 6-hour test ($Q_{ind,ave}$), determine the accuracy of the reported mean flow rate as:

Equation 20

$$\%\ \text{Difference} = \frac{|Q_{ind,ave} - Q_{ref,ave}|}{Q_{ref,ave}} \text{ x } 100\%$$

(ii) To successfully pass this test, the percent difference calculated in Equation 20 of this paragraph (g)(3) shall not exceed 2 percent for each test run.

(4) *Flow rate CV measurement accuracy*. (i) Using the flow rate coefficient of variation indicated by the candidate test sampler at the completion of the 6-hour test ($\%CV_{ind}$), determine the accuracy of the reported coefficient of variation as:

Equation 21

$$\text{Difference } (\%) = |\%CV_{ind} - \%CV_{ref}|$$

(ii) To successfully pass this test, the absolute difference in values calculated in Equation 21 of this paragraph (g)(4) must not exceed 0.3 (CV%) for each test run.

(5) *Ambient pressure measurement accuracy*. (i) Calculate the absolute difference between the mean ambient air pressure indicated by the test sampler and the ambient (chamber) air pressure measured with the reference barometer as:

Equation 22

$$P_{diff} = |P_{ind,ave} - P_{ref,ave}|$$

where:

$P_{ind,ave}$ = mean ambient pressure indicated by the test sampler, mm Hg; and

$P_{ref,ave}$ = mean barometric pressure measured by the reference barometer, mm Hg.

(ii) The calculated pressure difference must be less than 10 mm Hg for each test run to pass the test.

(6) *Sampler functionality*. To pass the sampler functionality test, the following two conditions must both be met for each test run:

(i) The sampler must not shut down during any part of the 6-hour tests; and

(ii) An inspection of the downloaded data from the test sampler verifies that all the data are consistent with normal operation of the sampler.

[62 FR 38799, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 53.57 Test for filter temperature control during sampling and post-sampling periods.

(a) *Overview*. This test is intended to measure the candidate sampler's ability to prevent excessive overheating of the $PM_{2.5}$ sample collection filter (or filters) under conditions of elevated

solar insolation. The test evaluates radiative effects on filter temperature during a 4-hour period of active sampling as well as during a subsequent 4-hour non-sampling time period prior to filter retrieval. Tests shall be conducted in an environmental chamber which provides the proper radiant wavelengths and energies to adequately simulate the sun's radiant effects under clear conditions at sea level. For additional guidance on conducting solar radiative tests under controlled conditions, consult military standard specification 810-E (reference 6 in appendix A of this subpart). The performance parameters tested under this procedure, the corresponding minimum performance specifications, and the applicable test conditions are summarized in table E–1 of this subpart. Each performance parameter tested, as described or determined in the test procedure, must meet or exceed the associated performance specification to successfully pass this test.

(b) *Technical definition.* Filter temperature control during sampling is the ability of a sampler to maintain the temperature of the particulate matter sample filter within the specified deviation (5 °C) from ambient temperature during any active sampling period. Post-sampling temperature control is the ability of a sampler to maintain the temperature of the particulate matter sample filter within the specified deviation from ambient temperature during the period from the end of active sample collection of the $PM_{2.5}$ sample by the sampler until the filter is retrieved from the sampler for laboratory analysis.

(c) *Required test equipment.* (1) Environmental chamber providing the means, such as a bank of solar-spectrum lamps, for generating or simulating thermal radiation in approximate spectral content and intensity equivalent to solar insolation of 1000 ±50 W/m^2 inside the environmental chamber. To properly simulate the sun's radiative effects on the sampler, the solar bank must provide the spectral energy distribution and permitted tolerances specified in table E–2 of this subpart. The solar radiation source area shall be such that the width of the candidate sampler shall not exceed one-half the dimensions of the solar bank. The solar bank shall be located a minimum of 76 cm (30 inches) from any surface of the candidate sampler. To meet requirements of the solar radiation tests, the chamber's internal volume shall be a minimum of 10 times that of the volume of the candidate sampler. Air velocity in the region of the sampler must be maintained continuously during the radiative tests at 2.0 ±0.5 m/sec.

(2) Ambient air temperature recorder, range −30 °C to =50 °C, with a resolution of 0.1 °C and certified accurate to within 0.5 °C. Ambient air temperature measurements must be made using continuous (analog) recording capability or digital recording at intervals not to exceed 5 minutes.

(3) Flow measurement adaptor (40 CFR part 50, appendix L, figure L-30) or equivalent adaptor to facilitate measurement of sampler flow rate at the sampler downtube.

(4) Miniature temperature sensor(s), capable of being installed in the sampler without introducing air leakage and capable of measuring the sample air temperature within 1 cm of the center of the filter, downstream of the filter; with a resolution of 0.1 °C, certified accurate to within 0.5 °C, NIST-traceable, with continuous (analog) recording capability or digital recording at intervals of not more than 5 minutes.

(5) Solar radiometer, to measure the intensity of the simulated solar radiation in the test environment, range of 0 to approximately 1500 W/m$^{2.}$ Optional capability for continuous (analog) recording or digital recording at intervals not to exceed 5 minutes is recommended.

(6) Sample filter or filters, as specified in section 6 of 40 CFR part 50, appendix L.

(d) *Calibration of test measurement instruments.* Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests. The accuracy of flow rate meters shall be verified at the highest and lowest pressures and temperatures used in the tests and shall be checked at zero and at least one flow rate within ±3 percent

of 16.7 L/min within 7 days prior to use for this test. Where an instrument's measurements are to be recorded with an analog recording device, the accuracy of the entire instrument-recorder system shall be calibrated or verified.

(e) *Test setup.* (1) Setup of the sampler shall be performed as required in this paragraph (e) and otherwise as described in the sampler's operation or instruction manual referred to in §53.4(b)(3). The sampler shall be installed upright and set up in the solar radiation environmental chamber in its normal configuration for collecting $PM_{2.5}$ samples (with the inlet installed). The sampler's ambient and filter temperature measurement systems shall be calibrated per the sampler's operating manual within 7 days prior to this test. A sample filter shall be installed for the duration of this test. For sequential samplers, a sample filter shall also be installed in each available sequential channel or station intended for collection of a sequential sample (or at least 5 additional filters for magazine-type sequential samplers) as directed by the sampler's operation or instruction manual.

(2) The miniature temperature sensor shall be temporarily installed in the test sampler such that it accurately measures the air temperature 1 cm from the center of the filter on the downstream side of the filter. The sensor shall be installed such that no external or internal air leakage is created by the sensor installation. The sensor's dimensions and installation shall be selected to minimize temperature measurement uncertainties due to thermal conduction along the sensor mounting structure or sensor conductors. For sequential samplers, similar temperature sensors shall also be temporarily installed in the test sampler to monitor the temperature 1 cm from the center of each filter stored in the sampler for sequential sample operation.

(3) The solar radiant energy source shall be installed in the test chamber such that the entire test sampler is irradiated in a manner similar to the way it would be irradiated by solar radiation if it were located outdoors in an open area on a sunny day, with the radiation arriving at an angle of between 30° and 45° from vertical. The intensity of the radiation received by all sampler surfaces that receive direct radiation shall average 1000 ±50 W/m^2, measured in a plane perpendicular to the incident radiation. The incident radiation shall be oriented with respect to the sampler such that the area of the sampler's ambient temperature sensor (or temperature shield) receives full, direct radiation as it would or could during normal outdoor installation. Also, the temperature sensor must not be shielded or shaded from the radiation by a sampler part in a way that would not occur at other normal insolation angles or directions.

(4) The solar radiometer shall be installed in a location where it measures thermal radiation that is generally representative of the average thermal radiation intensity that the upper portion of the sampler and sampler inlet receive. The solar radiometer shall be oriented so that it measures the radiation in a plane perpendicular to its angle of incidence.

(5) The ambient air temperature recorder shall be installed in the test chamber such that it will accurately measure the temperature of the air in the chamber without being unduly affected by the chamber's air temperature control system or by the radiant energy from the solar radiation source that may be present inside the test chamber.

(f) *Procedure.* (1) Set up the sampler as specified in paragraph (e) of this section and otherwise prepare the sampler for normal sample collection operation as directed in the sampler's operation or instruction manual.

(2) Remove the inlet of the candidate test sampler and install the flow measurement adaptor on the sampler's downtube. Conduct a leak check as described in the sampler's operation or instruction manual. The leak test must be properly passed before other tests are carried out.

(3) Remove the flow measurement adaptor from the downtube and re-install the sampling inlet.

(4) Activate the solar radiation source and verify that the resulting energy distribution prescribed in table E–2 of this subpart is achieved.

(5) Program the test sampler to conduct a single sampling run of 4 continuous hours. During the 4-hour sampling run, measure and record the radiant flux, ambient temperature, and filter temperature (all filter temperatures for sequential samplers) at intervals not to exceed 5 minutes.

(6) At the completion of the 4-hour sampling phase, terminate the sample period, if not terminated automatically by the sampler. Continue to measure and record the radiant flux, ambient temperature, and filter temperature or temperatures for 4 additional hours at intervals not to exceed 5 minutes. At the completion of the 4-hour post-sampling period, discontinue the measurements and turn off the solar source.

(7) Download all archived sampler data from the test run.

(g) *Test results*. Chamber radiant flux control. Examine the continuous record of the chamber radiant flux and verify that the flux met the requirements specified in table E–2 of this subpart at all times during the test. If not, the entire test is not valid and must be repeated.

(1) *Filter temperature measurement accuracy*. (i) For each 4-hour test period, calculate the absolute value of the difference between the mean filter temperature indicated by the sampler (active filter) and the mean filter temperature measured by the reference temperature sensor installed within 1 cm downstream of the (active) filter as:

Equation 23

$$T_{diff,filter} = |T_{ind,filter} - T_{ref,filter}|$$

where:

$T_{ind,filter}$ = mean filter temperature indicated by the test sampler, °C; and

$T_{ref,filter}$ = mean filter temperature measured by the reference temperature sensor, °C.

(ii) To successfully pass the indicated filter temperature accuracy test, the calculated difference between the measured means ($T_{diff,filter}$) must not exceed 2 °C for each 4-hour test period.

(2) *Ambient temperature measurement accuracy*. (i) For each 4-hour test period, calculate the absolute value of the difference between the mean ambient air temperature indicated by the test sampler and the mean ambient air temperature measured by the reference ambient air temperature recorder as:

Equation 24

$$T_{diff,ambient} = |T_{ind,ambient} - T_{ref,ambient}|$$

where:

$T_{ind,ambient}$ = mean ambient air temperature indicated by the test sampler, °C; and

$T_{ref,ambient}$ = mean ambient air temperature measured by the reference ambient air temperature recorder, °C.

(ii) To successfully pass the indicated ambient temperature accuracy test, the calculated difference between the measured means ($T_{diff,ambient}$) must not exceed 2 °C for each 4-hour test period.

(3) *Filter temperature control accuracy*. (i) For each temperature measurement interval over each 4-hour test period, calculate the difference between the filter temperature indicated by the reference temperature sensor and the ambient temperature indicated by the test sampler as:

Equation 25

$$T_{diff} = T_{ref,filter} - T_{ind,ambient}$$

(ii) Tabulate and inspect the calculated differences as a function of time. To successfully pass the indicated filter temperature control test, the calculated difference between the measured values must not exceed 5 °C for any consecutive intervals covering more than a 30–minute time period.

(iii) For sequential samplers, repeat the test calculations for each of the stored sequential sample filters. All stored filters must also meet the 5 °C temperature control test.

[62 FR 38799, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 53.58 Operational field precision and blank test.

(a) *Overview*. This test is intended to determine the operational precision of the candidate sampler during a minimum of 10 days of field operation, using three collocated test samplers. Measurements of $PM_{2.5}$ are made at a test site with all of the samplers and then compared to determine replicate

precision. Candidate sequential samplers are also subject to a test for possible deposition of particulate matter on inactive filters during a period of storage in the sampler. This procedure is applicable to both reference and equivalent methods. In the case of equivalent methods, this test may be combined and conducted concurrently with the comparability test for equivalent methods (described in subpart C of this part), using three reference method samplers collocated with three candidate equivalent method samplers and meeting the applicable site and other requirements of subpart C of this part.

(b) *Technical definition*. (1) Field precision is defined as the standard deviation or relative standard deviation of a set of $PM_{2.5}$ measurements obtained concurrently with three or more collocated samplers in actual ambient air field operation.

(2) Storage deposition is defined as the mass of material inadvertently deposited on a sample filter that is stored in a sequential sampler either prior to or subsequent to the active sample collection period.

(c) *Test site*. Any outdoor test site having $PM_{2.5}$ concentrations that are reasonably uniform over the test area and that meet the minimum level requirement of paragraph (g)(2) of this section is acceptable for this test.

(d) *Required facilities and equipment*. (1) An appropriate test site and suitable electrical power to accommodate three test samplers are required.

(2) Teflon sample filters, as specified in section 6 of 40 CFR part 50, appendix L, conditioned and preweighed as required by section 8 of 40 CFR part 50, appendix L, as needed for the test samples.

(e) *Test setup*. (1) Three identical test samplers shall be installed at the test site in their normal configuration for collecting $PM_{2.5}$ samples in accordance with the instructions in the associated manual referred to in §53.4(b)(3) and should be in accordance with applicable supplemental guidance provided in reference 3 in appendix A of this subpart. The test samplers' inlet openings shall be located at the same height above ground and between 2 and 4 meters apart horizontally. The samplers shall be arranged or oriented in a manner that will minimize the spatial and wind directional effects on sample collection of one sampler on any other sampler.

(2) Each test sampler shall be successfully leak checked, calibrated, and set up for normal operation in accordance with the instruction manual and with any applicable supplemental guidance provided in reference 3 in appendix A of this subpart.

(f) *Test procedure*. (1) Install a conditioned, preweighed filter in each test sampler and otherwise prepare each sampler for normal sample collection. Set identical sample collection start and stop times for each sampler. For sequential samplers, install a conditioned, preweighed specified filter in each available channel or station intended for automatic sequential sample filter collection (or at least 5 additional filters for magazine-type sequential samplers), as directed by the sampler's operation or instruction manual. Since the inactive sequential channels are used for the storage deposition part of the test, they may not be used to collect the active $PM_{2.5}$ test samples.

(2) Collect either a 24-hour or a 48-hour atmospheric $PM_{2.5}$ sample simultaneously with each of the three test samplers.

(3) Following sample collection, retrieve the collected sample from each sampler. For sequential samplers, retrieve the additional stored (blank, unsampled) filters after at least 5 days (120 hours) storage in the sampler if the active samples are 24-hour samples, or after at least 10 days (240 hours) if the active samples are 48-hour samples.

(4) Determine the measured $PM_{2.5}$ mass concentration for each sample in accordance with the applicable procedures prescribed for the candidate method in appendix L, 40 CFR part 50 of this chapter, in the associated manual referred to in §53.4(b)(3) and in accordance with supplemental guidance in reference 2 in appendix A of this subpart. For sequential samplers, also similarly determine the storage deposition as the net weight gain of each blank, unsampled filter after the 5–day (or 10–day) period of storage in the sampler.

(5) Repeat this procedure to obtain a total of 10 sets of any combination of

24-hour or 48-hour $PM_{2.5}$ measurements over 10 test periods. For sequential samplers, repeat the 5–day (or 10–day) storage test of additional blank filters once for a total of two sets of blank filters.

(g) *Calculations.* (1) Record the $PM_{2.5}$ concentration for each test sampler for each test period as $C_{i,j}$, where i is the sampler number (i = 1,2,3) and j is the test period (j = 1,2, . . . 10).

(2)(i) For each test period, calculate and record the average of the three measured $PM_{2.5}$ concentrations as C_j where j is the test period:

Equation 26

$$C_{ave,j} = \frac{1}{3} x \sum_{i=1}^{3} C_{i,j}$$

(ii) If $C_{ave,j}$ < 10 μg/m³ for any test period, data from that test period are unacceptable, and an additional sample collection set must be obtained to replace the unacceptable data.

(3)(i) Calculate and record the precision for each of the 10 test days as:

Equation 27

$$P_j = \sqrt{\frac{\sum_{i=1}^{3} C_{i,j}^2 - \frac{1}{3}\left(\sum_{i=1}^{3} C_{i,j}\right)^2}{2}}$$

(ii) If $C_{ave,j}$ is below 40 μg/m³ for 24-hour measurements or below 30 μg/m³ for 48-hour measurements; or

Equation 28

$$RP_j = 100\% \text{ x } \frac{1}{C_{ave,j}} \sqrt{\frac{\sum_{i=1}^{3} C_{i,j}^2 - \frac{1}{3}\left(\sum_{i=1}^{3} C_{i,j}\right)^2}{2}}$$

(iii) If $C_{ave,j}$ is above 40 μg/m³ for 24-hour measurements or above 30 μg/m³ for 48-hour measurements.

(h) *Test results.* (1) The candidate method passes the precision test if all 10 P_j or RP_j values meet the specifications in table E–1 of this subpart.

(2) The candidate sequential sampler passes the blank filter storage deposition test if the average net storage deposition weight gain of each set of blank filters (total of the net weight gain of each blank filter divided by the number of filters in the set) from each test sampler (six sets in all) is less than 50 μg.

§ 53.59 Aerosol transport test for Class I equivalent method samplers.

(a) *Overview.* This test is intended to verify adequate aerosol transport through any modified or air flow splitting components that may be used in a Class I candidate equivalent method sampler such as may be necessary to achieve sequential sampling capability. This test is applicable to all Class I candidate samplers in which the aerosol flow path (the flow path through which sample air passes upstream of sample collection filter) differs from that specified for reference method samplers as specified in 40 CFR part 50, appendix L. The test requirements and performance specifications for this test are summarized in table E–1 of this subpart.

(b) *Technical definitions.* (1) Aerosol transport is the percentage of a laboratory challenge aerosol which penetrates to the active sample filter of the candidate equivalent method sampler.

(2) The active sample filter is the exclusive filter through which sample air is flowing during performance of this test.

(3) A no-flow filter is a sample filter through which no sample air is intended to flow during performance of this test.

(4) A channel is any of two or more flow paths that the aerosol may take, only one of which may be active at a time.

(5) An added component is any physical part of the sampler which is different in some way from that specified for a reference method sampler in 40 CFR part 50, appendix L, such as a device or means to allow or cause the aerosol to be routed to one of several channels.

(c) *Required facilities and test equipment.* (1) Aerosol generation system, as specified in § 53.62(c)(2).

(2) Aerosol delivery system, as specified in § 53.64(c)(2).

(3) Particle size verification equipment, as specified in § 53.62(c)(3).

(4) Fluorometer, as specified in § 53.62(c)(7).

(5) Candidate test sampler, with the inlet and impactor or impactors removed, and with all internal surfaces of added components electroless nickel coated as specified in § 53.64(d)(2).

(6) Filters that are appropriate for use with fluorometric methods (e.g., glass fiber).

(d) *Calibration of test measurement instruments*. Submit documentation showing evidence of appropriately recent calibration, certification of calibration accuracy, and NIST-traceability (if required) of all measurement instruments used in the tests. The accuracy of flow rate meters shall be verified at the highest and lowest pressures and temperatures used in the tests and shall be checked at zero and at least one flow rate within ±3 percent of 16.7 L/min within 7 days prior to use for this test. Where an instrument's measurements are to be recorded with an analog recording device, the accuracy of the entire instrument-recorder system shall be calibrated or verified.

(e) *Test setup*. (1) The candidate test sampler shall have its inlet and impactor or impactors removed. The lower end of the down tube shall be reconnected to the filter holder, using an extension of the downtube, if necessary. If the candidate sampler has a separate impactor for each channel, then for this test, the filter holder assemblies must be connected to the physical location on the sampler where the impactors would normally connect.

(2) The test particle delivery system shall be connected to the sampler downtube so that the test aerosol is introduced at the top of the downtube.

(f) *Test procedure*. (1) All surfaces of the added or modified component or components which come in contact with the aerosol flow shall be thoroughly washed with 0.01 N NaOH and then dried.

(2) Generate aerosol. (i) Generate aerosol composed of oleic acid with a uranine fluorometric tag of 3 ±0.25 μm aerodynamic diameter using a vibrating orifice aerosol generator according to conventions specified in § 53.61(g).

(ii) Check for the presence of satellites and adjust the generator to minimize their production.

(iii) Calculate the aerodynamic particle size using the operating parameters of the vibrating orifice aerosol generator. The calculated aerodynamic diameter must be 3 ±0.25 μm aerodynamic diameter.

(3) Verify the particle size according to procedures specified in § 53.62(d)(4)(i).

(4) Collect particles on filters for a time period such that the relative error of the resulting measured fluorometric concentration for the active filter is less than 5 percent.

(5) Determine the quantity of material collected on the active filter using a calibrated fluorometer. Record the mass of fluorometric material for the active filter as $M_{active\ (i)}$ where i = the active channel number.

(6) Determine the quantity of material collected on each no-flow filter using a calibrated fluorometer. Record the mass of fluorometric material on each no-flow filter as $M_{no\text{-}flow}$.

(7) Using 0.01 N NaOH, wash the surfaces of the added component or components which contact the aerosol flow. Determine the quantity of material collected using a calibrated fluorometer. Record the mass of fluorometric material collected in the wash as M_{wash}.

(8) Calculate the aerosol transport as:

Equation 29

$$T_{(i)} = \frac{M_{active}}{M_{active+} M_{wash+} \sum M_{no\text{-}flow}} \text{ x } 100\%$$

where:

i = the active channel number.

(9) Repeat paragraphs (f)(1) through (8) of this section for each channel, making each channel in turn the exclusive active channel.

(g) *Test results*. The candidate Class I sampler passes the aerosol transport test if $T_{(i)}$ is at least 97 percent for each channel.

TABLE E–1 TO SUBPART E—SUMMARY OF TEST REQUIREMENTS FOR REFERENCE AND CLASS I EQUIVALENT METHODS FOR $PM_{2.5}$

Subpart E Procedure	Performance Test	Performance Specification	Test Conditions	Part 50, Appendix L Reference
§ 53.52 Sampler leak check test.	Sampler leak check facility	External leakage: 80 mL/min, max Internal leakage: 80 mL/min, max	Controlled leak flow rate of 80 mL/min	Sec. 7.4.6
§ 53.53 Base flow rate test.	Sample flow rate: 1. Mean 2. Regulation 3. Meas. accuracy 4. CV accuracy 5. Cut-off	1. 16.67 ±5%, L/min 2. 2%, max 3. 2%, max 4. 0.3%, max 5. Flow rate cut-off if flow rate deviates more than 10% from design flow rate for >60±30 seconds	(a) 6-hour normal operational test plus flow rate cut-off test (b) Nominal conditions (c) Additional 55 mm Hg pressure drop to simulate loaded filter (d) Variable flow restriction used for cut-off test	Sec. 7.4.1 Sec. 7.4.2 Sec. 7.4.3 Sec. 7.4.4 Sec. 7.4.5
§ 53.54 Power interruption test.	Sample flow rate: 1. Mean 2. Regulation 3. Meas. accuracy 4. CV accuracy 5. Occurrence time of power interruptions 6. Elapsed sample time 7. Sample volume	1. 16.67±5%, L/min 2. 2%, max 3. 2%, max 4. 0.3%, max 5. ±2 min if >60 seconds 6. ±20 seconds 7. ±2%, max	(a) 6-hour normal operational test (b) Nominal conditions (c) Additional 55 mm Hg pressure drop to simulate loaded filter (d) 6 power interruptions of various durations	Sec. 7.4.1 Sec. 7.4.2 Sec. 7.4.3 Sec. 7.4.5 Sec. 7.4.12 Sec. 7.4.13 Sec. 7.4.15.4 Sec. 7.4.15.5
§ 53.55 Temperature and line voltage effect test.	Sample flow rate: 1. Mean 2. Regulation 3. Meas. accuracy 4. CV accuracy 5. Temperature meas. accuracy 6. Proper operation	1. 16.67±5%, L/min 2. 2 %, max 3. 2 %, max 4. 0.3 %, max 5. 2 °C	(a) 6-hour normal operational test (b) Nominal conditions (c) Additional 55 mm Hg pressure drop to simulate loaded filter (d) Ambient temperature at −20 and +40 °C (e) Line voltage: 105 Vac to 125 Vac	Sec. 7.4.1 Sec. 7.4.2 Sec. 7.4.3 Sec. 7.4.5 Sec. 7.4.8 Sec. 7.4.15.1
§ 53.56 Barometric pressure effect test.	Sample flow rate: 1. Mean 2. Regulation 3. Meas. accuracy 4. CV accuracy 5. Pressure meas. accuracy 6. Proper operation	1. 16.67±5%, L/min 2. 2%, max 3. 2%, max 4. 0.3%, max 5. 10 mm Hg	(a) 6-hour normal operational test (b) Nominal conditions (c) Additional 55 mm Hg pressure drop to simulate loaded filter (d) Barometric pressure at 600 and 800 mm Hg.	Sec. 7.4.1 Sec. 7.4.2 Sec. 7.4.3 Sec. 7.4.5 Sec. 7.4.9
§ 53.57 Filter temperature control test.	1. Filter temp meas. accuracy 2. Ambient temp. meas. accuracy 3. Filter temp control accuracy, sampling and non-sampling	1. 2 °C 2. 2 °C 3. Not more than 5 °C above ambient temp. for more than 30 min	(a) 4-hour simulated solar radiation, sampling (b) 4-hour simulated solar radiation, non-sampling (c) Solar flux of 1000±50W/m²	Sec. 7.4.8 Sec. 7.4.10 Sec. 7.4.11
§ 53.58 Field precision test.	1. Measurement precision 2. Storage deposition test for sequential samplers	1. P_j <2 μg/m³ for conc. <40 μg/m³ (24-hr) or <30 μg/m³ (48-hr); or RP_j < 5% for conc. >40 μg/m3 (24-hr) or >30 μg/m3 (48-hr) 2. 50 μg, max weight gain	(a) 3 collocated samplers at 1 site for at least 10 days (b) $PM_{2.5}$ conc.≥10 μg/m³ (c) 24- or 48-hour samples (d) 5- or 10-day storage period for inactive stored filters	Sec. 5.1 Sec. 7.3.5 Sec. 8 Sec. 9 Sec. 10

Subpart E Procedure	Performance Test	Performance Specification	Test Conditions	Part 50, Appendix L Reference
The Following Requirement is Applicable to Candidate Equivalent Methods Only				
§ 53.59 Aerosol transport test.	Aerosol transport	97%, min, for all channels	Determine aerosol transport through any new or modified components with respect to the reference method sampler before the filter for each channel.	

[62 FR 38799, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

TABLE E–2 TO SUBPART E—SPECTRAL ENERGY DISTRIBUTION AND PERMITTED TOLERANCE FOR CONDUCTING RADIATIVE TESTS

Characteristic	Spectral Region			
	Ultraviolet		Visible	Infrared
Bandwidth (μm)	0.28 to 0.32	0.32 to 0.40	0.40 to 0.78	0.78 to 3.00
Irradiance (W/m^2)	5	56	450 to 550	439
Allowed Tolerance	± 35%	±25%	± 10%	±10%

[62 FR 38799, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

FIGURE E–1 TO SUBPART E—DESIGNATION TESTING CHECKLIST

DESIGNATION TESTING CHECKLIST

Auditee _____ Auditor signature _____ Date _____

Compliance Status: Y = Yes N = No NA = Not applicable/Not available				
Verification			Verified by Direct Observation of Process or of Documented Evidence: Performance, Design or Application Spec. Corresponding to Sections of 40 CFR Part 53 or 40 CFR Part 50, Appendix L	Verification Comments (Includes documentation of who, what, where, when, why) (Doc. #, Rev. #, Rev. Date)
Y	N	NA		
			Performance Specification Tests Sample flow rate coefficient of variation (§ 53.53) (L–7.4.3)	
			Filter temperature control (sampling) (§ 53.57) (L–7.4.10)	
			Elapsed sample time accuracy (§ 53.54) (L–7.4.13)	
			Filter temperature control (post sampling) (§ 53.57) (L–7.4.10)	
			Application Specification Tests	
			Field Precision (§ 53.58) (L–5.1)	
			Meets all Appendix L requirements (part 53, subpart A, § 53.2(a)(3)) (part 53, subpart E, § 53.51(a),(d))	
			Filter Weighing (L–8)	
			Field Sampling Procedure (§ 53.30, .31, .34)	
			Design Specification Tests	
			Filter (L–6)	
			Range of Operational Conditions (L–7.4.7)	
The Following Requirements Apply Only to Class I Candidate Equivalent Methods				
			Aerosol Transport (§ 53.59)	

FIGURE E–2 TO SUBPART E—PRODUCT MANUFACTURING CHECKLIST

PRODUCT MANUFACTURING CHECKLIST

Auditee	Auditor signature	Date

Compliance Status: Y = Yes N = No NA = Not applicable/Not available				Verification Comments (Includes documentation of who, what, where, when, why) (Doc. #, Rev. #, Rev. Date)
Verification			Verified by Direct Observation of Process or of Documented Evidence: Performance, Design or Application Spec. Corresponding to Sections of 40 CFR Part 53 or 40 CFR Part 50, Appendix L	
Y	N	NA		
			Performance Specification Tests	
			Assembled operational performance (Burn-in test) (§ 53.53)	
			Sample flow rate (§ 53.53) (L–7.4.1, L–7.4.2)	
			Sample flow rate regulation (§ 53.53) (L–7.4.3)	
			Flow rate and average flow rate measurement accuracy (§ 53.53) (L–7.4.5)	
			Ambient air temperature measurement accuracy (§ 53.55) (L–7.4.8)	
			Ambient barometric pressure measurement accuracy (§ 53.56) (L–7.4.9)	
			Sample flow rate cut-off (§ 53.53) (L–7.4.4)	
			Sampler leak check facility (§ 53.52) (L–7.4.6)	
			Application Specification Tests	
			Flow rate calibration transfer standard (L-9.2)	
			Operational /Instructional manual (L-7.4.18)	
			Design Specification Tests	
			Impactor (jet width) (§ 53.51(d)(1)) (L-7.3.4.1)	
			Surface finish (§ 53.51(d)(2)) (L-7.3.7)	

APPENDIX A TO SUBPART E—REFERENCES

(1) Quality systems—Model for quality assurance in design, development, production, installation and servicing, ISO 9001. July 1994. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

(2) American National Standard—Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs. ANSI/ASQC E4-1994. January 1995. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

(3) Copies of section 2.12 of the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Specific Methods, EPA/600/R-94/038b, are available from Department E (MD-77B), U.S. EPA, Research Triangle Park, NC 27711.

(4) Military standard specification (mil. spec.) 8625F, Type II, Class 1 as listed in Department of Defense Index of Specifications and Standards (DODISS), available from DODSSP-Customer Service, Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 1911-5094.

(5) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements. Revised March, 1995. EPA-600/R-94-038d. Available from U.S. EPA, ORD Publications Office, Center for Environmental Research Information (CERI), 26 West Martin Luther King Drive, Cincinnati, Ohio 45268-1072 (513-569-7562).

(6) Military standard specification (mil. spec.) 810-E as listed in Department of Defense Index of Specifications and Standards (DODISS), available from DODSSP-Customer Service, Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 1911-5094.

Subpart F—Procedures for Testing Performance Characteristics of Class II Equivalent Methods for $PM_{2.5}$

SOURCE: 62 FR 38814, July 18, 1997, unless otherwise noted.

§53.60 General provisions.

(a) This subpart sets forth the specific requirements that a $PM_{2.5}$ sampler associated with a candidate Class II equivalent method must meet to be designated as an equivalent method for $PM_{2.5}$. This subpart also sets forth the explicit test procedures that must be carried out and the test results, evidence, documentation, and other materials that must be provided to EPA to demonstrate that a sampler meets all specified requirements for designation as an equivalent method.

(b) A candidate method described in an application for a reference or equivalent method application submitted under §53.4 shall be determined by the EPA to be a Class II candidate equivalent method on the basis of the definition of a Class II equivalent method given in §53.1.

(c) Any sampler associated with a Class II candidate equivalent method (Class II sampler) must meet all requirements for reference method samplers and Class I equivalent method samplers specified in subpart E of this part, as appropriate. In addition, a Class II sampler must meet the additional requirements as specified in paragraph (d) of this section.

(d) Except as provided in paragraphs (d) (1), (2), and (3) of this section, all Class II samplers are subject to the additional tests and performance requirements specified in §53.62 (full wind tunnel test), §53.65 (loading test), and §53.66 (volatility test). Alternative tests and performance requirements, as described in paragraphs (d)(1), (2), and (3) of this section, are optionally available for certain Class II samplers which meet the requirements for reference method or Class I samplers given in 40 CFR part 50, appendix L, and in subpart E of this part, except for specific deviations of the inlet, fractionator, or filter.

(1) *Inlet deviation.* A sampler which has been determined to be a Class II sampler solely because the design or construction of its inlet deviates from the design or construction of the inlet specified in 40 CFR part 50, appendix L, for reference method samplers shall not be subject to the requirements of §53.62 (full wind tunnel test), provided that it meets all requirements of §53.63 (wind tunnel inlet aspiration test), §53.65 (loading test), and §53.66 (volatility test).

(2) *Fractionator deviation.* A sampler which has been determined to be a Class II sampler solely because the design or construction of its particle size fractionator deviates from the design or construction of the particle size fractionator specified in 40 CFR part 50, appendix L for reference method samplers shall not be subject to the requirements of §53.62 (full wind tunnel test), provided that it meets all requirements of §53.64 (static fractionator test), §53.65 (loading test), and §53.66 (volatility test).

(3) *Filter size deviation.* A sampler which has been determined to be a Class II sampler solely because its effective filtration area deviates from that of the reference method filter specified in 40 CFR part 50, appendix L, for reference method samplers shall not be subject to the requirements of §53.62 (full wind tunnel test) nor §53.65 (loading test), provided it meets all requirements of §53.66 (volatility test).

(e) *The test specifications and acceptance criteria for each test are summarized in table F–1 of this subpart.* The candidate sampler must demonstrate performance that meets the acceptance criteria for each applicable test to be designated as an equivalent method.

(f) *Overview of various test procedures for Class II samplers*—(1) *Full wind tunnel test.* This test procedure is designed to ensure that the candidate sampler's effectiveness (aspiration of an ambient aerosol and penetration of the sub 2.5-micron fraction to its sample filter) will be comparable to that of a reference method sampler. The candidate sampler is challenged at wind speeds of 2 and 24 km/hr with monodisperse aerosols of the size specified in table F–2 of this subpart. The experimental test results are then integrated with three

idealized ambient distributions (typical, fine, and coarse) to yield the expected mass concentration measurement for each. The acceptance criteria are based on the results of this numerical analysis and the particle diameter for which the sampler effectiveness is 50 percent.

(2) *Wind tunnel inlet aspiration test.* The wind tunnel inlet aspiration test directly compares the inlet of the candidate sampler to the inlet of a reference method sampler with the single-sized, liquid, monodisperse challenge aerosol specified in table F–2 of this subpart at wind speeds of 2 km/hr and 24 km/hr. The acceptance criteria, presented in table F–1 of this subpart, is based on the relative aspiration between the candidate inlet and the reference method inlet.

(3) *Static fractionator test.* The static fractionator test determines the effectiveness of the candidate sampler's 2.5-micron fractionator under static conditions for aerosols of the size specified in table F–2 of this subpart. The numerical analysis procedures and acceptance criteria are identical to those in the full wind tunnel test.

(4) *Loading test.* The loading test is conducted to ensure that the performance of a candidate sampler is not significantly affected by the amount of particulate deposited on its interior surfaces between periodic cleanings. The candidate sampler is artificially loaded by sampling a test environment containing aerosolized, standard test dust. The duration of the loading phase is dependent on both the time between cleaning as specified by the candidate method and the aerosol mass concentration in the test environment. After loading, the candidate's performance must then be evaluated by § 53.62 (full wind tunnel evaluation), § 53.64 (wind tunnel inlet aspiration test), or § 53.64 (static fractionator test). If the results of the appropriate test meet the criteria presented in table F–1 of this subpart, then the candidate sampler passes the loading test under the condition that it be cleaned at least as often as the cleaning frequency proposed by the candidate method and that has been demonstrated to be acceptable by this test.

(5) *Volatility test.* The volatility test challenges the candidate sampler with a polydisperse, semi-volatile liquid aerosol. This aerosol is simultaneously sampled by the candidate method sampler and a reference method sampler for a specified time period. Clean air is then passed through the samplers during a blow-off time period. Residual mass is then calculated as the weight of the filter after the blow-off phase is subtracted from the initial weight of the filter. Acceptance criteria are based on a comparison of the residual mass measured by the candidate sampler (corrected for flow rate variations from that of the reference method) to the residual mass measured by the reference method sampler for several specified clean air sampling time periods.

(g) *Test data.* All test data and other documentation obtained from or pertinent to these tests shall be identified, dated, signed by the analyst performing the test, and submitted to EPA as part of the equivalent method application. Schematic drawings of each particle delivery system and other information showing complete procedural details of the test atmosphere generation, verification, and delivery techniques for each test performed shall be submitted to EPA. All pertinent calculations shall be clearly presented. In addition, manufacturers are required to submit as part of the application, a Designation Testing Checklist (Figure F–1 of this subpart) which has been completed and signed by an ISO-certified auditor.

§ 53.61 Test conditions for $PM_{2.5}$ reference method equivalency.

(a) *Sampler surface preparation.* Internal surfaces of the candidate sampler shall be cleaned and dried prior to performing any Class II sampler test in this subpart. The internal collection surfaces of the sampler shall then be prepared in strict accordance with the operating instructions specified in the sampler's operating manual referred to in section 7.4.18 of 40 CFR part 50, appendix L.

(b) *Sampler setup.* Set up and start up of all test samplers shall be in strict accordance with the operating instructions specified in the manual referred

to in section 7.4.18 of 40 CFR part 50, appendix L, unless otherwise specified within this subpart.

(c) *Sampler adjustments.* Once the test sampler or samplers have been set up and the performance tests started, manual adjustment shall be permitted only between test points for all applicable tests. Manual adjustments and any periodic maintenance shall be limited to only those procedures prescribed in the manual referred to in section 7.4.18 of 40 CFR part 50, appendix L. The submitted records shall clearly indicate when any manual adjustment or periodic maintenance was made and shall describe the operations performed.

(d) *Sampler malfunctions.* If a test sampler malfunctions during any of the applicable tests, that test run shall be repeated. A detailed explanation of all malfunctions and the remedial actions taken shall be submitted as part of the equivalent method application.

(e) *Particle concentration measurements.* All measurements of particle concentration must be made such that the relative error in measurement is less than 5.0 percent. Relative error is defined as (s × 100 percent)/(X), where s is the sample standard deviation of the particle concentration detector, X is the measured concentration, and the units of s and X are identical.

(f) *Operation of test measurement equipment.* All test measurement equipment shall be set up, calibrated, and maintained by qualified personnel according to the manufacturer's instructions. All appropriate calibration information and manuals for this equipment shall be kept on file.

(g) *Vibrating orifice aerosol generator conventions.* This section prescribes conventions regarding the use of the vibrating orifice aerosol generator (VOAG) for the size-selective performance tests outlined in §§ 53.62, 53.63, 53.64, and 53.65.

(1) *Particle aerodynamic diameter.* The VOAG produces near-monodisperse droplets through the controlled breakup of a liquid jet. When the liquid solution consists of a non-volatile solute dissolved in a volatile solvent, the droplets dry to form particles of near-monodisperse size.

(i) The physical diameter of a generated spherical particle can be calculated from the operating parameters of the VOAG as:

Equation 1

$$D_p = \left(\frac{6\ Q\ C_{vol}}{\pi\ f} \right)^{1/3}$$

where:

D_p = particle physical diameter, μm;
Q = liquid volumetric flow rate, μm^3/sec;
C_{vol} = volume concentration (particle volume produced per drop volume), dimensionless; and
f = frequency of applied vibrational signal, 1/sec.

(ii) A given particle's aerodynamic behavior is a function of its physical particle size, particle shape, and density. Aerodynamic diameter is defined as the diameter of a unit density (ρ_o = 1g/cm^3) sphere having the same settling velocity as the particle under consideration. For converting a spherical particle of known density to aerodynamic diameter, the governing relationship is:

Equation 2

$$D_{ae} = \frac{\sqrt{\rho_p}\sqrt{C_{D_p}}\,D_p}{\sqrt{\rho_o}\sqrt{C_{D_{ae}}}}$$

where:

D_{ae} = particle aerodynamic diameter, μm;
ρ_p = particle density, g/cm^3;
ρ_o = aerodynamic particle density = 1 g/cm^3;
C_{Dp} = Cunningham's slip correction factor for physical particle diameter, dimensionless; and
C_{Dae} = Cunningham's slip correction factor for aerodynamic particle diameter, dimensionless.

(iii) At room temperature and standard pressure, the Cunningham's slip correction factor is solely a function of particle diameter:

Equation 3

$$C_{Dae} = 1 + \frac{0.1659}{D_{ae}} + \frac{0.053}{D_{ae}}\ \exp\left(-8.33\ D_{ae}\right)$$

or

Equation 4

$$C_{D_p} = 1 + \frac{0.1659}{D_p} + \frac{0.053}{D_p} \exp\left(-8.33\ D_p\right)$$

(iv) Since the slip correction factor is itself a function of particle diameter, the aerodynamic diameter in equation 2 of paragraph (g)(1)(ii) of this section cannot be solved directly but must be determined by iteration.

(2) *Solid particle generation.* (i) Solid particle tests performed in this subpart shall be conducted using particles composed of ammonium fluorescein. For use in the VOAG, liquid solutions of known volumetric concentration can be prepared by diluting fluorescein powder ($C_20H_{12}O_5$, FW = 332.31, CAS 2321-07-5) with aqueous ammonia. Guidelines for preparation of fluorescein solutions of the desired volume concentration (C_{vol}) are presented by Vanderpool and Rubow (1988) (Reference 2 in appendix A of this subpart). For purposes of converting particle physical diameter to aerodynamic diameter, an ammonium fluorescein density of 1.35 g/cm^3 shall be used.

(ii) Mass deposits of ammonium fluorescein shall be extracted and analyzed using solutions of 0.01 N ammonium hydroxide.

(3) *Liquid particle generation.* (i) Tests prescribed in § 53.63 for inlet aspiration require the use of liquid particle tests composed of oleic acid tagged with uranine to enable subsequent fluorometric quantitation of collected aerosol mass deposits. Oleic acid ($C_{18}H_{34}O_2$, FW = 282.47, CAS 112-80-1) has a density of 0.8935 g/cm^3. Because the viscosity of oleic acid is relatively high, significant errors can occur when dispensing oleic acid using volumetric pipettes. For this reason, it is recommended that oleic acid solutions be prepared by quantifying dispensed oleic acid gravimetrically. The volume of oleic acid dispensed can then be calculated simply by dividing the dispensed mass by the oleic acid density.

(ii) Oleic acid solutions tagged with uranine shall be prepared as follows. A known mass of oleic acid shall first be diluted using absolute ethanol. The desired mass of the uranine tag should then be diluted in a separate container using absolute ethanol. Uranine ($C_{20}H_{10}O_5Na_2$, FW = 376.3, CAS 518-47-8) is the disodium salt of fluorescein and has a density of 1.53 g/cm^3. In preparing uranine tagged oleic acid particles, the uranine content shall not exceed 20 percent on a mass basis. Once both oleic acid and uranine solutions are properly prepared, they can then be combined and diluted to final volume using absolute ethanol.

(iii) Calculation of the physical diameter of the particles produced by the VOAG requires knowledge of the liquid solution's volume concentration (C_{vol}). Because uranine is essentially insoluble in oleic acid, the total particle volume is the sum of the oleic acid volume and the uranine volume. The volume concentration of the liquid solution shall be calculated as:

Equation 5

$$C_{vol} = \frac{V_u + V_{oleic}}{V_{sol}} = \frac{\left(M_u/\rho_u\right) + \left(M_{oleic}/\rho_{oleic}\right)}{V_{sol}}$$

where:

V_u = uranine volume, ml;
V_{oleic} = oleic acid volume, ml;
V_{sol} = total solution volume, ml;
M_u = uranine mass, g;
ρ_u = uranine density, g/cm^3;
M_{oleic} = oleic acid mass, g; and
ρ_{oleic} = oleic acid density, g/cm^3.

(iv) For purposes of converting the particles' physical diameter to aerodynamic diameter, the density of the generated particles shall be calculated as:

Equation 6

$$\rho_p = \frac{M_u + M_{oleic}}{\left(M_u/\rho_u\right) + \left(M_{oleic}/\rho_{oleic}\right)}$$

(v) Mass deposits of oleic acid shall be extracted and analyzed using solutions of 0.01 N sodium hydroxide.

[62 FR 38814, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 53.62 Test procedure: Full wind tunnel test.

(a) *Overview.* The full wind tunnel test evaluates the effectiveness of the candidate sampler at 2 km/hr and 24 km/hr for aerosols of the size specified in table F–2 of this subpart (under the

heading, ''Full Wind Tunnel Test''). For each wind speed, a smooth curve is fit to the effectiveness data and corrected for the presence of multiplets in the wind tunnel calibration aerosol. The cutpoint diameter (D_{p50}) at each wind speed is then determined from the corrected effectiveness curves. The two resultant penetration curves are then each numerically integrated with three idealized ambient particle size distributions to provide six estimates of measured mass concentration. Critical parameters for these idealized distributions are presented in table F–3 of this subpart.

(b) *Technical definitions.* Effectiveness is the ratio (expressed as a percentage) of the mass concentration of particles of a specific size reaching the sampler filter or filters to the mass concentration of particles of the same size approaching the sampler.

(c) *Facilities and equipment required*—(1) *Wind tunnel.* The particle delivery system shall consist of a blower system and a wind tunnel having a test section of sufficiently large cross-sectional area such that the test sampler, or portion thereof, as installed in the test section for testing, blocks no more than 15 percent of the test section area. The wind tunnel blower system must be capable of maintaining uniform wind speeds at the 2 km/hr and 24 km/hr in the test section.

(2) *Aerosol generation system.* A vibrating orifice aerosol generator shall be used to produce monodisperse solid particles of ammonium fluorescein with equivalent aerodynamic diameters as specified in table F–2 of this subpart. The geometric standard deviation for each particle size generated shall not exceed 1.1 (for primary particles) and the proportion of multiplets (doublets and triplets) in all test particle atmosphere shall not exceed 10 percent of the particle population. The aerodynamic particle diameter, as established by the operating parameters of the vibrating orifice aerosol generator, shall be within the tolerance specified in table F–2 of this subpart.

(3) *Particle size verification equipment.* The size of the test particles shall be verified during this test by use of a suitable instrument (e.g., scanning electron microscope, optical particle sizer, time-of-flight apparatus). The instrument must be capable of measuring solid and liquid test particles with a size resolution of 0.1 μm or less. The accuracy of the particle size verification technique shall be 0.15 μm or better.

(4) *Wind speed measurement.* The wind speed in the wind tunnel shall be determined during the tests using an appropriate technique capable of a precision of 2 percent and an accuracy of 5 percent or better (e.g., hot-wire anemometry). For the wind speeds specified in table F–2 of this subpart, the wind speed shall be measured at a minimum of 12 test points in a cross-sectional area of the test section of the wind tunnel. The mean wind speed in the test section must be within ±10 percent of the value specified in table F–2 of this subpart, and the variation at any test point in the test section may not exceed 10 percent of the measured mean.

(5) *Aerosol rake.* The cross-sectional uniformity of the particle concentration in the sampling zone of the test section shall be established during the tests using an array of isokinetic samplers, referred to as a rake. Not less than five evenly spaced isokinetic samplers shall be used to determine the particle concentration spatial uniformity in the sampling zone. The sampling zone shall be a rectangular area having a horizontal dimension not less than 1.2 times the width of the test sampler at its inlet opening and a vertical dimension not less than 25 centimeters.

(6) *Total aerosol isokinetic sampler.* After cross-sectional uniformity has been confirmed, a single isokinetic sampler may be used in place of the array of isokinetic samplers for the determination of particle mass concentration used in the calculation of sampling effectiveness of the test sampler in paragraph (d)(5) of this section. In this case, the array of isokinetic samplers must be used to demonstrate particle concentration uniformity prior to the replicate measurements of sampling effectiveness.

(7) *Fluorometer.* A fluorometer used for quantifying extracted aerosol mass deposits shall be set up, maintained,

and calibrated according to the manufacturer's instructions. A series of calibration standards shall be prepared to encompass the minimum and maximum concentrations measured during size-selective tests. Prior to each calibration and measurement, the fluorometer shall be zeroed using an aliquot of the same solvent used for extracting aerosol mass deposits.

(8) *Sampler flow rate measurements.* All flow rate measurements used to calculate the test atmosphere concentrations and the test results must be accurate to within ±2 percent, referenced to a NIST-traceable primary standard. Any necessary flow rate measurement corrections shall be clearly documented. All flow rate measurements shall be performed and reported in actual volumetric units.

(d) *Test procedures*—(1) *Establish and verify wind speed.* (i) Establish a wind speed specified in table F–2 of this subpart.

(ii) Measure the wind speed at a minimum of 12 test points in a cross-sectional area of the test section of the wind tunnel using a device as described in paragraph (c)(4) of this section.

(iii) Verify that the mean wind speed in the test section of the wind tunnel during the tests is within 10 percent of the value specified in table F–2 of this subpart. The wind speed measured at any test point in the test section shall not differ by more than 10 percent from the mean wind speed in the test section.

(2) *Generate aerosol.* (i) Generate particles of a size specified in table F–2 of this subpart using a vibrating orifice aerosol generator.

(ii) Check for the presence of satellites and adjust the generator as necessary.

(iii) Calculate the physical particle size using the operating parameters of the vibrating orifice aerosol generator and record.

(iv) Determine the particle's aerodynamic diameter from the calculated physical diameter and the known density of the generated particle. The calculated aerodynamic diameter must be within the tolerance specified in table F–2 of this subpart.

(3) *Introduce particles into the wind tunnel.* Introduce the generated particles into the wind tunnel and allow the particle concentration to stabilize.

(4) *Verify the quality of the test aerosol.* (i) Extract a representative sample of the aerosol from the sampling test zone and measure the size distribution of the collected particles using an appropriate sizing technique. If the measurement technique does not provide a direct measure of aerodynamic diameter, the geometric mean aerodynamic diameter of the challenge aerosol must be calculated using the known density of the particle and the measured mean physical diameter. The determined geometric mean aerodynamic diameter of the test aerosol must be within 0.15 μm of the aerodynamic diameter calculated from the operating parameters of the vibrating orifice aerosol generator. The geometric standard deviation of the primary particles must not exceed 1.1.

(ii) Determine the population of multiplets in the collected sample. The multiplet population of the particle test atmosphere must not exceed 10 percent of the total particle population.

(5) *Aerosol uniformity and concentration measurement.* (i) Install an array of five or more evenly spaced isokinetic samplers in the sampling zone (paragraph (c)(5) of this section). Collect particles on appropriate filters over a time period such that the relative error of the measured particle concentration is less than 5.0 percent.

(ii) Determine the quantity of material collected with each isokinetic sampler in the array using a calibrated fluorometer. Calculate and record the mass concentration for each isokinetic sampler as:

Equation 7

$$C_{iso(ij)} = \frac{M_{iso(ij)}}{Q_{(ij)} \times t_{(ij)}}$$

where:

i = replicate number;

j = isokinetic sampler number;

M_{iso} = mass of material collected with the isokinetic sampler;

Q = isokinetic sampler volumetric flow rate; and

t = sampling time.

(iii) Calculate and record the mean mass concentration as:

Equation 8

$$\overline{C}_{iso(i)} = \frac{\sum_{j=1}^{n} C_{iso(ij)}}{n}$$

where:

i = replicate number;
j = isokinetic sampler number; and
n = total number of isokinetic samplers.

(iv) Precision calculation. (A) Calculate the coefficient of variation of the mass concentration measurements as:

Equation 9

$$CV_{iso(i)} = \frac{\sqrt{\sum_{j=1}^{n} C_{iso(ij)}^2 - \frac{1}{n}\left(\sum_{j=1}^{n} C_{iso(ij)}\right)^2}}{n-1} / \overline{C}_{iso(i)} \times 100\%$$

where:

i = replicate number;
j = isokinetic sampler number; and
n = total number of isokinetic samplers.

(B) If the value of $CV_{iso(i)}$ for any replicate exceeds 10 percent, the particle concentration uniformity is unacceptable and step 5 must be repeated. If adjustment of the vibrating orifice aerosol generator or changes in the particle delivery system are necessary to achieve uniformity, steps 1 through 5 must be repeated. When an acceptable aerosol spatial uniformity is achieved, remove the array of isokinetic samplers from the wind tunnel.

(6) *Alternative measure of wind tunnel total concentration.* If a single isokinetic sampler is used to determine the mean aerosol concentration in the wind tunnel, install the sampler in the wind tunnel with the sampler nozzle centered in the sampling zone (paragraph (c)(6) of this section).

(i) Collect particles on an appropriate filter over a time period such that the relative error of the measured concentration is less than 5.0 percent.

(ii) Determine the quantity of material collected with the isokinetic sampler using a calibrated fluorometer.

(iii) Calculate and record the mass concentration as $C_{iso(i)}$ as in paragraph (d)(5)(ii) of this section.

(iv) Remove the isokinetic sampler from the wind tunnel.

(7) *Measure the aerosol with the candidate sampler.* (i) Install the test sampler (or portion thereof) in the wind tunnel with the sampler inlet opening centered in the sampling zone. To meet the maximum blockage limit of paragraph (c)(1) of this section or for convenience, part of the test sampler may be positioned external to the wind tunnel provided that neither the geometry of the sampler nor the length of any connecting tube or pipe is altered. Collect particles for a time period such that the relative error of the measured concentration is less than 5.0 percent.

(ii) Remove the test sampler from the wind tunnel.

(iii) Determine the quantity of material collected with the test sampler using a calibrated fluorometer. Calculate and record the mass concentration for each replicate as:

Equation 10

$$C_{cand(i)} = \frac{M_{cand(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number;
M_{cand} = mass of material collected with the candidate sampler;
Q = candidate sampler volumetric flow rate; and
t = sampling time.

(iv)(A) Calculate and record the sampling effectiveness of the candidate sampler as:

Equation 11

$$E_{(i)} = \frac{C_{cand(i)}}{\overline{C}_{iso(i)}} \times 100\%$$

where:

i = replicate number.

(B) If a single isokinetic sampler is used for the determination of particle mass concentration, replace $C_{iso(i)}$ with C_{iso}.

(8) *Replicate measurements and calculation of mean sampling effectiveness.* (i) Repeat steps in paragraphs (d)(5) through (d)(7) of this section, as appropriate, to obtain a minimum of three

valid replicate measurements of sampling effectiveness.

(ii) Calculate and record the average sampling effectiveness of the test sampler for the particle size as:

Equation 12

$$\overline{E} = \frac{\sum_{i=1}^{n} E_{(i)}}{n}$$

where:

i = replicate number; and
n = number of replicates.

(iii) Sampling effectiveness precision. (A) Calculate and record the coefficient of variation for the replicate sampling effectiveness measurements of the test sampler as:

Equation 13

$$CV_E = \frac{\sqrt{\sum_{i=1}^{n} E_{(i)}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} E_{(i)}\right)^2}}{n-1} \frac{1}{\overline{E}} \times 100\%$$

where:

i = replicate number, and
n = number of replicates.

(B) If the value of CV_E exceeds 10 percent, the test run (steps in paragraphs (d)(2) through (d)(8) of this section) must be repeated until an acceptable value is obtained.

(9) Repeat steps in paragraphs (d)(2) through (d)(8) of this section until the sampling effectiveness has been measured for all particle sizes specified in table F–2 of this subpart.

(10) Repeat steps in paragraphs (d)(1) through (d)(9) of this section until tests have been successfully conducted for both wind speeds of 2 km/hr and 24 km/hr.

(e) *Calculations*—(1) *Graphical treatment of effectiveness data.* For each wind speed given in table F–2 of this subpart, plot the particle average sampling effectiveness of the candidate sampler as a function of aerodynamic particle diameter (D_{ae}) on semi-logarithmic graph paper where the aerodynamic particle diameter is the particle size established by the parameters of the VOAG in conjunction with the known particle density. Construct a best-fit, smooth curve through the data by extrapolating the sampling effectiveness curve through 100 percent at an aerodynamic particle size of 0.5 μm and 0 percent at an aerodynamic particle size of 10 μm. Correction for the presence of multiplets shall be performed using the techniques presented by Marple, et al (1987). This multiplet-corrected effectiveness curve shall be used for all remaining calculations in this paragraph (e).

(2) *Cutpoint determination.* For each wind speed determine the sampler Dp_{50} cutpoint defined as the aerodynamic particle size corresponding to 50 percent effectiveness from the multiplet corrected smooth curve.

(3) *Expected mass concentration calculation.* For each wind speed, calculate the estimated mass concentration measurement for the test sampler under each particle size distribution (Tables F–4, F–5, and F–6 of this subpart) and compare it to the mass concentration predicted for the reference sampler as follows:

(i) Determine the value of corrected effectiveness using the best-fit, multiplet-corrected curve at each of the particle sizes specified in the first column of table F–4 of this subpart. Record each corrected effectiveness value as a decimal between 0 and 1 in column 2 of table F–4 of this subpart.

(ii) Calculate the interval estimated mass concentration measurement by multiplying the values of corrected effectiveness in column 2 by the interval mass concentration values in column 3 and enter the products in column 4 of table F–4 of this subpart.

(iii) Calculate the estimated mass concentration measurement by summing the values in column 4 and entering the total as the estimated mass concentration measurement for the test sampler at the bottom of column 4 of table F–4 of this subpart.

(iv) Calculate the estimated mass concentration ratio between the candidate method and the reference method as:

Equation 14

$$R_c = \frac{C_{cand(est)}}{C_{ref(est)}} \times 100\%$$

where:

$C_{cand(est)}$ = estimated mass concentration measurement for the test sampler, μg/m³; and

$C_{ref(est)}$ = estimated mass concentration measurement for the reference sampler, μg/m³ (calculated for the reference sampler and specified at the bottom of column 7 of table F–4 of this subpart).

(v) Repeat steps in paragraphs (e) (1) through (e)(3) of this section for tables F–5 and F–6 of this subpart.

(f) *Evaluation of test results.* The candidate method passes the wind tunnel effectiveness test if the R_c value for each wind speed meets the specification in table F–1 of this subpart for each of the three particle size distributions.

§53.63 Test procedure: Wind tunnel inlet aspiration test.

(a) *Overview.* This test applies to a candidate sampler which differs from the reference method sampler only with respect to the design of the inlet. The purpose of this test is to ensure that the aspiration of a Class II candidate sampler is such that it representatively extracts an ambient aerosol at elevated wind speeds. This wind tunnel test uses a single-sized, liquid aerosol in conjunction with wind speeds of 2 km/hr and 24 km/hr. The test atmosphere concentration is alternately measured with the candidate sampler and a reference method device, both of which are operated without the 2.5-micron fractionation device installed. The test conditions are summarized in table F–2 of this subpart (under the heading of ''wind tunnel inlet aspiration test''). The candidate sampler must meet or exceed the acceptance criteria given in table F–1 of this subpart.

(b) *Technical definition.* Relative aspiration is the ratio (expressed as a percentage) of the aerosol mass concentration measured by the candidate sampler to that measured by a reference method sampler.

(c) *Facilities and equipment required.* The facilities and equipment are identical to those required for the full wind tunnel test (§53.62(c)).

(d) *Setup.* The candidate and reference method samplers shall be operated with the $PM_{2.5}$ fractionation device removed from the flow path throughout this entire test procedure. Modifications to accommodate this requirement shall be limited to removal of the fractionator and insertion of the filter holder directly into the downtube of the inlet.

(e) *Test procedure*—(1) *Establish the wind tunnel test atmosphere.* Follow the procedures in §53.62(d)(1) through (d)(4) to establish a test atmosphere for one of the two wind speeds specified in table F–2 of this subpart.

(2) *Measure the aerosol concentration with the reference sampler.* (i) Install the reference sampler (or portion thereof) in the wind tunnel with the sampler inlet opening centered in the sampling zone. To meet the maximum blockage limit of §53.62(c)(1) or for convenience, part of the test sampler may be positioned external to the wind tunnel provided that neither the geometry of the sampler nor the length of any connecting tube or pipe is altered. Collect particles for a time period such that the relative error of the measured concentration is less than 5.0 percent.

(ii) Determine the quantity of material collected with the reference method sampler using a calibrated fluorometer. Calculate and record the mass concentration as:

Equation 15

$$C_{ref(i)} = \frac{M_{ref(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number;

M_{ref} = mass of material collected with the reference method sampler;

Q = reference method sampler volumetric flow rate; and

t = sampling time.

(iii) Remove the reference method sampler from the tunnel.

(3) *Measure the aerosol concentration with the candidate sampler.* (i) Install the candidate sampler (or portion thereof) in the wind tunnel with the sampler inlet centered in the sampling zone. To meet the maximum blockage limit of §53.62(c)(1) or for convenience, part of the test sampler may be positioned external to the wind tunnel provided that neither the geometry of the sampler nor the length of any connecting tube or pipe is altered. Collect

particles for a time period such that the relative error of the measured concentration is less than 5.0 percent.

(ii) Determine the quantity of material collected with the candidate sampler using a calibrated fluorometer. Calculate and record the mass concentration as:

Equation 16

$$C_{cand(i)} = \frac{M_{cand(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number;
M_{cand} = mass of material collected with the candidate sampler;
Q = candidate sampler volumetric flow rate; and
t = sampling time.

(iii) Remove the candidate sampler from the wind tunnel.

(4) Repeat steps in paragraphs (d) (2) and (d)(3) of this section. Alternately measure the tunnel concentration with the reference sampler and the candidate sampler until four reference sampler and three candidate sampler measurements of the wind tunnel concentration are obtained.

(5) *Calculations.* (i) Calculate and record aspiration ratio for each candidate sampler run as:

Equation 17

$$A_{(i)} = \frac{C_{cand(i)}}{\left(C_{ref(i)} + C_{ref(i+1)}\right) \times \frac{1}{2}}$$

where:

i = replicate number.

(ii) Calculate and record the mean aspiration ratio as:

Equation 18

$$\overline{A} = \frac{\sum_{i=1}^{n} A_{(i)}}{n}$$

where:

i = replicate number; and
n = total number of measurements of aspiration ratio.

(iii) Precision of the aspiration ratio. (A) Calculate and record the precision of the aspiration ratio measurements as the coefficient of variation as:

Equation 19

$$CV_A = \frac{\sqrt{\sum_{i=1}^{n} A_{(i)}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} A_{(i)}\right)^2}}{n-1} / \overline{A}_{(i)} \times 100\%$$

where:

i = replicate number; and
n = total number of measurements of aspiration ratio.

(B) If the value of CV_A exceeds 10 percent, the entire test procedure must be repeated.

(f) *Evaluation of test results.* The candidate method passes the inlet aspiration test if all values of A meet the acceptance criteria specified in table F–1 of this subpart.

§ 53.64 Test procedure: Static fractionator test.

(a) *Overview.* This test applies only to those candidate methods in which the sole deviation from the reference method is in the design of the 2.5-micron fractionation device. The purpose of this test is to ensure that the fractionation characteristics of the candidate fractionator are acceptably similar to that of the reference method sampler. It is recognized that various methodologies exist for quantifying fractionator effectiveness. The following commonly-employed techniques are provided for purposes of guidance. Other methodologies for determining sampler effectiveness may be used contingent upon prior approval by the Agency.

(1) *Wash-off method.* Effectiveness is determined by measuring the aerosol mass deposited on the candidate sampler's after filter versus the aerosol mass deposited in the fractionator. The material deposited in the fractionator is recovered by washing its internal surfaces. For these wash-off tests, a fluorometer must be used to quantitate the aerosol concentration. Note that if this technique is chosen, the candidate must be reloaded with coarse aerosol prior to each test point when reevaluating the curve as specified in the loading test.

(2) *Static chamber method.* Effectiveness is determined by measuring the aerosol mass concentration sampled by the candidate sampler's after filter versus that which exists in a static chamber. A calibrated fluorometer shall be used to quantify the collected aerosol deposits. The aerosol concentration is calculated as the measured aerosol mass divided by the sampled air volume.

(3) *Divided flow method.* Effectiveness is determined by comparing the aerosol concentration upstream of the candidate sampler's fractionator versus that concentration which exists downstream of the candidate fractionator. These tests may utilize either fluorometry or a real-time aerosol measuring device to determine the aerosol concentration.

(b) *Technical definition.* Effectiveness under static conditions is the ratio (expressed as a percentage) of the mass concentration of particles of a given size reaching the sampler filter to the mass concentration of particles of the same size existing in the test atmosphere.

(c) *Facilities and equipment required*—(1) *Aerosol generation.* Methods for generating aerosols shall be identical to those prescribed in § 53.62(c)(2).

(2) *Particle delivery system.* Acceptable apparatus for delivering the generated aerosols to the candidate fractionator is dependent on the effectiveness measurement methodology and shall be defined as follows:

(i) *Wash-off test apparatus.* The aerosol may be delivered to the candidate fractionator through direct piping (with or without an in-line mixing chamber). Validation particle size and quality shall be conducted at a point directly upstream of the fractionator.

(ii) *Static chamber test apparatus.* The aerosol shall be introduced into a chamber and sufficiently mixed such that the aerosol concentration within the chamber is spatially uniform. The chamber must be of sufficient size to house at least four total filter samplers in addition to the inlet of the candidate method size fractionator. Validation of particle size and quality shall be conducted on representative aerosol samples extracted from the chamber.

(iii) *Divided flow test apparatus.* The apparatus shall allow the aerosol concentration to be measured upstream and downstream of the fractionator. The aerosol shall be delivered to a manifold with two symmetrical branching legs. One of the legs, referred to as the bypass leg, shall allow the challenge aerosol to pass unfractionated to the detector. The other leg shall accommodate the fractionation device.

(3) *Particle concentration measurement*—(i) *Fluorometry.* Refer to § 53.62(c)(7).

(ii) *Number concentration measurement.* A number counting particle sizer may be used in conjunction with the divided flow test apparatus in lieu of fluorometric measurement. This device must have a minimum range of 1 to 10 μm, a resolution of 0.1 μm, and an accuracy of 0.15 μm such that primary particles may be distinguished from multiplets for all test aerosols. The measurement of number concentration shall be accomplished by integrating the primary particle peak.

(d) *Setup*—(1) *Remove the inlet and downtube from the candidate fractionator.* All tests procedures shall be conducted with the inlet and downtube removed from the candidate sampler.

(2) *Surface treatment of the fractionator.* Rinsing aluminum surfaces with alkaline solutions has been found to adversely affect subsequent fluorometric quantitation of aerosol mass deposits. If wash-off tests are to be used for quantifying aerosol penetration, internal surfaces of the fractionator must first be plated with electroless nickel. Specifications for this plating are specified in Society of Automotive Engineers Aerospace Material Specification (SAE AMS) 2404C, Electroless Nickel Plating (Reference 3 in appendix A of subpart F).

(e) *Test procedure: Wash-off method*—(1) *Clean the candidate sampler.* Note: The procedures in this step may be omitted if this test is being used to evaluate the fractionator after being loaded as specified in § 53.65.

(i) Clean and dry the internal surfaces of the candidate sampler.

(ii) Prepare the internal fractionator surfaces in strict accordance with the

operating instructions specified in the sampler's operating manual referred to in section 7.4.18 of 40 CFR part 50, appendix L.

(2) *Generate aerosol.* Follow the procedures for aerosol generation prescribed in § 53.62(d)(2).

(3) *Verify the quality of the test aerosol.* Follow the procedures for verification of test aerosol size and quality prescribed in § 53.62(d)(4).

(4) *Determine effectiveness for the particle size being produced.* (i) Collect particles downstream of the fractionator on an appropriate filter over a time period such that the relative error of the fluorometric measurement is less than 5.0 percent.

(ii) Determine the quantity of material collected on the after filter of the candidate method using a calibrated fluorometer. Calculate and record the aerosol mass concentration for the sampler filter as:

Equation 20

$$C_{cand(i)} = \frac{M_{cand(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number;
M_{cand} = mass of material collected with the candidate sampler;
Q = candidate sampler volumetric flowrate; and
t = sampling time.

(iii) Wash all interior surfaces upstream of the filter and determine the quantity of material collected using a calibrated fluorometer. Calculate and record the fluorometric mass concentration of the sampler wash as:

Equation 21

$$C_{wash(i)} = \frac{M_{wash(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number;
M_{wash} = mass of material washed from the interior surfaces of the fractionator;
Q = candidate sampler volumetric flowrate; and
t = sampling time.

(iv) Calculate and record the sampling effectiveness of the test sampler for this particle size as:

Equation 22

$$E_{(i)} = \frac{C_{wash(i)}}{C_{cand(i)} + C_{wash(i)}} \times 100\%$$

where:

i = replicate number.

(v) Repeat steps in paragraphs (e)(4) of this section, as appropriate, to obtain a minimum of three replicate measurements of sampling effectiveness. Note: The procedures for loading the candidate in § 53.65 must be repeated between repetitions if this test is being used to evaluate the fractionator after being loaded as specified in § 53.65.

(vi) Calculate and record the average sampling effectiveness of the test sampler as:

Equation 23

$$\overline{E} = \frac{\sum_{i=1}^{n} E_{(i)}}{n}$$

where:

i = replicate number; and
n = number of replicates.

(vii)(A) Calculate and record the coefficient of variation for the replicate sampling effectiveness measurements of the test sampler as:

Equation 24

$$CV_E = \frac{\sqrt{\sum_{i=1}^{n} E_{(i)}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} E_{(i)}\right)^2}}{n-1} \times \frac{1}{\overline{E}} \times 100\%$$

where:

i = replicate number; and
n = total number of measurements.

(B) If the value of CV_E exceeds 10 percent, then steps in paragraphs (e) (2) through (e)(4) of this section must be repeated.

(5) Repeat steps in paragraphs (e) (1) through (e)(4) of this section for each particle size specified in table F–2 of this subpart.

(f) *Test procedure: Static chamber method*—(1) *Generate aerosol.* Follow the procedures for aerosol generation prescribed in § 53.62(d)(2).

(2) *Verify the quality of the test aerosol.* Follow the procedures for verification of test aerosol size and quality prescribed in §53.62(d)(4).

(3) *Introduce particles into chamber.* Introduce the particles into the static chamber and allow the particle concentration to stabilize.

(4) *Install and operate the candidate sampler's fractionator and its after-filter and at least four total filters.* (i) Install the fractionator and an array of four or more equally spaced total filter samplers such that the total filters surround and are in the same plane as the inlet of the fractionator.

(ii) Simultaneously collect particles onto appropriate filters with the total filter samplers and the fractionator for a time period such that the relative error of the measured concentration is less than 5.0 percent.

(5) *Calculate the aerosol spatial uniformity in the chamber.* (i) Determine the quantity of material collected with each total filter sampler in the array using a calibrated fluorometer. Calculate and record the mass concentration for each total filter sampler as:

Equation 25

$$C_{total(ij)} = \frac{M_{total(ij)}}{Q_{(ij)} \times t_{(ij)}}$$

where:

i = replicate number;
j = total filter sampler number;
M_{total} = mass of material collected with the total filter sampler;
Q = total filter sampler volumetric flowrate; and
t = sample time.

(ii) Calculate and record the mean mass concentration as:

Equation 26

$$\overline{C}_{total(i)} = \frac{\sum_{j=1}^{n} C_{total(ij)}}{n}$$

where:

n = total number of samplers;
i = replicate number; and
j = filter sampler number.

(iii) (A) Calculate and record the coefficient of variation of the total mass concentration as:

Equation 27

$$CV_{total} = \frac{\sqrt{\sum_{j=1}^{n} C_{total(ij)}^{2} - \frac{1}{n}\left(\sum_{j=1}^{n} C_{total(ij)}\right)^{2}}}{n-1} \times \frac{1}{\overline{C}_{total(i)}} \times 100\%$$

where:

i = replicate number;
j = total filter sampler number; and
n = number of total filter samplers.

(B) If the value of CV_{total} exceeds 10 percent, then the particle concentration uniformity is unacceptable, alterations to the static chamber test apparatus must be made, and steps in paragraphs (f)(1) through (f)(5) of this section must be repeated.

(6) *Determine the effectiveness of the candidate sampler.* (i) Determine the quantity of material collected on the candidate sampler's after filter using a calibrated fluorometer. Calculate and record the mass concentration for the candidate sampler as:

Equation 28

$$C_{cand(i)} = \frac{M_{cand(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number;
M_{cand} = mass of material collected with the candidate sampler;
Q = candidate sampler volumetric flowrate; and
t = sample time.

(ii) Calculate and record the sampling effectiveness of the candidate sampler as:

Equation 29

$$E_{(i)} = \frac{C_{cand(i)}}{\overline{C}_{total(i)}} \times 100\%$$

where:

i = replicate number.

(iii) Repeat step in paragraph (f)(4) through (f)(6) of this section, as appropriate, to obtain a minimum of three replicate measurements of sampling effectiveness.

(iv) Calculate and record the average sampling effectiveness of the test sampler as:

Equation 30

$$\overline{E} = \frac{\sum_{i=1}^{n} E_{(i)}}{n}$$

where:

i= replicate number.

(v)(A) Calculate and record the coefficient of variation for the replicate sampling effectiveness measurements of the test sampler as:

Equation 31

$$CV_E = \frac{\sqrt{\sum_{i=1}^{n} E_{(i)}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} E_{(i)}\right)^2}}{n-1} \times \frac{1}{\overline{E}} \times 100\%$$

where:

i = replicate number; and

n = number of measurements of effectiveness.

(B) If the value of CV_E exceeds 10 percent, then the test run (steps in paragraphs (f)(2) through (f)(6) of this section) is unacceptable and must be repeated.

(7) Repeat steps in paragraphs (f)(1) through (f)(6) of this section for each particle size specified in table F–2 of this subpart.

(g) *Test procedure: Divided flow method*—(1) *Generate calibration aerosol.* Follow the procedures for aerosol generation prescribed in § 53.62(d)(2).

(2) *Verify the quality of the calibration aerosol.* Follow the procedures for verification of calibration aerosol size and quality prescribed in § 53.62(d)(4).

(3) *Introduce aerosol.* Introduce the calibration aerosol into the static chamber and allow the particle concentration to stabilize.

(4) *Validate that transport is equal for the divided flow option.* (i) With fluorometry as a detector:

(A) Install a total filter on each leg of the divided flow apparatus.

(B) Collect particles simultaneously through both legs at 16.7 L/min onto an appropriate filter for a time period such that the relative error of the measured concentration is less than 5.0 percent.

(C) Determine the quantity of material collected on each filter using a calibrated fluorometer. Calculate and record the mass concentration measured in each leg as:

Equation 32

$$C_{(i)} = \frac{M_{(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number,

M = mass of material collected with the total filter; and

Q = candidate sampler volumetric flowrate.

(D) Repeat steps in paragraphs (g)(4)(i)(A) through (g)(4)(i)(C) of this section until a minimum of three replicate measurements are performed.

(ii) With an aerosol number counting device as a detector:

(A) Remove all flow obstructions from the flow paths of the two legs.

(B) Quantify the aerosol concentration of the primary particles in each leg of the apparatus.

(C) Repeat steps in paragraphs (g)(4)(ii)(A) through (g)(4)(ii)(B) of this section until a minimum of three replicate measurements are performed.

(iii) (A) Calculate the mean concentration and coefficient of variation as:

Equation 33

$$\overline{C} = \frac{\sum_{i=1}^{n} C_{(i)}}{n}$$

Equation 34

$$CV = \frac{\sqrt{\sum_{i=1}^{n} C_{(i)}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} C_{(i)}\right)^2}}{n-1} \times \frac{1}{\overline{C}} \times 100\%$$

where:

i = replicate number; and
n = number of replicates.

(B) If the measured mean concentrations through the two legs do not agree within 5 percent, then adjustments may be made in the setup, and this step must be repeated.

(5) *Determine effectiveness.* Determine the sampling effectiveness of the test sampler with the inlet removed by one of the following procedures:

(i) With fluorometry as a detector:

(A) Prepare the divided flow apparatus for particle collection. Install a total filter into the bypass leg of the divided flow apparatus. Install the particle size fractionator with a total filter placed immediately downstream of it into the other leg.

(B) Collect particles simultaneously through both legs at 16.7 L/min onto appropriate filters for a time period such that the relative error of the measured concentration is less than 5.0 percent.

(C) Determine the quantity of material collected on each filter using a calibrated fluorometer. Calculate and record the mass concentration measured by the total filter and that measured after penetrating through the candidate fractionator as follows:

Equation 35

$$C_{total_{(i)}} = \frac{M_{total(i)}}{Q_{(i)} \times t_{(i)}}$$

Equation 36

$$C_{cand_{(i)}} = \frac{M_{cand(i)}}{Q_{(i)} \times t_{(i)}}$$

where:

i = replicate number.

(ii) With a number counting device as a detector:

(A) Install the particle size fractionator into one of the legs of the divided flow apparatus.

(B) Quantify and record the aerosol number concentration of the primary particles passing through the fractionator as $C_{cand(i)}$.

(C) Divert the flow from the leg containing the candidate fractionator to the bypass leg. Allow sufficient time for the aerosol concentration to stabilize.

(D) Quantify and record the aerosol number concentration of the primary particles passing through the bypass leg as $C_{total(i)}$.

(iii) Calculate and record sampling effectiveness of the candidate sampler as:

Equation 37

$$E_{(i)} = \frac{C_{cand(i)}}{\overline{C}_{total(i)}} \times 100\%$$

where:

i = replicate number.

(6) Repeat step in paragraph (g)(5) of this section, as appropriate, to obtain a minimum of three replicate measurements of sampling effectiveness.

(7) *Calculate the mean and coefficient of variation for replicate measurements of effectiveness.* (i) Calculate and record the mean sampling effectiveness of the candidate sampler as:

Equation 38

$$\overline{E} = \frac{\sum_{i=1}^{n} E_{(i)}}{n}$$

where:

i = replicate number.

(ii)(A) Calculate and record the coefficient of variation for the replicate

sampling effectiveness measurements of the candidate sampler as:

Equation 39

$$CV_E = \frac{\sqrt{\sum_{i=1}^{n} E_{(i)}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} E_{(i)}\right)^2}}{n-1} \times \frac{1}{\overline{E}} \times 100\%$$

where:

i = replicate number; and
n = number of replicates.

(B) If the coefficient of variation is not less than 10 percent, then the test run must be repeated (steps in paragraphs (g)(1) through (g)(7) of this section).

(8) Repeat steps in paragraphs (g)(1) through (g)(7) of this section for each particle size specified in table F–2 of this subpart.

(h) *Calculations*—(1) *Treatment of multiplets*. For all measurements made by fluorometric analysis, data shall be corrected for the presence of multiplets as described in § 53.62(f)(1). Data collected using a real-time device (as described in paragraph (c)(3)(ii)) of this section will not require multiplet correction.

(2) *Cutpoint determination*. For each wind speed determine the sampler Dp_{50} cutpoint defined as the aerodynamic particle size corresponding to 50 percent effectiveness from the multiplet corrected smooth curve.

(3) *Graphical analysis and numerical integration with ambient distributions*. Follow the steps outlined in § 53.62 (e)(3) through (e)(4) to calculate the estimated concentration measurement ratio between the candidate sampler and a reference method sampler.

(i) *Test evaluation*. The candidate method passes the static fractionator test if the values of Rc and Dp_{50} for each distribution meets the specifications in table F–1 of this subpart.

[62 FR 38814, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 53.65 Test procedure: Loading test.

(a) *Overview*. (1) The loading tests are designed to quantify any appreciable changes in a candidate method sampler's performance as a function of coarse aerosol collection. The candidate sampler is exposed to a mass of coarse aerosol equivalent to sampling a mass concentration of 150 μg/m³ over the time period that the manufacturer has specified between periodic cleaning. After loading, the candidate sampler is then evaluated by performing the test in § 53.62 (full wind tunnel test), § 53.63 (wind tunnel inlet aspiration test), or § 53.64 (static fractionator test). If the acceptance criteria are met for this evaluation test, then the candidate sampler is approved for multiday sampling with the periodic maintenance schedule as specified by the candidate method. For example, if the candidate sampler passes the reevaluation tests following loading with an aerosol mass equivalent to sampling a 150 μg/m³ aerosol continuously for 7 days, then the sampler is approved for 7 day field operation before cleaning is required.

(2) [Reserved]

(b) *Technical definition*. Effectiveness after loading is the ratio (expressed as a percentage) of the mass concentration of particles of a given size reaching the sampler filter to the mass concentration of particles of the same size approaching the sampler.

(c) *Facilities and equipment required*—(1) *Particle delivery system*. The particle delivery system shall consist of a static chamber or a low velocity wind tunnel having a sufficiently large cross-sectional area such that the test sampler, or portion thereof, may be installed in the test section. At a minimum, the system must have a sufficiently large cross section to house the candidate sampler inlet as well as a collocated isokinetic nozzle for measuring total aerosol concentration. The mean velocity in the test section of the static chamber or wind tunnel shall not exceed 2 km/hr.

(2) *Aerosol generation equipment*. For purposes of these tests, the test aerosol shall be produced from commercially available, bulk Arizona road dust. To provide direct interlaboratory comparability of sampler loading characteristics, the bulk dust is specified as 0-10 μm ATD available from Powder Technology Incorporated (Burnsville, MN). A fluidized bed aerosol generator, Wright dust feeder, or sonic nozzle shall be used to efficiently

deagglomerate the bulk test dust and transform it into an aerosol cloud. Other dust generators may be used contingent upon prior approval by the Agency.

(3) *Isokinetic sampler*. Mean aerosol concentration within the static chamber or wind tunnel shall be established using a single isokinetic sampler containing a preweighed high-efficiency total filter.

(4) *Analytic balance*. An analytical balance shall be used to determine the weight of the total filter in the isokinetic sampler. The precision and accuracy of this device shall be such that the relative measurement error is less than 5.0 percent for the difference between the initial and final weight of the total filter. The identical analytic balance shall be used to perform both initial and final weighing of the total filter.

(d) *Test procedure*. (1) Calculate and record the target time weighted concentration of Arizona road dust which is equivalent to exposing the sampler to an environment of 150 μg/m³ over the time between cleaning specified by the candidate sampler's operations manual as:

Equation 40

$$\text{Target TWC} = 150\,\mu g/m^3 \times t$$

where:

t = the number of hours specified by the candidate method prior to periodic cleaning.

(2) Clean the candidate sampler. (i) Clean and dry the internal surfaces of the candidate sampler.

(ii) Prepare the internal surfaces in strict accordance with the operating manual referred to in section 7.4.18 of 40 CFR part 50, appendix L.

(3) Determine the preweight of the filter that shall be used in the isokinetic sampler. Record this value as InitWt.

(4) Install the candidate sampler's inlet and the isokinetic sampler within the test chamber or wind tunnel.

(5) Generate a dust cloud. (i) Generate a dust cloud composed of Arizona test dust.

(ii) Introduce the dust cloud into the chamber.

(iii) Allow sufficient time for the particle concentration to become steady within the chamber.

(6) Sample aerosol with a total filter and the candidate sampler. (i) Sample the aerosol for a time sufficient to produce an equivalent TWC equal to that of the target TWC ±15 percent.

(ii) Record the sampling time as t.

(7) Determine the time weighted concentration. (i) Determine the postweight of the isokinetic sampler's total filter.

(ii) Record this value as FinalWt.

(iii) Calculate and record the TWC as:

Equation 41

$$TWC = \frac{(FinalWt - InitWt) \times t}{Q}$$

where:

Q = the flow rate of the candidate method.

(iv) If the value of TWC deviates from the target TWC ±15 percent, then the loaded mass is unacceptable and the entire test procedure must be repeated.

(8) Determine the candidate sampler's effectiveness after loading. The candidate sampler's effectiveness as a function of particle aerodynamic diameter must then be evaluated by performing the test in § 53.62 (full wind tunnel test). A sampler which fits the category of inlet deviation in § 53.60(e)(1) may opt to perform the test in § 53.63 (inlet aspiration test) in lieu of the full wind tunnel test. A sampler which fits the category of fractionator deviation in § 53.60(e)(2) may opt to perform the test in § 53.64 (static fractionator test) in lieu of the full wind tunnel test.

(e) *Test results*. If the candidate sampler meets the acceptance criteria for the evaluation test performed in paragraph (d)(8) of this section, then the candidate sampler passes this test with the stipulation that the sampling train be cleaned as directed by and as frequently as that specified by the candidate sampler's operations manual.

§ 53.66 Test procedure: Volatility test.

(a) *Overview*. This test is designed to ensure that the candidate method's losses due to volatility when sampling semi-volatile ambient aerosol will be

comparable to that of a federal reference method sampler. This is accomplished by challenging the candidate sampler with a polydisperse, semi-volatile liquid aerosol in three distinct phases. During phase A of this test, the aerosol is elevated to a steady-state, test-specified mass concentration and the sample filters are conditioned and preweighed. In phase B, the challenge aerosol is simultaneously sampled by the candidate method sampler and a reference method sampler onto the preweighed filters for a specified time period. In phase C (the blow-off phase), aerosol and aerosol-vapor free air is sampled by the samplers for an additional time period to partially volatilize the aerosol on the filters. The candidate sampler passes the volatility test if the acceptance criteria presented in table F–1 of this subpart are met or exceeded.

(b) *Technical definitions*. (1) Residual mass (RM) is defined as the weight of the filter after the blow-off phase subtracted from the initial weight of the filter.

(2) Corrected residual mass (CRM) is defined as the residual mass of the filter from the candidate sampler multiplied by the ratio of the reference method flow rate to the candidate method flow rate.

(c) *Facilities and equipment required*—(1) *Environmental chamber*. Because the nature of a volatile aerosol is greatly dependent upon environmental conditions, all phases of this test shall be conducted at a temperature of 22.0 ±0.5 °C and a relative humidity of 40 ±3 percent. For this reason, it is strongly advised that all weighing and experimental apparatus be housed in an environmental chamber capable of this level of control.

(2) *Aerosol generator*. The aerosol generator shall be a pressure nebulizer operated at 20 to 30 psig (140 to 207 kPa) to produce a polydisperse, semi-voltile aerosol with a mass median diameter larger than 1 μm and smaller than 2.5 μm. The nebulized liquid shall be A.C.S. reagent grade glycerol (C_3H_8O, FW = 92.09, CAS 56–81–5) of 99.5 percent minimum purity. For the purpose of this test the accepted mass median diameter is predicated on the stable aerosol inside the internal chamber and not on the aerosol emerging from the nebulizer nozzle. Aerosol monitoring and its stability are described in (c)(3) and (c)(4) of this section.

(3) *Aerosol monitoring equipment*. The evaporation and condensation dynamics of a volatile aerosol is greatly dependent upon the vapor pressure of the volatile component in the carrier gas. The size of an aerosol becomes fixed only when an equilibrium is established between the aerosol and the surrounding vapor; therefore, aerosol size measurement shall be used as a surrogate measure of this equilibrium. A suitable instrument with a range of 0.3 to 10 μm, an accuracy of 0.5 μm, and a resolution of 0.2 μm (e.g., an optical particle sizer, or a time-of-flight instrument) shall be used for this purpose. The parameter monitored for stability shall be the mass median instrument measured diameter (i.e. optical diameter if an optical particle counter is used). A stable aerosol shall be defined as an aerosol with a mass median diameter that has changed less than 0.25 μm over a 4 hour time period.

(4) *Internal chamber*. The time required to achieve a stable aerosol depends upon the time during which the aerosol is resident with the surrounding air. This is a function of the internal volume of the aerosol transport system and may be facilitated by recirculating the challenge aerosol. A chamber with a volume of 0.5 m^3 and a recirculating loop (airflow of approximately 500 cfm) is recommended for this purpose. In addition, a baffle is recommended to dissipate the jet of air that the recirculating loop can create. Furthermore, a HEPA filtered hole in the wall of the chamber is suggested to allow makeup air to enter the chamber or excess air to exit the chamber to maintain a system flow balance. The concentration inside the chamber shall be maintained at 1 mg/m^3 ±20 percent to obtain consistent and significant filter loading.

(5) *Aerosol sampling manifold*. A manifold shall be used to extract the aerosol from the area in which it is equilibrated and transport it to the candidate method sampler, the reference method sampler, and the aerosol monitor. The losses in each leg of the manifold shall be equivalent such that the

three devices will be exposed to an identical aerosol.

(6) *Chamber air temperature recorders.* Minimum range 15-25 °C, certified accuracy to within 0.2 °C, resolution of 0.1 °C. Measurement shall be made at the intake to the sampling manifold and adjacent to the weighing location.

(7) *Chamber air relative humidity recorders.* Minimum range 30 - 50 percent, certified accuracy to within 1 percent, resolution of 0.5 percent. Measurement shall be made at the intake to the sampling manifold and adjacent to the weighing location.

(8) *Clean air generation system.* A source of aerosol and aerosol-vapor free air is required for phase C of this test. This clean air shall be produced by filtering air through an absolute (HEPA) filter.

(9) *Balance.* Minimum range 0 - 200 mg, certified accuracy to within 10 μg, resolution of 1 μg.

(d) *Additional filter handling conditions.* (1) *Filter handling.* Careful handling of the filter during sampling, conditioning, and weighing is necessary to avoid errors due to damaged filters or loss of collected particles from the filters. All filters must be weighed immediately after phase A dynamic conditioning and phase C.

(2) *Dynamic conditioning of filters.* Total dynamic conditioning is required prior to the initial weight determined in phase A. Dynamic conditioning refers to pulling clean air from the clean air generation system through the filters. Total dynamic conditioning can be established by sequential filter weighing every 30 minutes following repetitive dynamic conditioning. The filters are considered sufficiently conditioned if the sequential weights are repeatable to ±3 μg.

(3) *Static charge.* The following procedure is suggested for minimizing charge effects. Place six or more Polonium static control devices (PSCD) inside the microbalance weighing chamber, (MWC). Two of them must be placed horizontally on the floor of the MWC and the remainder placed vertically on the back wall of the MWC. Taping two PSCD's together or using double-sided tape will help to keep them from falling. Place the filter that is to be weighed on the horizontal PSCDs facing aerosol coated surface up. Close the MWC and wait 1 minute. Open the MWC and place the filter on the balance dish. Wait 1 minute. If the charges have been neutralized the weight will stabilize within 30-60 seconds. Repeat the procedure of neutralizing charges and weighing as prescribed above several times (typically 2-4 times) until consecutive weights will differ by no more than 3 micrograms. Record the last measured weight and use this value for all subsequent calculations.

(e) *Test procedure*—(1) *Phase A - Preliminary steps.* (i) Generate a polydisperse glycerol test aerosol.

(ii) Introduce the aerosol into the transport system.

(iii) Monitor the aerosol size and concentration until stability and level have been achieved.

(iv) Condition the candidate method sampler and reference method sampler filters until total dynamic conditioning is achieved as specified in paragraph (d)(2) of this section.

(v) Record the dynamically conditioned weight as $InitWt_c$ and $InitWt_r$ where c is the candidate method sampler and r is the reference method sampler.

(2) *Phase B - Aerosol loading.* (i) Install the dynamically conditioned filters into the appropriate samplers.

(ii) Attach the samplers to the manifold.

(iii) Operate the candidate and the reference samplers such that they simultaneously sample the test aerosol for 30 minutes.

(3) *Phase C - Blow-off.* (i) Alter the intake of the samplers to sample air from the clean air generation system.

(ii) Sample clean air for one of the required blow-off time durations (1, 2, 3, and 4 hours).

(iii) Remove the filters from the samplers.

(iv) Weigh the filters immediately and record this weight, $FinalWt_c$ and $FinalWt_r$, where c is the candidate method sampler and r is the reference method sampler.

(v) Calculate the residual mass for the reference method sampler:

Equation 41a

$$RM_{(ij)} = \left(FinalWt_r - InitWt_r\right)$$

where:

i = repetition number; and
j = blow-off time period.

(vi) Calculate the corrected residual mass for the candidate method sampler as:

Equation 41b

$$CRM_{(ij)} = \left(FinalWt_r - InitWt_r\right) \times \frac{Q_r}{Q_c}$$

where:

i = repetition number;
j = blow-off time period;
Q_c = candidate method sampler flow rate, and
Q_r = reference method sampler flow rate.

(4) Repeat steps in paragraph (e)(1) through (e)(3) of this section until three repetitions have been completed for each of the required blow-off time durations (1, 2, 3, and 4 hours).

(f) *Calculations and analysis.* (1) Perform a linear regression with the candidate method CRM as the dependent variable and the reference method RM as the independent variable.

(2) Determine the following regression parameters: slope, intercept, and correlation coefficient (r).

(g) *Test results.* The candidate method passes the volatility test if the regression parameters meet the acceptance criteria specified in table F–1 of this subpart.

TABLE F–1 TO SUBPART F—PERFORMANCE SPECIFICATIONS FOR $PM_{2.5}$ CLASS II EQUIVALENT SAMPLERS

Performance Test	Specifications	Acceptance Criteria
§ 53.62 Full Wind Tunnel Evaluation	Solid VOAG produced aerosol at 2 km/hr and 24 km/hr.	Dp_{50} = 2.5 μm ±0.2 μm; Numerical Analysis Results: 95% ≤R_c≤105%
§ 53.63 Wind Tunnel Inlet Aspiration Test.	Liquid VOAG produced aerosol at 2 km/hr and 24 km/hr.	Relative Aspiration: 95% ≤A≤105%
§ 53.64 Static Fractionator Test	Evaluation of the fractionator under static conditions.	Dp_{50} = 2.5 μm ±0.2 μm; Numerical Analysis Results: 95% ≤R_c≤105%
§ 53.65 Loading Test	Loading of the clean candidate under laboratory conditions.	Acceptance criteria as specified in the post-loading evaluation test (§ 53.62, § 53.63, or § 53.64)
§ 53.66 Volatility Test	Polydisperse liquid aerosol produced by air nebulization of A.C.S. reagent grade glycerol, 99.5% minimum purity.	Regression Parameters Slope = 1 ±0.1, Intercept = 0 ±0.15 r ≥ 0.97

TABLE F–2 TO SUBPART F—PARTICLE SIZES AND WIND SPEEDS FOR FULL WIND TUNNEL TEST, WIND TUNNEL INLET ASPIRATION TEST, AND STATIC CHAMBER TEST

Primary Partical Mean Size[a] (μm)	Full Wind Tunnel Test		Inlet Aspiration Test		Static Fractionator Test	Volatility Test
	2 km/hr	24 km/hr	2 km/hr	24 km/hr		
1.5±0.25	S	S			S	
2.0±0.25	S	S			S	
2.2±0.25	S	S			S	
2.5±0.25	S	S			S	
2.8±0.25	S	S			S	
3.0±0.25			L	L		
3.5±0.25	S	S			S	
4.0±0.5	S	S			S	
Polydisperse Glycerol Aerosol						L

[a] Aerodynamic diameter.
S=Solid particles.
L=Liquid particles.

TABLE F–3 TO SUBPART F—CRITICAL PARAMETERS OF IDEALIZED AMBIENT PARTICLE SIZE DISTRIBUTIONS

Idealized Distribution	Fine Particle Mode			Coarse Particle Mode			$PM_{2.5}/PM_{10}$ Ratio	FRM Sampler Expected Mass Conc. (μg/m³)
	MMD (μm)	Geo. Std. Dev.	Conc. (μg/m³)	MMD (μm)	Geo. Std. Dev.	Conc. (μg/m³)		
Coarse	0.50	2	12.0	10	2	88.0	0.27	13.814
''Typical''	0.50	2	33.3	10	2	66.7	0.55	34.284
Fine	0.85	2	85.0	15	2	15.0	0.94	78.539

TABLE F–4 TO SUBPART F—ESTIMATED MASS CONCENTRATION MEASUREMENT OF $PM_{2.5}$ FOR IDEALIZED COARSE AEROSOL SIZE DISTRIBUTION

Particle Aerodynamic Diameter (μm)	Test Sampler			Ideal Sampler		
	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<0.500	1.000	6.001		1.000	6.001	6.001
0.625		2.129		0.999	2.129	2.127
0.750		0.982		0.998	0.982	0.980
0.875		0.730		0.997	0.730	0.728
1.000		0.551		0.995	0.551	0.548
1.125		0.428		0.991	0.428	0.424
1.250		0.346		0.987	0.346	0.342
1.375		0.294		0.980	0.294	0.288
1.500		0.264		0.969	0.264	0.256
1.675		0.251		0.954	0.251	0.239
1.750		0.250		0.932	0.250	0.233
1.875		0.258		0.899	0.258	0.232
2.000		0.272		0.854	0.272	0.232
2.125		0.292		0.791	0.292	0.231
2.250		0.314		0.707	0.314	0.222
2.375		0.339		0.602	0.339	0.204
2.500		0.366		0.480	0.366	0.176
2.625		0.394		0.351	0.394	0.138
2.750		0.422		0.230	0.422	0.097
2.875		0.449		0.133	0.449	0.060
3.000		0.477		0.067	0.477	0.032
3.125		0.504		0.030	0.504	0.015
3.250		0.530		0.012	0.530	0.006
3.375		0.555		0.004	0.555	0.002
3.500		0.579		0.001	0.579	0.001
3.625		0.602		0.000000	0.602	0.000000
3.750		0.624		0.000000	0.624	0.000000
3.875		0.644		0.000000	0.644	0.000000
4.000		0.663		0.000000	0.663	0.000000
4.125		0.681		0.000000	0.681	0.000000
4.250		0.697		0.000000	0.697	0.000000
4.375		0.712		0.000000	0.712	0.000000
4.500		0.726		0.000000	0.726	0.000000
4.625		0.738		0.000000	0.738	0.000000
4.750		0.750		0.000000	0.750	0.000000
4.875		0.760		0.000000	0.760	0.000000
5.000		0.769		0.000000	0.769	0.000000
5.125		0.777		0.000000	0.777	0.000000
5.250		0.783		0.000000	0.783	0.000000
5.375		0.789		0.000000	0.789	0.000000
5.500		0.794		0.000000	0.794	0.000000
5.625		0.798		0.000000	0.798	0.000000
5.75		0.801		0.000000	0.801	0.000000
		$C_{sam(exp)}$=			$C_{ideal(exp)}$=	13.814

TABLE F–5 TO SUBPART F—ESTIMATED MASS CONCENTRATION MEASUREMENT OF $PM_{2.5}$ FOR IDEALIZED ''TYPICAL'' COARSE AEROSOL SIZE DISTRIBUTION

Particle Aerodynamic Diameter (μm)	Test Sampler			Ideal Sampler		
	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<0.500	1.000	16.651		1.000	16.651	16.651
0.625		5.899		0.999	5.899	5.893
0.750		2.708		0.998	2.708	2.703
0.875		1.996		0.997	1.996	1.990
1.000		1.478		0.995	1.478	1.471
1.125		1.108		0.991	1.108	1.098
1.250		0.846		0.987	0.846	0.835
1.375		0.661		0.980	0.661	0.648
1.500		0.532		0.969	0.532	0.516
1.675		0.444		0.954	0.444	0.424
1.750		0.384		0.932	0.384	0.358
1.875		0.347		0.899	0.347	0.312
2.000		0.325		0.854	0.325	0.277
2.125		0.314		0.791	0.314	0.248
2.250		0.312		0.707	0.312	0.221
2.375		0.316		0.602	0.316	0.190
2.500		0.325		0.480	0.325	0.156
2.625		0.336		0.351	0.336	0.118
2.750		0.350		0.230	0.350	0.081
2.875		0.366		0.133	0.366	0.049
3.000		0.382		0.067	0.382	0.026
3.125		0.399		0.030	0.399	0.012
3.250		0.416		0.012	0.416	0.005
3.375		0.432		0.004	0.432	0.002
3.500		0.449		0.001	0.449	0.000000
3.625		0.464		0.000000	0.464	0.000000
3.750		0.480		0.000000	0.480	0.000000
3.875		0.494		0.000000	0.494	0.000000
4.000		0.507		0.000000	0.507	0.000000
4.125		0.520		0.000000	0.520	0.000000
4.250				0.000000	0.532	0.000000
4.375				0.000000	0.543	0.000000
4.500				0.000000	0.553	0.000000
4.625				0.000000	0.562	0.000000
4.750				0.000000	0.570	0.000000
4.875				0.000000	0.577	0.000000
5.000				0.000000	0.584	0.000000
5.125				0.000000	0.590	0.000000
5.250				0.000000	0.595	0.000000
5.375				0.000000	0.599	0.000000
5.500				0.000000	0.603	0.000000
5.625				0.000000	0.605	0.000000
5.75				0.000000	0.608	0.000000
		$C_{sam(exp)}$=			$C_{ideal(exp)}$=	34.284

TABLE F–6 TO SUBPART F—ESTIMATED MASS CONCENTRATION MEASUREMENT OF $PM_{2.5}$ FOR IDEALIZED FINE AEROSOL SIZE DISTRIBUTION

Particle Aerodynamic Diameter (μm)	Test Sampler			Ideal Sampler		
	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<0.500	1.000	18.868		1.000	18.868	18.868
0.625		13.412		0.999	13.412	13.399
0.750		8.014		0.998	8.014	7.998

Particle Aerodynamic Diameter (μm)	Test Sampler			Ideal Sampler		
	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)	Fractional Sampling Effectiveness	Interval Mass Concentration (μg/m³)	Estimated Mass Concentration Measurement (μg/m³)
0.875		6.984		0.997	6.984	6.963
1.000		5.954		0.995	5.954	5.924
1.125		5.015		0.991	5.015	4.970
1.250		4.197		0.987	4.197	4.142
1.375		3.503		0.980	3.503	3.433
1.500		2.921		0.969	2.921	2.830
1.675		2.438		0.954	2.438	2.326
1.750		2.039		0.932	2.039	1.900
1.875		1.709		0.899	1.709	1.536
2.000		1.437		0.854	1.437	1.227
2.125		1.212		0.791	1.212	0.959
2.250		1.026		0.707	1.026	0.725
2.375		0.873		0.602	0.873	0.526
2.500		0.745		0.480	0.745	0.358
2.625		0.638		0.351	0.638	0.224
2.750		0.550		0.230	0.550	0.127
2.875		0.476		0.133	0.476	0.063
3.000		0.414		0.067	0.414	0.028
3.125		0.362		0.030	0.362	0.011
3.250		0.319		0.012	0.319	0.004
3.375		0.282		0.004	0.282	0.001
3.500		0.252		0.001	0.252	0.000000
3.625		0.226		0.000000	0.226	0.000000
3.750		0.204		0.000000	0.204	0.000000
3.875		0.185		0.000000	0.185	0.000000
4.000		0.170		0.000000	0.170	0.000000
4.125		0.157		0.000000	0.157	0.000000
4.250		0.146		0.000000	0.146	0.000000
4.375		0.136		0.000000	0.136	0.000000
4.500		0.129		0.000000	0.129	0.000000
4.625		0.122		0.000000	0.122	0.000000
4.750		0.117		0.000000	0.117	0.000000
4.875		0.112		0.000000	0.112	0.000000
5.000		0.108		0.000000	0.108	0.000000
5.125		0.105		0.000000	0.105	0.000000
5.250		0.102		0.000000	0.102	0.000000
5.375		0.100		0.000000	0.100	0.000000
5.500		0.098		0.000000	0.098	0.000000
5.625		0.097		0.000000	0.097	0.000000
5.75		0.096		0.000000	0.096	0.000000
		$C_{sam(exp)}$=			$C_{ideal(exp)}$=	78.539

FIGURE E–1 TO SUBPART F—DESIGNATION TESTING CHECKLIST

DESIGNATION TESTING CHECKLIST FOR CLASS II

Auditee _____ Auditor signature _____ Date _____

Compliance Status: Y = Yes N = No NA = Not applicable/Not available				
Verification			Verified by Direct Observation of Process or of Documented Evidence: Performance, Design or Application Spec. Corresponding to Sections of 40 CFR Part 53, Subparts E and F	Verification Comments (Includes documentation of who, what, where, when, why) (Doc. #, Rev. #, Rev. Date)
Y	N	NA		
			Subpart E: Performance Specification Tests	
			Evaluation completed according to Subpart E §53.50 to §53.56	
			Subpart E: Class I Sequential Tests	

Compliance Status: Y = Yes N = No NA = Not applicable/Not available				Verification Comments (Includes documentation of who, what, where, when, why) (Doc. #, Rev. #, Rev. Date)
Verification			Verified by Direct Observation of Process or of Documented Evidence: Performance, Design or Application Spec. Corresponding to Sections of 40 CFR Part 53, Subparts E and F	
Y	N	NA		
			Class II samplers that are also Class I (sequentialized) have passed the tests in § 53.57	
			Subpart F: Performance Spec/Test	
			Evaluation of Physical Characteristics of Clean Sampler - One of these tests must be performed: § 53.62 - Full Wind Tunnel § 53.63 - Inlet Aspiration § 53.64 - Static Fractionator	
			Evaluation of Physical Characteristics of Loaded Sampler § 53.65 Loading Test One of the following tests must be performed for evaluation after loading: § 53.62, § 53.63, § 53.64	
			Evaluation of the Volatile Characteristics of the Class II Sampler § 53.66	

APPENDIX A TO SUBPART F—REFERENCES

(1) Marple, V.A., K.L. Rubow, W. Turner, and J.D. Spangler, Low Flow Rate Sharp Cut Impactors for Indoor Air Sampling: Design and Calibration., JAPCA, 37: 1303-1307 (1987).

(2) Vanderpool, R.W. and K.L. Rubow, Generation of Large, Solid Calibration Aerosols, J. of Aer. Sci. and Tech., 9:65-69 (1988).

(3) Society of Automotive Engineers Aerospace Material Specification (SAE AMS) 2404C, Electroless Nickel Planting, SAE, 400 Commonwealth Drive, Warrendale PA-15096, Revised 7-1-84, pp. 1-6.

PART 54—PRIOR NOTICE OF CITIZEN SUITS

Sec.
54.1 Purpose.
54.2 Service of notice.
54.3 Contents of notice.

AUTHORITY: Sec. 304 of the Clean Air Act, as amended (sec. 12, Pub. L. 91–604, 84 Stat. 1706).

SOURCE: 36 FR 23386, Dec. 9, 1971, unless otherwise noted.

§ 54.1 Purpose.

Section 304 of the Clean Air Act, as amended, authorizes the commencement of civil actions to enforce the Act or to enforce certain requirements promulgated pursuant to the Act. The purpose of this part is to prescribe procedures governing the giving of notices required by subsection 304(b) of the Act (sec. 12, Pub. L. 91–604; 84 Stat. 1706) as a prerequisite to the commencement of such actions.

§ 54.2 Service of notice.

(a) Notice to Administrator: Service of notice given to the Administrator under this part shall be accomplished by certified mail addressed to the Administrator, Environmental Protection Agency, Washington, DC 20460. Where notice relates to violation of an emission standard or limitation or to violation of an order issued with respect to an emission standard or limitation, a copy of such notice shall be mailed to the Regional Administrator of the Environmental Protection Agency for the Region in which such violation is alleged to have occurred.

(b) Notice to State: Service of notice given to a State under this part regarding violation of an emission standard or limitation, or an order issued with respect to an emission standard or limitation shall be accomplished by certified mail addressed to an authorized representative of the State agency

charged with responsibility for air pollution control in the State. A copy of such notice shall be mailed to the Governor of the State.

(c) Notice to alleged violator: Service of notice given to an alleged violator under this part shall be accomplished by certified mail addressed to, or by personal service upon, the owner or managing agent of the building, plant, installation, or facility alleged to be in violation of an emission standard or limitation, or an order issued with respect to an emission standard or limitation. Where the alleged violator is a corporation, a copy of such notice shall be sent by certified mail to the registered agent, if any, of such corporation in the State in which such violation is alleged to have occurred.

(d) Notice served in accordance with the provisions of this part shall be deemed given on the postmark date, if served by mail, or on the date of receipt, if personally served.

§54.3 Contents of notice.

(a) *Failure to act*. Notice regarding a failure of the Administrator to perform an act or duty which is not discretionary shall identify the provisions of the Act which requires such act or creates such duty, shall describe with reasonable specificity the action taken or not taken by the Administrator which is claimed to constitute a failure to perform such act or duty, and shall state the full name and address of the person giving the notice.

(b) *Violation of standard, limitation or order*. Notices to the Administrator, States, and alleged violators regarding violation of an emission standard or limitation or an order issued with respect to an emission standard or limitation, shall include sufficient information to permit the recipient to identify the specific standard, limitation, or order which has allegedly been violated, the activity alleged to be in violation, the person or persons responsible for the alleged violation, the location of the alleged violation, the date or dates of such violation, and the full name and address of the person giving the notice.

PART 55—OUTER CONTINENTAL SHELF AIR REGULATIONS

Sec.

55.1 Statutory authority and scope.
55.2 Definitions.
55.3 Applicability.
55.4 Requirements to submit a notice of intent.
55.5 Corresponding onshore area designation.
55.6 Permit requirements.
55.7 Exemptions.
55.8 Monitoring, reporting, inspections, and compliance.
55.9 Enforcement.
55.10 Fees.
55.11 Delegation.
55.12 Consistency updates.
55.13 Federal requirements that apply to OCS sources.
55.14 Requirements that apply to OCS sources located within 25 miles of States' seaward boundaries, by State.
55.15 Specific designation of corresponding onshore areas.

APPENDIX A TO PART 55—LISTING OF STATE AND LOCAL REQUIREMENTS INCORPORATED BY REFERENCE INTO PART 55, BY STATE

AUTHORITY: Section 328 of the Clean Air Act (42 U.S.C. 7401, *et seq.*) as amended by Public Law 101–549.

SOURCE: 57 FR 40806, Sept. 4, 1992, unless otherwise noted.

§55.1 Statutory authority and scope.

Section 328(a)(1) of the Clean Air Act (''the Act''), requires the Environmental Protection Agency (''EPA'') to establish requirements to control air pollution from outer continental shelf (''OCS'') sources in order to attain and maintain Federal and State ambient air quality standards and to comply with the provisions of part C of title I of the Act. This part establishes the air pollution control requirements for OCS sources and the procedures for implementation and enforcement of the requirements, consistent with these stated objectives of section 328(a)(1) of the Act. In implementing, enforcing and revising this rule and in delegating authority hereunder, the Administrator will ensure that there is a rational relationship to the attainment and maintenance of Federal and State ambient air quality standards and the requirements of part C of title I, and that the

rule is not used for the purpose of preventing exploration and development of the OCS.

§ 55.2 Definitions.

Administrator means the Administrator of the U.S. Environmental Protection Agency.

Corresponding Onshore Area (COA) means, with respect to any existing or proposed OCS source located within 25 miles of a State's seaward boundary, the onshore area that is geographically closest to the source or another onshore area that the Administrator designates as the COA, pursuant to § 55.5 of this part.

Delegated agency means any agency that has been delegated authority to implement and enforce requirements of this part by the Administrator, pursuant to § 55.11 of this part. It can refer to a State agency, a local agency, or an Indian tribe, depending on the delegation status of the program.

Existing source or existing OCS source shall have the meaning given in the applicable requirements incorporated into §§ 55.13 and 55.14 of this part, except that for two years following the date of promulgation of this part the definition given in § 55.3 of this part shall apply for the purpose of determining the required date of compliance with this part.

Exploratory source or exploratory OCS source means any OCS source that is a temporary operation conducted for the sole purpose of gathering information. This includes an operation conducted during the exploratory phase to determine the characteristics of the reservoir and formation and may involve the extraction of oil and gas.

Modification shall have the meaning given in the applicable requirements incorporated into §§ 55.13 and 55.14 of this part, except that for two years following the date of promulgation of this part the definition given in section 111(a) of the Act shall apply for the purpose of determining the required date of compliance with this part, as set forth in § 55.3 of this part.

Nearest Onshore Area (NOA) means, with respect to any existing or proposed OCS source, the onshore area that is geographically closest to that source.

New source or new OCS source shall have the meaning given in the applicable requirements of §§ 55.13 and 55.14 of this part, except that for two years following the date of promulgation of this part, the definition given in § 55.3 of this part shall apply for the purpose of determining the required date of compliance with this part.

OCS source means any equipment, activity, or facility which:

(1) Emits or has the potential to emit any air pollutant;

(2) Is regulated or authorized under the Outer Continental Shelf Lands Act (''OCSLA'') (43 U.S.C. § 1331 *et seq.*); and

(3) Is located on the OCS or in or on waters above the OCS.

This definition shall include vessels only when they are:

(1) Permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. § 1331 *et seq.*); or

(2) Physically attached to an OCS facility, in which case only the stationary sources aspects of the vessels will be regulated.

Onshore area means a coastal area designated as an attainment, nonattainment, or unclassifiable area by EPA in accordance with section 107 of the Act. If the boundaries of an area designated pursuant to section 107 of the Act do not coincide with the boundaries of a single onshore air pollution control agency, then onshore area shall mean a coastal area defined by the jurisdictional boundaries of an air pollution control agency.

Outer continental shelf shall have the meaning provided by section 2 of the OCSLA (43 U.S.C. § 1331 *et seq.*).

Potential emissions means the maximum emissions of a pollutant from an OCS source operating at its design capacity. Any physical or operational limitation on the capacity of a source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as a limit on the design capacity of the source if the limitation is federally enforceable. Pursuant to section 328 of

the Act, emissions from vessels servicing or associated with an OCS source shall be considered direct emissions from such a source while at the source, and while enroute to or from the source when within 25 miles of the source, and shall be included in the ''potential to emit'' for an OCS source. This definition does not alter or affect the use of this term for any other purposes under §§55.13 or 55.14 of this part, except that vessel emissions must be included in the ''potential to emit'' as used in §§55.13 and 55.14 of this part.

Residual emissions means the difference in emissions from an OCS source if it applies the control requirements(s) imposed pursuant to §55.13 or §55,14 of this part and emissions from that source if it applies a substitute control requirement pursuant to an exemption granted under §55.7 of this part.

State means the State air pollution control agency that would be the permitting authority, a local air pollution permitting agency, or certain Indian tribes which can be the permitting authority for areas within their jurisdiction. State may also be used in the geographic sense to refer to a State, the NOA, or the COA.

[57 FR 40806, Sept. 4, 1992, as amended at 62 FR 46408, Sept. 2, 1997]

§55.3 Applicability.

(a) This part applies to all OCS sources except those located in the Gulf of Mexico west of 87.5 degrees longitude.

(b) OCS sources located within 25 miles of States' seaward boundaries shall be subject to all the requirements of this part, which include, but are not limited to, the Federal requirements as set forth in §55.13 of this part and the Federal, State, and local requirements of the COA (designated pursuant to §55.5 of this part), as set forth in §55.14 of this part.

(c) The OCS sources located beyond 25 miles of States' seaward boundaries shall be subject to all the requirements of this part, except the requirements of §§55.4, 55.5, 55.12 and 55.14 of this part.

(d) New OCS sources shall comply with the requirements of this part by September 4, 1992 where a ''new OCS source'' means an OCS source that is a new source within the meaning of section 111(a) of the Act.

(e) Existing sources shall comply with the requirements of this part by September 4, 1994, where an ''existing OCS source'' means any source that is not a new source within the meaning of section 111(a) of the Act.

[57 FR 40806, Sept. 4, 1992, as amended at 62 FR 46408, Sept. 2, 1997]

§55.4 Requirements to submit a notice of intent.

(a) Prior to performing any physical change or change in method of operation that results in an increase in emissions, and not more than 18 months prior to submitting an application for a preconstruction permit, the applicant shall submit a Notice of Intent (''NOI'') to the Administrator through the EPA Regional Office, and at the same time shall submit copies of the NOI to the air pollution control agencies of the NOA and onshore areas adjacent to the NOA. This section applies only to sources located within 25 miles of States' seaward boundaries.

(b) The NOI shall include the following:

(1) General company information, including company name and address, owner's name and agent, and facility site contact.

(2) Facility description in terms of the proposed process and products, including identification by Standard Industrial Classification Code.

(3) Estimate of the proposed project's potential emissions of any air pollutant, expressed in total tons per year and in such other terms as may be necessary to determine the applicability of requirements of this part. Potential emissions for the project must include all vessel emissions associated with the proposed project in accordance with the definition of potential emissions in §55.2 of this part.

(4) Description of all emissions points including associated vessels.

(5) Estimate of quantity and type of fuels and raw materials to be used.

(6) Description of proposed air pollution control equipment.

(7) Proposed limitations on source operations or any work practice standards affecting emissions.

(8) Other information affecting emissions, including, where applicable, information related to stack parameters (including height, diameter, and plume temperature), flow rates, and equipment and facility dimensions.

(9) Such other information as may be necessary to determine the applicability of onshore requirements.

(10) Such other information as may be necessary to determine the source's impact in onshore areas.

(c) Exploratory sources and modifications to existing sources with designated COAs shall be exempt from the requirement in paragraph (b)(10) of this section.

(d) The scope and contents of the NOI shall in no way limit the scope and contents of the required permit application or applicable requirements given in this part.

§ 55.5 Corresponding onshore area designation.

(a) *Proposed exploratory sources.* The NOA shall be the COA for exploratory sources located within 25 miles of States' seaward boundaries. Paragraphs (b), (c), and (f) of this section are not applicable to these sources.

(b) *Requests for designation.* (1) The chief executive officer of the air pollution control agency of an area that believes it has more stringent air pollution control requirements than the NOA for a proposed OCS source, may submit a request to be designated as the COA to the Administrator and at the same time shall send copies of the request to the chief executive officer of the NOA and to the proposed source. The request must be received by the Administrator within 60 days of the receipt of the NOI. If no requests are received by the Administrator within 60 days of the receipt of the NOI, the NOA will become the designated COA without further action.

(2) No later than 90 days after the receipt of the NOI, a demonstration must be received by the Administrator showing that:

(i) The area has more stringent requirements with respect to the control and abatement of air pollution than the NOA;

(ii) The emissions from the source are or would be transported to the requesting area; and

(iii) The transported emissions would affect the requesting area's efforts to attain or maintain a Federal or State ambient air quality standard or to comply with the requirements of part C of title I of the Act, taking into account the effect of air pollution control requirements that would be imposed if the NOA were designated as the COA.

(c) *Determination by the Administrator.* (1) If no demonstrations are received by the Administrator within 90 days of the receipt of the NOI, the NOA will become the designated COA without further action.

(2) If one or more demonstrations are received, the Administrator will issue a preliminary designation of the COA within 150 days of the receipt of the NOI, which shall be followed by a 30 day public comment period, in accordance with paragraph (f) of this section.

(3) The Administrator will designate the COA for a specific source within 240 days of the receipt of the NOI.

(4) When the Administrator designates a more stringent area as the COA with respect to a specific OCS source, the delegated agency in the COA will exercise all delegated authority. If there is no delegated agency in the COA, then EPA will issue the permit and implement and enforce the requirements of this part. The Administrator may retain authority for implementing and enforcing the requirements of this part if the NOA and the COA are in different States.

(5) The Administrator shall designate the COA for each source only once in the source's lifetime.

(d) *Offset requirements.* Offsets shall be obtained based on the applicable requirements of the COA, as set forth in §§ 55.13 and 55.14 of this part.

(e) *Authority to designate the COA.* The authority to designate the COA for any OCS source shall not be delegated to a State or local agency, but shall be retained by the Administrator.

(f) *Administrative procedures and public participation.* The Administrator will use the following public notice and comment procedures for processing a request for COA designation under this section:

(1) Within 150 days from receipt of an NOI, if one or more demonstrations are received, the Administrator shall make a preliminary determination of the COA and shall:

(i) Make available, in at least one location in the NOA and in the area requesting COA designation, a copy of all materials submitted by the requester, a copy of the Administrator's preliminary determination, and a copy or summary of other materials, if any, considered by the Administrator in making the preliminary determination; and

(ii) Notify the public, by prominent advertisement in a newspaper of general circulation in the NOA and the area requesting COA designation, of a 30-day opportunity for written public comment on the available information and the Administrator's preliminary COA designation.

(2) A copy of the notice required pursuant to paragraph (f)(1)(ii) of this section shall be sent to the requester, the affected source, each person from whom a written request of such notice has been received, and the following officials and agencies having jurisdiction over the COA and NOA: State and local air pollution control agencies, the chief executive of the city and county, the Federal Land Manager of potentially affected Class I areas, and any Indian governing body whose lands may be affected by emissions from the OCS source.

(3) Public comments received in writing within 30 days after the date the public notice is made available will be considered by the Administrator in making the final decision on the request. All comments will be made available for public inspection.

(4) The Administrator will make a final COA designation within 60 days after the close of the public comment period. The Administrator will notify, in writing, the requester and each person who has requested notice of the final action and will set forth the reasons for the determination. Such notification will be made available for public inspection.

[57 FR 40806, Sept. 4, 1992, as amended at 61 FR 25151, May 20, 1996]

§55.6 Permit requirements.

(a) *General provisions*—(1) *Permit applications.* (i) The owner or operator of an OCS source shall submit to the Administrator or delegated agency all information necessary to perform any analysis or make any determination required under this section.

(ii) Any application submitted pursuant to this part by an OCS source shall include a description of all the requirements of this part and a description of how the source will comply with the applicable requirements. For identification purposes only, the application shall include a description of those requirements that have been proposed by EPA for incorporation into this part and that the applicant believes, after diligent research and inquiry, apply to the source.

(2) *Exemptions.* (i) When an applicant submits any approval to construct or permit to operate application to the Administrator or delegated agency it shall include a request for exemption from compliance with any pollution control technology requirement that the applicant believes is technically infeasible or will cause an unreasonable threat to health and safety. The Administrator or delegated agency shall act on the request for exemption in accordance with the procedures established in §55.7 of this part.

(ii) A final permit shall not be issued under this part until a final determination is made on any exemption request, including those appealed to the Administrator in accordance with §55.7 of this part.

(3) *Administrative procedures and public participation.* The Administrator will follow the applicable procedures of 40 CFR part 124 in processing applications under this part. Until 40 CFR part 124 has been modified to specifically reference permits issued under this part, the Administrator will follow the procedures in part 124 used to issue Prevention of Significant Deterioration (''PSD'') permits.

(4) *Source obligation.* (i) Any owner or operator who constructs or operates an OCS source not in accordance with the application submitted pursuant to this part 55, or with any approval to construct or permit to operate, or any owner or operator of a source subject

to the requirements of this part who commences construction after the effective date of this part without applying for and receiving approval under this part, shall be in violation of this part.

(ii) Any owner or operator of a new OCS source who commenced construction prior to the promulgation date of this rule shall comply with the requirements of paragraph (e) of this section.

(iii) Receipt of an approval to construct or a permit to operate from the Administrator or delegated agency shall not relieve any owner or operator of the responsibility to comply fully with the applicable provisions of any other requirements under Federal law.

(iv) The owner or operator of an OCS source to whom the approval to construct or permit to operate is issued under this part shall notify all other owners and operators, contractors, and the subsequent owners and operators associated with emissions from the source, of the conditions of the permit issued under this part.

(5) *Delegation of authority*. If the Administrator delegates any of the authority to implement and enforce the requirements of this section, the following provisions shall apply:

(i) The applicant shall send a copy of any permit application required by this section to the Administrator through the EPA Regional Office at the same time as the application is submitted to the delegated agency.

(ii) The delegated agency shall send a copy of any public comment notice required under this section or §§ 55.13 or 55.14 to the Administrator through the EPA Regional Office.

(iii) The delegated agency shall send a copy of any preliminary determination and final permit action required under this section or §§ 55.13 or 55.14 to the Administrator through the EPA Regional Office at the time of the determination and shall make available to the Administrator any materials used in making the determination.

(b) *Preconstruction requirements for OCS sources located within 25 miles of States' seaward boundaries*. (1) No OCS source to which the requirements of §§ 55.13 or 55.14 of this part apply shall begin actual construction after the effective date of this part without a permit that requires the OCS source to meet those requirements.

(2) Any permit application required under this part shall not be submitted until the Administrator has determined whether a consistency update is necessary, pursuant to § 55.12 of this part, and, if the Administrator finds an update to be necessary, has published a proposed consistency update.

(3) The applicant may be required to obtain more than one preconstruction permit, if necessitated by partial delegation of this part or by the requirements of this section and §§ 55.13 and 55.14 of this part.

(4) An approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The 18-month period may be extended upon a showing satisfactory to the Administrator or the delegated agency that an extension is justified. Sources obtaining extensions are subject to all new or interim requirements and a reassessment of the applicable control technology when the extension is granted. This requirement shall not supersede a more stringent requirement under §§ 55.13 or 55.14 of this part.

(5) Any preconstruction permit issued to a new OCS source or modification shall remain in effect until it expires under paragraph (b)(4) of this section or is rescinded under the applicable requirements incorporated in §§ 55.13 and 55.14 of this part.

(6) Whenever any proposed OCS source or modification to an existing OCS source is subject to action by a Federal agency that might necessitate preparation of an environmental impact statement pursuant to the National Environmental Policy Act (42 U.S.C. 4321), review by the Administrator conducted pursuant to this section shall be coordinated with the environmental reviews under that Act to the extent feasible and reasonable.

(7) The Administrator or delegated agency and the applicant shall provide written notice of any permit application from a source, the emissions from which may affect a Class I area, to the

Federal Land Manager charged with direct responsibility for management of any lands within the Class I area. Such notification shall include a copy of all information contained in the permit application and shall be given within 30 days of receipt of the application and at least 60 days prior to any public hearing on the preconstruction permit.

(8) *Modification of existing sources.* The preconstruction requirements above shall not apply to a particular modification, as defined in §55.13 or §55.14 of this part, of an existing OCS source if:

(i) The modification is necessary to comply with this part, and no other physical change or change in the method of operation is made in conjunction with the modification;

(ii) The modification is made within 24 months of promulgation of this part; and

(iii) The modification does not result in an increase, in excess of any *de minimus* levels contained in the applicable requirements of §§55.13 and 55.14, of potential emissions or actual hourly emissions of a pollutant regulated under the Act.

(9) *Compliance plans.* Sources intending to perform modifications that meet all of the criteria of paragraph (b)(8) of this section shall submit a compliance plan to the Administrator or delegated agency prior to performing the modification. The compliance shall describe the schedule and method the source will use to comply with the applicable OCS requirements within 24 months of the promulgation date of this part and shall include a request for any exemptions from compliance with a pollution control technology requirement that the applicant believes is technically infeasible or will cause an unreasonable threat to health and safety. The Administrator or delegated agency shall act on the request for exemption in accordance with the procedures established in §55.7 of this part.

(i) The Administrator or delegated agency shall review the compliance plan and provide written comments to the source within 45 days of receipt of such plan. The source shall provide a written response to such comments as required by the reviewing agency.

(ii) Receipt and review of a compliance plan by the Administrator or delegated agency shall not relieve any owner or operator of an existing OCS source of the responsibility to comply fully with the applicable requirements of §§55.13 and 55.14 of this part within 24 months of promulgation of this part.

(c) *Operating permit requirements for sources located within 25 miles of States' seaward boundaries.* (1) All applicable operating permit requirements listed in this section and incorporated into §§55.13 and 55.14 of this part shall apply to OCS sources.

(2) The Administrator or delegated agency shall not issue a permit to operate to any existing OCS source that has not demonstrated compliance with all the applicable requirements of this part.

(3) If the COA does not have an operating permits program approved pursuant to 40 CFR part 70 or if EPA has determined that the COA is not adequately implementing an approved program, the applicable requirements of 40 CFR part 71, the Federal operating permits program, shall apply to the OCS sources. The applicable requirements of 40 CFR part 71 will be implemented and enforced by the Administrator. The Administrator may delegate the authority to implement and enforce all or part of a Federal operating permits program to a State pursuant to §55.11 of this part.

(d) *Permit requirements for sources located beyond 25 miles of States' seaward boundaries.* (1) OCS sources located beyond 25 miles of States' seaward boundaries shall be subject to the permitting requirements set forth in this section and §55.13 of this part.

(2) The Administrator or delegated agency shall not issue a permit-to-operate to any existing OCS source that has not demonstrated compliance with all the applicable requirements of this part.

(e) *Permit requirements for new sources that commenced construction prior to September 4, 1992*—(1) *Applicability.* §55.6(e) applies to a new OCS source, as defined by section 328 of the Act, that commenced construction before September 4, 1992.

(2) A source subject to §55.6(e) shall comply with the following requirements:

(i) By October 5, 1992, the owner or operator of the source shall submit a transitional permit application (''TPA'') to the Administrator or the delegated agency. The TPA shall include the following:

(A) The information specified in §§ 55.4(b)(1) through § 55.4(b)(9) of this part;

(B) A list of all requirements applicable to the source under this part;

(C) A request for exemption from compliance with any control technology requirement that the applicant believes is technically infeasible or will cause an unreasonable threat to health and safety;

(D) An air quality screening analysis demonstrating whether the source has or is expected in the future to cause or contribute to a violation of any applicable State or Federal ambient air quality standard or exceed any applicable increment. If no air quality analysis is required by the applicable requirements of §§ 55.13 and 55.14, this requirement does not apply;

(E) Documentation that source emissions are currently being offset, or will be offset if the source has not commenced operation, at the ratio required under this part, and documentation that those offsets meet or will meet the requirements of this part; and

(F) A description of how the source is complying with the applicable requirements of §§ 55.13 and 55.14 of this part, including emission levels and corresponding control measures, including Best Available Control Technology (''BACT'') or Lowest Achievable Emission Rates (''LAER''), but excluding the requirements to have valid permits.

(ii) The source shall expeditiously complete its permit application in compliance with the schedule determined by the Administrator or delegated agency.

(iii) The source shall comply with all applicable requirements of this part except for the requirements of paragraph (a)(4)(i) of this section. The source shall comply with the control technology requirements (such as BACT or LAER) set forth in the TPA that would be applicable if the source had a valid permit.

(iv) Any owner or operator subject to this subsection who continues to construct or operate an OCS source thirty days from promulgation of this part without submitting a TPA, or continues to construct or operate an OCS source not in accordance with the TPA submitted pursuant to paragraph (e) of this section, or constructs or operates an OCS source not in accordance with the schedule determined by the permitting authority, shall be in violation of this part.

(3) Upon the submittal of a permit application deemed to be complete by the permitting authority, the owner or operator of the source shall be subject to the permitting requirements of §§ 55.13 and 55.14 of this part that apply subsequent to the submission of a complete permit application. When a source receives the permit or permits required under this part, its TPA shall expire.

(4) Until the date that a source subject to this subsection receives the permit or permits required under this part, that source shall cease operation if, based on projected or actual emissions, the permitting authority determines that the source is currently or may in the future cause or contribute to a violation of a State or Federal ambient air quality standard or exceed any applicable increment.

[57 FR 40806, Sept. 4, 1992, as amended at 61 FR 34228, July 1, 1996; 62 FR 46409, Sept. 2, 1997]

§ 55.7 Exemptions.

(a) *Authority and criteria.* The Administrator or the delegated agency may exempt a source from a control technology requirement of this part if the Administrator or the delegated agency finds that compliance with the control technology requirement is technically infeasible or will cause an unreasonable threat to health and safety.

(b) *Request for an exemption*—(1) *Permit application required.* An applicant shall submit a request for an exemption from a control technology requirement at the same time as the applicant submits a preconstruction or operating permit application to the Administrator or delegated agency.

(2) *No permit application required.* If no permit or permit modification is required, a request for an exemption must be received by the Administrator or delegated agency within 60 days from the date the control technology requirement is promulgated by EPA.

(3) *Compliance plan.* An existing source that submits a compliance plan in accordance with §55.6(b) of this part shall submit all requests for exemptions at the same time as the compliance plan. For the purpose of applying §55.7 of this part, a request submitted with a compliance plan shall be treated in the same manner as a request that does not require a permit application.

(4) *Content of request.* (i) The request shall include information that demonstrates that compliance with a control technology requirement of this part would be technically infeasible or would cause an unreasonable threat to health and safety.

(ii) The request shall include a proposed substitute requirement(s) as close in stringency to the original requirement as possible.

(iii) The request shall include an estimate of emission reductions that would be achieved by compliance with the original requirement, an estimate of emission reductions that would be achieved by compliance with the proposed substitute requirement(s) and an estimate of residual emissions.

(iv) The request shall identify emission reductions of a sufficient quantity to offset the estimated residual emissions. Sources located beyond 25 miles from States' seaward boundaries shall consult with the Administrator to identify suitable emission reductions.

(c) *Consultation requirement.* If the authority to grant or deny exemptions has been delegated, the delegated agency shall consult with the Minerals Management Service of the U.S. Department of Interior and the U.S. Coast Guard to determine whether the exemption will be granted or denied.

(1) The delegated agency shall transmit to the Administrator (through the Regional Office), the Minerals Management Service, and the U.S. Coast Guard, a copy of the permit application, or the request if no permit is required, within 5 days of its receipt.

(2) *Consensus.* If the delegated agency, the Minerals Management Service, and the U.S. Coast Guard reach a consensus decision on the request within 90 days from the date the delegated agency received the request, the delegated agency may issue a preliminary determination in accordance with the applicable requirements of paragraph (f) of this section.

(3) *No consensus.* If the delegated agency, the Minerals Management Service, and the U.S. Coast Guard do not reach a consensus decision within 90 days from the date the delegated agency received the request, the request shall automatically be referred to the Administrator who will process the referral in accordance with paragraph (f)(3) of this section. The delegated agency shall transmit to the Administrator, within 91 days of its receipt, the request and all materials submitted with the request, such as the permit application or the compliance plan, and any other information considered or developed during the consultation process.

(4) If a request is referred to the Administrator and the delegated agency issues a preliminary determination on a permit application before the Administrator issues a final decision on the exemption, the delegated agency shall include a notice of the opportunity to comment on the Administrator's preliminary determination in accordance with the procedures of paragraph (f)(4) of this section.

(5) The Administrator's final decision on a request that has been referred pursuant to paragraph (c) of this section shall be incorporated into the final permit issued by the delegated agency. If no permit is required, the Administrator's final decision on the request shall be implemented and enforced by the delegated agency.

(d) *Preliminary determination.* The Administrator or delegated agency shall issue a preliminary determination in accordance with paragraph (f) of this section. A preliminary determination shall propose to grant or deny the request for exemption. A preliminary determination to grant the request shall include proposed substitute control requirements and offsets necessary to

comply with the requirements of paragraph (e) of this section.

(e) *Grant of exemption.* (1) The source shall comply with a substitute requirement(s), equal to or as close in stringency to the original requirement as possible, as determined by the Administrator or delegated agency.

(2) An OCS source located within 25 miles of States' seaward boundaries shall offset residual emissions resulting from the grant of an exemption request in accordance with the requirements of the Act and the regulations thereunder. The source shall obtain offsets in accordance with the applicable requirements as follows:

(i) If offsets are required in the COA, a new source shall offset residual emissions in the same manner as all other new source emissions in accordance with the requirements of § 55.5(d) of this part.

(ii) If offsets are not required in the COA, a new source shall comply with an offset ratio of 1:1.

(iii) An existing OCS source shall comply with an offset at a ratio of 1:1.

(3) An OCS source located beyond 25 miles from States' seaward boundaries shall obtain emission reductions at a ratio determined by the Administrator to be adequate to protect State and Federal ambient air quality standards and to comply with part C of title I of the Act.

(f) *Administrative procedures and public participation*—(1) *Request submitted with a permit application.* If a request is submitted with a permit application, the request shall be considered part of the permit application and shall be processed accordingly for the purpose of administrative procedures and public notice and comment requirements. The Administrator shall comply with the requirements of 40 CFR part 124 and the requirements set forth at § 55.6 of this part. If the Administrator has delegated authority to a State, the delegated agency shall use its own procedures as deemed adequate by the Administrator in accordance with § 55.11 of this part. These procedures must provide for public notice and comment on the preliminary determination.

(2) *Request submitted without a permit or with a compliance plan.* If a permit is not required, the Administrator or the delegated agency shall issue a preliminary determination within 90 days from the date the request was received, and shall use the procedures set forth at paragraph (f)(4) of this section for processing a request.

(3) *Referral.* If a request is referred to the Administrator pursuant to paragraph (c) of this section, the Administrator shall make a preliminary determination no later than 30 days after receipt of the request and any accompanying materials transmitted by the delegated agency. The Administrator shall use the procedures set forth at paragraph (f)(4) of this section for processing a request.

(4) The Administrator or the delegated agency shall comply with the following requirements for processing requests submitted without a permit, with a compliance plan, and requests referred to the Administrator:

(i) Issue a preliminary determination to grant or deny the request. A preliminary determination by the Administrator to deny a request shall be considered a final decision and will be accompanied by the reasons for the decision. As such, it is not subject to any further public notice, comment, or hearings. Written notice of the denial shall be given to the requester.

(ii) Make available, in at least one location in the COA and NOA, a copy of all materials submitted by the requester, a copy of the preliminary determination, and a copy or summary of other materials, if any, considered in making the preliminary determination.

(iii) Notify the public, by prominent advertisement in a newspaper of general circulation in the COA and NOA, of a 30-day opportunity for written public comment on the information submitted by the owner or operator and on the preliminary determination.

(iv) Send a copy of the notice required pursuant to paragraph (f)(4)(iii) of this section to the requester, the affected source, each person from whom a written request of such notice has been received, and the following officials and agencies having jurisdiction over the COA and NOA: State and local air pollution control agencies, the chief executive of the city and county,

the Federal Land Manager of potentially affected Class I areas, and any Indian governing body whose lands may be affected by emissions from the OCS source.

(v) Consider written public comments received within 30 days after the date the public notice is made available when making the final decision on the request. All comments will be made available for public inspection. At the time that any final decision is issued, the Administrator or delegated agency will issue a response to comments.

(vi) Make a final decision on the request within 30 days after the close of the public comment period. The Administrator or the delegated agency will notify, in writing, the applicant and each person who has submitted written comments, or from whom a written request of such notice has been received, of the final decision and will set forth the reasons. Such notification will be made available for public inspection.

(5) Within 30 days after the final decision has been made on a request, the requester, or any person who filed comments on the preliminary determination, may petition the Administrator to review any aspect of the decision. Any person who failed to file comments on the preliminary decision may petition for administrative review only on the changes from the preliminary to the final determination.

§ 55.8 Monitoring, reporting, inspections, and compliance.

(a) The Administrator may require monitoring or reporting and may authorize inspections pursuant to section 114 of the Act and the regulations thereunder. Sources shall also be subject to the requirements set forth in §§ 55.13 and 55.14 of this part.

(b) All monitoring, reporting, inspection and compliance requirements authorized under the Act shall apply.

(c) An existing OCS source that is not required to obtain a permit to operate within 24 months of the date of promulgation of this part shall submit a compliance report to the Administrator or delegated agency within 25 months of promulgation of this part. The compliance report shall specify all the applicable OCS requirements of this part and a description of how the source has complied with these requirements.

(d) The Administrator or the delegated agency shall consult with the Minerals Management Service and the U.S. Coast Guard prior to inspections. This shall in no way interfere with the ability of EPA or the delegated agency to conduct unannounced inspections.

(Approved by the Office of Management and Budget under the control number 2060–0249)

[57 FR 40806, Sept. 4, 1992, as amended at 58 FR 16626, Mar. 30, 1993]

§ 55.9 Enforcement.

(a) OCS sources shall comply with all requirements of this part and all permits issued pursuant to this part. Failure to do so shall be considered a violation of section 111(e) of the Act.

(b) All enforcement provisions of the Act, including, but not limited to, the provisions of sections 113, 114, 120, 303 and 304 of the Act, shall apply to OCS sources.

(c) If a facility is ordered to cease operation of any piece of equipment due to enforcement action taken by EPA or a delegated agency pursuant to this part, the shutdown will be coordinated by the enforcing agency with the Minerals Management Service and the U.S. Coast Guard to assure that the shutdown will proceed in a safe manner. No shutdown action will occur until after consultation with these agencies, but in no case will initiation of the shutdown be delayed by more than 24 hours.

§ 55.10 Fees.

(a) *OCS sources located within 25 miles of States' seaward boundaries.* (1) The EPA will calculate and collect operating permit fees from OCS sources in accordance with the requirements of 40 CFR part 71.

(2) EPA will collect all other fees from OCS sources calculated in accordance with the fee requirements imposed in the COA if the fees are based on regulatory objectives, such as discouraging emissions. If the fee requirements are based on cost recovery objectives, however, EPA will adjust the fees to reflect the costs to EPA to issue permits and administer the permit program.

(3) Upon delegation, the delegated agency will collect fees from OCS sources calculated in accordance with the fee requirements imposed in the COA. Upon delegation of authority to implement and enforce any portion of this part, EPA will cease to collect fees imposed in conjunction with that portion.

(b) The OCS sources located beyond 25 miles of States' seaward boundaries. The EPA will calculate and collect operating permit fees from OCS sources in accordance with the requirements of 40 CFR part 71.

[57 FR 40806, Sept. 4, 1992, as amended at 61 FR 34228, July 1, 1996]

§ 55.11 Delegation.

(a) The Governor or the Governor's designee of any State adjacent to an OCS source subject to the requirements of this part may submit a request, purusant to section 328(a)(3) of the Act, to the Administrator for the authority to implement and enforce the requirements of this OCS program: Within 25 miles of the State's seaward boundary; and/or Beyond 25 miles of the State's seaward boundary. Authority to implement and enforce §§ 55.5, 55.11, and 55.12 of this part will not be delegated.

(b) The Administrator will delegate implementation and enforcement authority to a State if the State has an adjacent OCS source and the Administrator determines that the State's regulations are adequate, including a demonstration by the State that the State has:

(1) Adopted the appropriate portions of this part into State law;

(2) Adequate authority under State law to implement and enforce the requirements of this part. A letter from the State Attorney General shall be required stating that the requesting agency has such authority;

(3) Adequate resources to implement and enforce the requirements of this part; and

(4) Adequate administrative procedures to implement and enforce the requirements of this part, including public notice and comment procedures.

(c) The Administrator will notify in writing the Governor or the Governor's designee of the Administrator's final action on a request for delegation within 6 months of the receipt of the request.

(d) If the Administrator finds that the State regulations are adequate, the Administrator will authorize the State to implement and enforce the OCS requirements under State law. If the Administrator finds that only part of the State regulations are adequate, he will authorize the State to implement and enforce only that portion of this part.

(e) Upon delegation, a State may use any authority it possesses under State law to enforce any permit condition or any other requirement of this part for which the agency has delegated authority under this part. A State may use anyauthority it possesses under State law to require monitoring and reporting and to conduct inspections.

(f) Nothing in this part shall prohibit the Administrator from enforcing any requirement of this part.

(g) The Administrator will withdraw a delegation of any authority to implement and enforce any or all of this part if the Administrator determines that: (1) The requirements of this part are not being adequately implemented or enforced by the delegated agency, or (2) The delegated agency no longer has adequate regulations as required by § 55.11(b) of this part.

(h) *Sharing of information*. Any information obtained or used in the administration of a delegated program shall be made available to EPA upon request without restriction. If the information has been submitted to the delegated agency under a claim of confidentiality, the delegated agency must notify the source of this obligation and submit that claim to EPA. Any information obtained from a delegated agency accompanied by a claim of confidentiality will be treated in accordance with the requirements of 40 CFR part 2.

(i) *Grant of exemptions*. A decision by a delegated agency to grant or deny an exemption request may be appealed to the Administrator in accordance with § 55.7 of this part.

(j) *Delegated authority*. The delegated agency in the COA for sources located within 25 miles of the State's seaward boundary or the delegated agency in the NOA for sources located beyond 25 miles of the State's seaward boundary

will exercise all delegated authority. If there is no delegated agency in the COA for sources located within 25 miles of the State's seaward boundary, or in the NOA for sources located beyond 25 miles of the State's seaward boundary, the EPA will issue the permit and implement and enforce the requirements of this part. For sources located within 25 miles of the State's seaward boundary, the Administrator may retain the authority for implementing and enforcing the requirements of this part if the NOA and COA are in different States.

[57 FR 40806, Sept. 4, 1992, as amended at 62 FR 46409, Sept. 2, 1997]

§55.12 Consistency updates.

(a) The Administrator will update this part as necessary to maintain consistency with the regulations of onshore areas in order to attain and maintain Federal and State ambient standards and comply with part C of title I of the Act.

(b) Where an OCS activity is occurring within 25 miles of a State seaward boundary, consistency reviews will occur at least annually. In addition, in accordance with paragraphs (c) and (d) of this section, consistency reviews will occur upon receipt of an NOI and when a State or local agency submits a rule to EPA to be considered for incorporation by reference in this part 55.

(1) Upon initiation of a consistency review, the Administrator will evaluate the requirements of part 55 to determine whether they are consistent with the current onshore requirements.

(2) If the Administrator finds that part 55 is inconsistent with the requirements in effect in the onshore area, EPA will conduct a notice and comment rulemaking to update part 55 accordingly.

(c) *Consistency reviews triggered by receipt of an NOI.* Upon receipt of an NOI, the Administrator will initiate a consistency review of regulations in the onshore area.

(1) If the NOI is submitted by a source for which the COA has previously been assigned, EPA will publish a proposed consistency update in the FEDERAL REGISTER no later than 60 days after the receipt of the NOI, if an update is deemed necessary by the Administrator:

(2) If the NOI is submitted by a source requiring a COA designation, EPA will publish a proposed consistency update in the FEDERAL REGISTER, if an update is deemed necessary by the Administrator:

(i) No later than 75 days after receipt of the NOI if no adjacent areas submit a request for COA designation and the NOA becomes the COA by default, or

(ii) No later than 105 days after receipt of the NOI if an adjacent area submits a request to be designated as COA but fails to submit the required demonstration within 90 days of receipt of the NOI, or

(iii) No later than 15 days after the date of the final COA determination if one or more demonstrations are received.

(d) *Consistency reviews triggered by State and local air pollution control agencies submitting rules directly to EPA for inclusion into part 55.* (1) EPA will propose in the FEDERAL REGISTER to approve applicable rules submitted by State or local regulatory agencies for incorporation by reference into §55.14 of this part by the end of the calendar quarter following the quarter in which the submittal is received by EPA.

(2) State and local rules submitted for inclusion in part 55 must be rationally related to the attainment and maintenance of Federal or State ambient air quality standards or to the requirements of part C of title I of the Act. The submittal must be legible and unmarked, with the adoption date and the name of the agency on each page, and must be accompanied by proof of adoption.

(e) No rule or regulation that EPA finds to be arbitrary or capricious will be incorporated into this part.

(f) A source may not submit a complete permit application until any update the Administrator deems necessary to make part 55 consistent with the COA's rules has been proposed.

§55.13 Federal requirements that apply to OCS sources.

(a) The requirements of this section shall apply to OCS sources as set forth below. In the event that a requirement of this section conflicts with an applicable requirement of §55.14 of this part and a source cannot comply with the

requirements of both sections, the more stringent requirement shall apply.

(b) In applying the requirements incorporated into this section:

(1) *New Source* means new OCS source; and

(2) *Existing Source* means existing OCS source; and

(3) *Modification* means a modification to an OCS source.

(4) For requirements adopted prior to promulgation of this part, language in such requirements limiting the applicability of the requirements to onshore sources or to sources within State boundaries shall not apply.

(c) 40 CFR part 60 (NSPS) shall apply to OCS sources in the same manner as in the COA, except that any source determined to be an existing source pursuant to § 55.3(e) of this part shall not be considered a ''new source'' for the purpose of NSPS adopted before December 5, 1991.

(d) 40 CFR 52.21 (PSD) shall apply to OCS sources:

(1) Located within 25 miles of a State's seaward boundary if the requirements of 40 CFR 52.21 are in effect in the COA;

(2) Located beyond 25 miles of States' seaward boundaries.

(e) 40 CFR part 61, together with any other provisions promulgated pursuant to section 112 of the Act, shall apply if rationally related to the attainment and maintenance of Federal or State ambient air quality standards or the requirements of part C of title I of the Act.

(f) 40 CFR part 71 shall apply to OCS sources:

(1) Located within 25 miles of States' seaward boundaries if the requirements of 40 CFR part 71 are in effect in the COA.

(2) Located beyond 25 miles of States' seaward boundaries.

(3) When an operating permits program approved pursuant to 40 CFR part 70 is in effect in the COA and a Federal operating permit is issued to satisfy an EPA objection pursuant to 40 CFR 71.4(e).

(g) The provisions of 40 CFR 52.10, 40 CFR 52.24, and 40 CFR part 51 and accompanying appendix S shall apply to OCS sources located within 25 miles of States' seaward boundaries, if these requirements are in effect in the COA.

(h) If the Administrator determines that additional requirements are necessary to protect Federal and State ambient air quality standards or to comply with part C of title I, such requirements will be incorporated in this part.

[57 FR 40806, Sept. 4, 1992, as amended at 61 FR 34228, July 1, 1996]

§ 55.14 Requirements that apply to OCS sources located within 25 miles of States' seaward boundaries, by State.

(a) The requirements of this section shall apply to OCS sources as set forth below. In the event that a requirement of this section conflicts with an applicable requirement of § 55.13 of this part and a source cannot comply with the requirements of both sections, the more stringent requirement shall apply.

(b) In applying the requirements incorporated into this section:

(1) *New Source* means new OCS source; and

(2) *Existing Source* means existing OCS source; and

(3) *Modification* means a modification to an existing OCS source.

(4) For requirements adopted prior to promulgation of this part, language in such requirements limiting the applicability of the requirements to onshore sources or to sources within State boundaries shall not apply.

(c) During periods of EPA implementation and enforcement of this section, the following shall apply:

(1) Any reference to a State or local air pollution control agency or air pollution control officer shall mean EPA or the Administrator, respectively.

(2) Any submittal to State or local air pollution control agency shall instead be submitted to the Administrator through the EPA Regional Office.

(3) Nothing in this section shall alter or limit EPA's authority to administer or enforce the requirements of this part under Federal law.

(4) EPA shall not be bound by any State or local administrative or procedural requirements including, but not limited to, requirements pertaining to

hearing boards, permit issuance, public notice procedures, and public hearings. EPA will follow the applicable procedures set forth elsewhere in this part, in 40 CFR part 124, and in Federal rules promulgated pursuant to title V of the Act (as such rules apply in the COA), when administering this section.

(5) Only those requirements of 40 CFR part 52 that are rationally related to the attainment and maintenance of Federal or State ambient air quality standards or part C of title I shall apply to OCS sources.

(d) *Implementation Plan Requirements.*

(1) [Reserved]

(2) Alaska.

(i) 40 CFR part 52, subpart C.

(ii) [Reserved]

(3) California.

(i) 40 CFR part 52, subpart F.

(ii) [Reserved]

(4)–(5) [Reserved]

(6) Florida.

(i) 40 CFR part 52, subpart K.

(ii) [Reserved]

(7)–(16) [Reserved]

(17) North Carolina.

(i) 40 CFR part 52, subpart II.

(ii) [Reserved]

(18)–(23) [Reserved]

(e) *State and local requirements.* State and local requirements promulgated by EPA as applicable to OCS sources located within 25 miles of States' seaward boundaries have been compiled into separate documents organized by State and local areas of jurisdiction. These documents, set forth below, are incorporated by reference. This incorporation by reference was approved by the Director of the Federal Register Office in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC. Copies of rules pertaining to particular States or local areas may be inspected or obtained from the EPA Air Docket (A–91–76), U.S. EPA, room M–1500, 401 M St., SW., Washington, DC 20460 or the appropriate EPA regional offices: U.S. EPA, Region 4 (Florida and North Carolina), 345 Courtland Street, NE., Atlanta, GA 30365; U.S. EPA, Region 9 (California), 75 Hawthorne Street, San Francisco, CA 94105; and U.S. EPA, Region 10 (Alaska), 1200 Sixth Avenue, Seattle, WA 98101. For an informational listing of the State and local requirements incorporated into this part, which are applicable to sources of air pollution located on the OCS, see appendix A to this part.

(1) [Reserved]

(2) Alaska.

(i) State requirements.

(A) *State of Alaska Requirements Applicable to OCS Sources,* July 2, 2000.

(B) [Reserved]

(ii) Local requirements.

(A) *South Central Alaska Clean Air Authority Requirements Applicable to OCS Sources,* August 21, 1992.

(B) [Reserved]

(3) California.

(i) State requirements.

(A) State of California Requirements Applicable to OCS Sources.

(ii) Local requirements.

(A)–(D) [Reserved]

(E) *San Luis Obispo County Air Pollution Control District Requirements Applicable to OCS Sources,* February 2000.

(F) *Santa Barbara County Air Pollution Control District Requirements Applicable to OCS Sources,* February 2000.

(G) *South Coast Air Quality Management District Requirements Applicable to OCS Sources* (Part I , II and Part III), February 2000.

(H) *Ventura County Air Pollution Control District Requirements Applicable to OCS Sources,* February 2000.

(4) and (5) [Reserved]

(6) Florida.

(i) State requirements.

(A) State of Florida Requirements Applicable to OCS Sources, January 11, 1995.

(B) [Reserved]

(ii) Local requirements.

(A) [Reserved]

(7)–(16) [Reserved]

(17) North Carolina.

(i) State requirements.

(A) *State of North Carolina Air Pollution Control Requirements Applicable to OCS Sources,* August 21, 1992.

(B) [Reserved]

(ii) Local requirements.

(A) [Reserved]

(18)–(23) [Reserved]

[57 FR 40806, Sept. 4, 1992, as amended at 58 FR 16626, Mar. 30, 1993; 58 FR 59173, Nov. 8, 1993; 59 FR 17270, Apr. 12, 1994; 59 FR 50846, Oct. 6, 1994; 60 FR 47293, Sept. 12, 1995; 60 FR 55327, Oct. 31, 1995; 61 FR 28758, June 6, 1996; 62 FR 41871, Aug. 4, 1997; 65 FR 15869, Mar. 24, 2000; 66 FR 12984, Mar. 1, 2001]

§ 55.15 Specific designation of corresponding onshore areas.

(a) California.

(1) The South Coast Air Quality Management District is designated as the COA for the following OCS facilities: Edith, Ellen, Elly, and Eureka.

(2) The Ventura County Air Pollution Control District is designated as the COA for the following OCS facilities: Grace, Gilda, Gail and Gina.

(3) The Santa Barbara County Air Pollution Control District is designated as the COA for the following OCS facilities: Habitat, Hacienda, Harmony, Harvest, Heather, Henry, Heritage, Hermosa, Hidalgo, Hillhouse, Hogan, Houchin, Hondo, Irene, Independence (formerly Iris), the OS and T, and Union A, B, and C.

(b) [Reserved]

[58 FR 14159, Mar. 16, 1993]

APPENDIX A TO PART 55—LISTING OF STATE AND LOCAL REQUIREMENTS INCORPORATED BY REFERENCE INTO PART 55, BY STATE

This appendix lists the titles of the State and local requirements that are contained within the documents incorporated by reference into 40 CFR part 55.

ALASKA

(a) State requirements.

(1) The following requirements are contained in the *State of Alaska Requirements Applicable to OCS Sources*, July 2, 2000.

Alaska Administrative Code—Department of Environmental Conservation. The following sections of Title 18, Chapter 50:

Article 1. Ambient Air Quality Management

18 AAC 50.005. Purpose and Applicability of Chapter. (effective 1/18/1997)
18 AAC 50.010. Ambient Air Quality Standards. (effective 6/21/1998)
18 AAC 50.015. Air Quality Designations, Classifications, And Control Regions. (effective 1/18/1997)
Table 1. Air Quality Classifications
18 AAC 50.020. Baseline Dates, Maximum Allowable Increases, And Maximum Allowable Ambient Concentrations. (effective 6/21/1998)
Table 2. Baseline Dates
Table 3. Maximum Allowable Increases
18 AAC 50.025. Visibility and Other Special Protection Areas. (effective 1/18/1997) (a) [untitled]
18 AAC 50.030. State Air Quality Control Plan. (effective 9/04/1998)
18 AAC 50.035. Documents, Procedures, and Methods Adopted by Reference. (effective 7/02/2000)
18 AAC 50.045. Prohibitions. (effective 1/18/1997)
18 AAC 50.050. Incinerator Emission Standards. (effective 1/18/1997)
Table 4. Particulate Matter Standards for Incinerators
18 AAC 50.055. Industrial Processes and Fuel-burning Equipment. (effective 11/04/1999)
18 AAC 50.065. Open Burning. (effective 1/18/1997)
(a) General Requirements.
(b) Black Smoke Prohibited.
(c) Toxic and Acid Gases and Particulate Matter Prohibited.
(d) Adverse Effects Prohibited.
(e) Air Quality Advisory.
(i) Firefighter Training: Fuel Burning.
(j) Public Notice.
(k) Complaints.
18 AAC 50.070. Marine Vessel Visible Emission Standards. (effective 6/21/1998)
18 AAC 50.080. Ice Fog Standards. (effective 1/18/1997)
18 AAC 50.100. Nonroad Engines/ (effective 1/18/1997)
18 AAC 50.110. Air Pollution Prohibited. (effective 5/26/1972)

Article 2. Program Administration

18 AAC 50.201. Ambient Air Quality Investigation. (effective 1/18/1997)
18 AAC 50.205. Certification. (effective 1/18/1997)
18 AAC 50.210. Potential to Emit. (effective 1/18/1997)
18 AAC 50.215. Ambient Air Quality Analysis Methods. (effective 6/21/1998)
18 AAC 50.220. Enforceable Test Methods. (effective 1/18/1997)
18 AAC 50.225. Owner-requested Limits. (effective 6/21/1998)
18 AAC 50.230. Preapproved Limits. (effective 6/21/1998)
18 AAC 50.235. Unavoidable Emergencies and Malfunctions. (effective 6/14/1998)
18 AAC 50.240. Excess Emissions. (effective 1/18/1997)

Article 3. Permit Procedures and Requirements

18 AAC 50.300. Construction Permits: Classifications. (effective 6/21/1998)
(a) [untitled]
(b) Ambient Air Quality Facilities.
(c) Prevention of Significant Deterioration Major Facilities.

(d) Nonattainment Major Facilities.
(e) Major Facility Near a Nonattainment Area.
(f) Hazardous Air Contaminant Major Facilities.
(h) Modifications. (paragraphs 1 through 10)
18 AAC 50.305. Construction Permit Provisions Requested by the Owner or Operator. (effective 1/18/97)
18 AAC 50.310. Construction Permits: Application. (effective 1/18/1997)
(a) Application Required.
(b) Operating Permit Coordination.
(c) General Information.
(d) Prevention of Significant Deterioration Information.
Table 6. Significant Concentrations
(e) Excluded Ambient Air Monitoring.
(f) Nonattainment Information.
(g) Demonstration Required Near A Nonattainment Area.
(h) Hazardous Air Contaminant Information.
(j) Nonattainment Air Contaminant Reductions.
(k) Revising Permit Terms.
(l) Requested Limits.
(m) Stack Injection.
(n) Ambient Air Quality Information.
18 AAC 50.320. Construction Permits: Content and Duration. (effective 1/18/1997)
18 AAC 50.325. Operating Permits: Classifications. (effective 6/21/1998)
18 AAC 50.330. Operating Permits: Exemptions. (effective 1/18/1997)
18 AAC 50.335. Operating Permits: Application. (effective 6/21/1998)
(a) Application Required.
(b) Identification.
(c) General Emission Information.
(d) Fees.
(e) Regulated Source Information.
(f) Facility-wide Information: Ambient Air Quality.
(g) Facility-wide Information: Owner Requested Limits.
(h) Facility-wide Information: Emissions Trading.
(i) Compliance Information.
(j) Proposed Terms and Conditions.
(k) Compliance Certifications.
(l) Permit Shield.
(m) Supporting Documentation.
(n) Additional Information.
(o) Certification of Accuracy and Completeness.
(p) Renewals.
(q) Insignificant Sources.
(r) Insignificant Sources: Emission Rate Basis.
(s) Insignificant Sources: Category Basis.
(t) Insignificance Sources: Size or Production Rate Basis.
(u) Insignificant Sources: Case-by-Case Basis.
(v) Administratively Insignificant Sources.
18 AAC 50.340. Operating Permits: Review and Issuance. (effective 1/18/1997)
(a) Review for Completeness.
(b) Evaluation of Complete Applications.
(c) Expiration of Application Shield.
18 AAC 50.341. Operating Permits: Reopenings. (paragraphs a, b, c, f, and g) (effective 6/14/1998)
18 AAC 50.345. Operating Permits: Standard Conditions. (effective 6/21/1998)
18 AAC 50.350. Operating Permits: Content. (effective 6/21/1998)
(a) Purpose of Section.
(b) Standard Requirements.
(c) Fee Information.
(d) Source-Specific Permit Requirements.
(e) Facility-Wide Permit Requirements.
(f) Other Requirements.
(g) Monitoring Requirements.
(h) Records.
(i) Reporting Requirements.
(j) Compliance Certification.
(k) Compliance Plan and Schedule.
(l) Permit Shield.
(m) Insignificant Sources.
18 AAC 50.355. Changes to a Permitted Facility. (effective 1/18/1997)
18 AAC 50.360. Facility Changes that Violate a Permit Condition. (effective 1/18/1997)
18 AAC 50.365. Facility Changes that do not Violate a Permit Condition. (effective 6/14/1998)
18 AAC 50.370. Administrative Revisions. (effective 6/14/1998)
18 AAC 50.375. Minor and Significant Permit Revisions. (effective 6/21/1998)
18 AAC 50.380. General Operating Permits. (effective 6/14/1998)
18 AAC 50.385. Permit-by-rule for Certain Small Storage Tanks. (effective 6/21/1998)

Article 4. User Fees

18 AAC 50.400. Permit Administration Fees. (effective 6/21/1998)
18 AAC 50.410. Emission Fees. (effective 1/18/1997)
18 AAC 50.420. Billing Procedures. (effective 1/18/1997)

Article 9. General Provisions

18 AAC 50.910. Establishing Level of Actual Emissions. (effective 1/18/1997)
18 AAC 50.990. Definitions. (effective 1/01/2000)

CALIFORNIA

(a) State requirements.
(1) The following requirements are contained in *State of California Requirements Applicable to OCS Sources*, February 2000.

Barclays California Code of Regulations

The following sections of Title 17 Subchapter 6:
17 § 92000 Definitions (Adopted 5/31/91)
17 § 92100 Scope and Policy (Adopted 5/31/91)

17 §92200 Visible Emission Standards (Adopted 5/31/91)
17 §92210 Nuisance Prohibition (Adopted 5/31/91)
17 §92220 Compliance with Performance Standards (Adopted 5/31/91)
17 §92400 Visible Evaluation Techniques (Adopted 5/31/91)
17 §92500 General Provisions (Adopted 5/31/91)
17 §92510 Pavement Marking (Adopted 5/31/91)
17 §92520 Stucco and Concrete (Adopted 5/31/91)
17 §92530 Certified Abrasive (Adopted 5/31/91)
17 §92540 Stucco and Concrete (Adopted 5/31/91)

Health and Safety Code

The following section of Division 26, Part 4, Chapter 4, Article 1: Health and Safety Code §42301.13 of *seq*. Stationary sources: demolition or removal (chaptered 7/25/96)

(b) Local requirements.

(1)–(4) [Reserved]

(5) The following requirements are contained in *San Luis Obispo County Air Pollution Control District Requirements Applicable to OCS Sources*, February 2000:

Rule 103 Conflicts Between District, State and Federal Rules (Adopted 8/6/76)
Rule 105 Definitions (Adopted 1/24/96)
Rule 106 Standard Conditions (Adopted 8/6/76)
Rule 108 Severability (Adopted 11/13/84)
Rule 113 Continuous Emissions Monitoring, except F. (Adopted 7/5/77)
Rule 201 Equipment not Requiring a Permit, except A.1.b. (Revised 4/26/95)
Rule 202 Permits, except A.4. and A.8. (Adopted 11/5/91)
Rule 203 Applications, except B. (Adopted 11/5/91)
Rule 204 Requirements, except B.3. and C. (Adopted 8/10/93)
Rule 209 Provision for Sampling and Testing Facilities (Adopted 11/5/91)
Rule 210 Periodic Inspection, Testing and Renewal of Permits to Operate (Adopted 11/5/91)
Rule 213 Calculations, except E.4. and F. (Adopted 8/10/93)
Rule 302 Schedule of Fees (Adopted 6/18/97)
Rule 305 Fees for Major Non-Vehicular Sources (Adopted 9/15/92)
Rule 401 Visible Emissions (Adopted 8/6/76)
Rule 403 Particulate Matter Emissions (Adopted 8/6/76)
Rule 404 Sulfur Compounds Emission Standards, Limitations and Prohibitions (Revised 12/6/76)
Rule 405 Nitrogen Oxides Emission Standards, Limitations and Prohibitions (Adopted 11/16/93)
Rule 406 Carbon Monoxide Emission Standards, Limitations and Prohibitions (Adopted 11/14/84)
Rule 407 Organic Material Emission Standards, Limitations and Prohibitions (Adopted 5/22/96)
Rule 411 Surface Coating of Metal Parts and Products (Adopted 1/28/98)
Rule 416 Degreasing Operations (Adopted 6/18/79)
Rule 417 Control of Fugitive Emissions of Volatile Organic Compounds (Adopted 2/9/93)
Rule 419 Petroleum Pits, Ponds, Sumps, Well Cellars, and Wastewater Separators (Revised 7/12/94)
Rule 422 Refinery Process Turnarounds (Adopted 6/18/79)
Rule 425 Storage of Volatile Organic Compounds (Adopted 7/12/94)
Rule 427 Marine Tanker Loading (Adopted 4/26/95)
Rule 429 Oxides of Nitrogen and Carbon Monoxide Emissions from Electric Power Generation Boilers (Revised 11/12/97)
Rule 430 Control of Oxides of Nitrogen from Industrial, Institutional, Commercial Boilers, Steam Generators, and Process Heaters (Adopted 7/26/95)
Rule 431 Stationary Internal Combustion Engines (Adopted 11/13/96)
Rule 501 General Burning Provisions (Adopted 1/10/89)
Rule 503 Incinerator Burning, except B.1.a. (Adopted 2/7/89)
Rule 601 New Source Performance Standards (Adopted 5/28/97)

(6) *The following requirements are containing in Santa Barbara County Air Pollution Control District Requirements Applicable to OCS Sources*, February 2000:

Rule 102 Definitions (Adopted 5/20/99)
Rule 103 Severability (Adopted 10/23/78)
Rule 106 Notice to Comply for Minor Violations (Adopted 7/15/99)
Rule 201 Permits Required (Adopted 4/17/97)
Rule 202 Exemptions to Rule 201 (Adopted 4/17/97)
Rule 203 Transfer (Adopted 4/17/97)
Rule 204 Applications (Adopted 4/17/97)
Rule 205 Standards for Granting Applications (Adopted 4/17/97)
Rule 206 Conditional Approval of Authority to Construct or Permit to Operate (Adopted 10/15/91)
Rule 207 Denial of Application (Adopted 10/23/78)
Rule 210 Fees (Adopted 4/17/97)
Rule 212 Emission Statements (Adopted 10/20/92)
Rule 301 Circumvention (Adopted 10/23/78)
Rule 302 Visible Emissions (Adopted 10/23/78)
Rule 304 Particulate Matter-Northern Zone (Adopted 10/23/78)
Rule 305 Particulate Matter Concentration-Southern Zone (Adopted 10/23/78)
Rule 306 Dust and Fumes-Northern Zone (Adopted 10/23/78)

Rule 307 Particulate Matter Emission Weight Rate-Southern Zone (Adopted 10/23/78)
Rule 308 Incinerator Burning (Adopted 10/23/78)
Rule 309 Specific Contaminants (Adopted 10/23/78)
Rule 310 Odorous Organic Sulfides (Adopted 10/23/78)
Rule 311 Sulfur Content of Fuels (Adopted 10/23/78)
Rule 312 Open Fires (Adopted 10/2/90)
Rule 316 Storage and Transfer of Gasoline (Adopted 4/17/97)
Rule 317 Organic Solvents (Adopted 10/23/78)
Rule 318 Vacuum Producing Devices or Systems-Southern Zone (Adopted 10/23/78)
Rule 321 Solvent Cleaning Operations (Adopted 9/18/97)
Rule 322 Metal Surface Coating Thinner and Reducer (Adopted 10/23/78)
Rule 323 Architectural Coatings (Adopted 7/18/96)
Rule 324 Disposal and Evaporation of Solvents (Adopted 10/23/78)
Rule 325 Crude Oil Production and Separation (Adopted 1/25/94)
Rule 326 Storage of Reactive Organic Liquid Compounds (Adopted 12/14/93)
Rule 327 Organic Liquid Cargo Tank Vessel Loading (Adopted 12/16/85)
Rule 328 Continuous Emission Monitoring (Adopted 10/23/78)
Rule 330 Surface Coating of Miscellaneous Metal Parts and Products (Adopted 4/21/95)
Rule 331 Fugitive Emissions Inspection and Maintenance (Adopted 12/10/91)
Rule 332 Petroleum Refinery Vacuum Producing Systems, Wastewater Separators and Process Turnarounds (Adopted 6/11/79)
Rule 333 Control of Emissions from Reciprocating Internal Combustion Engines (Adopted 4/17/97)
Rule 342 Control of Oxides of Nitrogen (NO_X) from Boilers, Steam Generators and Process Heaters) (Adopted 4/17/97)
Rule 343 Petroleum Storage Tank Degassing (Adopted 12/14/93)
Rule 344 Petroleum Sumps, Pits, and Well Cellars (Adopted 11/10/94)
Rule 352 Natural Gas-Fired Fan-Type Central Furnaces and Residential Water Heaters (Adopted 9/16/99)
Rule 353 Adhesives and Sealants (Adopted 8/19/99)
Rule 359 Flares and Thermal Oxidizers (6/28/94)
Rule 370 Potential to Emit—Limitations for Part 70 Sources (Adopted 6/15/95)
Rule 505 Breakdown Conditions Sections A., B.1,. and D. only (Adopted 10/23/78)
Rule 603 Emergency Episode Plans (Adopted 6/15/81)
Rule 702 General Conformity (Adopted 10/20/94)
Rule 801 New Source Review (Adopted 4/17/97)
Rule 802 Nonattainment Review (Adopted 4/17/97)
Rule 803 Prevention of Significant Deterioration (Adopted 4/17/97)
Rule 804 Emission Offsets (Adopted 4/17/97)
Rule 805 Air Quality Impact Analysis and Modeling (Adopted 4/17/97)
Rule 808 New Source Review for Major Sources of Hazardous Air Pollutants (Adopted 5/20/99)
Rule 1301 Part 70 Operating Permits—General Information (Adopted 4/17/97)
Rule 1302 Part 70 Operating Permits—Permit Application (Adopted 11/09/93)
Rule 1303 Part 70 Operating Permits—Permits (Adopted 11/09/93)
Rule 1304 Part 70 Operating Permits—Issuance, Renewal, Modification and Reopening (Adopted 11/09/93)
Rule 1305 Part 70 Operating Permits—Enforcement (Adopted 11/09/93)

(7) *The following requirements are contained in South Coast Air Quality Management District Requirements Applicable to OCS Sources* (Part I, II and III), February 2000:

Rule 102 Definition of Terms (Adopted 6/13/97)
Rule 103 Definition of Geographical Areas (Adopted 1/9/76)
Rule 104 Reporting of Source Test Data and Analyses (Adopted 1/9/76)
Rule 108 Alternative Emission Control Plans (Adopted 4/6/90)
Rule 109 Recordkeeping for Volatile Organic Compound Emissions (Adopted 3/6/92)
Rule 118 Emergencies (Adopted 12/7/95)
Rule 201 Permit to Construct (Adopted 1/5/90)
Rule 201.1 Permit Conditions in Federally Issued Permits to Construct (Adopted 1/5/90)
Rule 202 Temporary Permit to Operate (Adopted 5/7/76)
Rule 203 Permit to Operate (Adopted 1/5/90)
Rule 204 Permit Conditions (Adopted 3/6/92)
Rule 205 Expiration of Permits to Construct (Adopted 1/5/90)
Rule 206 Posting of Permit to Operate (Adopted 1/5/90)
Rule 207 Altering or Falsifying of Permit (Adopted 1/9/76)
Rule 208 Permit for Open Burning (Adopted 1/5/90)
Rule 209 Transfer and Voiding of Permits (Adopted 1/5/90)
Rule 210 Applications (Adopted 1/5/90)
Rule 212 Standards for Approving Permits (Adopted 12/7/95) except (c)(3) and (e)
Rule 214 Denial of Permits (Adopted 1/5/90)
Rule 217 Provisions for Sampling and Testing Facilities (Adopted 1/5/90)
Rule 218 Stack Monitoring (Adopted 8/7/81)
Rule 219 Equipment Not Requiring a Written Permit Pursuant to Regulation II (Adopted 12/13/96)
Rule 220 Exemption—Net Increase in Emissions (Adopted 8/7/81)

Rule 221 Plans (Adopted 1/4/85)
Rule 301 Permit Fees (Adopted 5/9/97) except (e)(6) and Table IV
Rule 304 Equipment, Materials, and Ambient Air Analyses (Adopted 5/9/97)
Rule 304.1 Analyses Fees (Adopted 5/9/97)
Rule 305 Fees for Acid Deposition (Adopted 10/4/91)
Rule 306 Plan Fees (Adopted 5/9/97)
Rule 309 Fees for Regulation XVI Plans (Adopted 5/9/97)
Rule 401 Visible Emissions (Adopted 4/7/89)
Rule 403 Fugitive Dust (Adopted 2/14/97)
Rule 404 Particulate Matter—Concentration (Adopted 2/7/86)
Rule 405 Solid Particulate Matter—Weight (Adopted 2/7/86)
Rule 407 Liquid and Gaseous Air Contaminants (Adopted 4/2/82)
Rule 408 Circumvention (Adopted 5/7/76)
Rule 409 Combustion Contaminants (Adopted 8/7/81)
Rule 429 Start-Up and Shutdown Provisions for Oxides of Nitrogen (Adopted 12/21/90)
Rule 430 Breakdown Provisions, (a) and (e) only (Adopted 7/12/96)
Rule 431.1 Sulfur Content of Gaseous Fuels (Adopted 11/17/95)
Rule 431.2 Sulfur Content of Liquid Fuels (Adopted 5/4/90)
Rule 431.3 Sulfur Content of Fossil Fuels (Adopted 5/7/76)
Rule 441 Research Operations (Adopted 5/7/76)
Rule 442 Usage of Solvents (Adopted 3/5/82)
Rule 444 Open Fires (Adopted 10/2/87)
Rule 463 Organic Liquid Storage (Adopted 3/11/94)
Rule 465 Vacuum Producing Devices or Systems (Adopted 11/1/91)
Rule 468 Sulfur Recovery Units (Adopted 10/8/76)
Rule 473 Disposal of Solid and Liquid Wastes (Adopted 5/7/76)
Rule 474 Fuel Burning Equipment-Oxides of Nitrogen (Adopted 12/4/81)
Rule 475 Electric Power Generating Equipment (Adopted 8/7/78)
Rule 476 Steam Generating Equipment (Adopted 10/8/76)
Rule 480 Natural Gas Fired Control Devices (Adopted 10/7/77); Addendum to Regulation IV (Effective 1977)
Rule 518 Variance Procedures for Title V Facilities (Adopted 8/11/95)
Rule 518.1 Permit Appeal Procedures for Title V Facilities (Adopted 8/11/95)
Rule 518.2 Federal Alternative Operating Conditions (Adopted 1/12/96)
Rule 701 Air Pollution Emergency Contingency Actions (Adopted 6/13/97)
Rule 702 Definitions (Adopted 7/11/80)
Rule 704 Episode Declaration (Adopted 7/9/82)
Rule 707 Radio—Communication System (Adopted 7/11/80)
Rule 708 Plans (Adopted 7/9/82)
Rule 708.1 Stationary Sources Required to File Plans (Adopted 4/4/80)
Rule 708.2 Content of Stationary Source Curtailment Plans (Adopted 4/4/80)
Rule 708.4 Procedural Requirements for Plans (Adopted 7/11/80)
Rule 709 First Stage Episode Actions (Adopted 7/11/80)
Rule 710 Second Stage Episode Actions (Adopted 7/11/80)
Rule 711 Third Stage Episode Actions (Adopted 7/11/80)
Rule 712 Sulfate Episode Actions (Adopted 7/11/80)
Rule 715 Burning of Fossil Fuel on Episode Days (Adopted 8/24/77)
Regulation IX—New Source Performance Standards (Adopted 1/9/98)
Rule 1106 Marine Coatings Operations (Adopted 1/13/95)
Rule 1107 Coating of Metal Parts and Products (Adopted 3/8/96)
Rule 1109 Emissions of Oxides of Nitrogen for Boilers and Process Heaters in Petroleum Refineries (Adopted 8/5/88)
Rule 1110 Emissions from Stationary Internal Combustion Engines (Demonstration) (Adopted 11/14/97)
Rule 1110.1 Emissions from Stationary Internal Combustion Engines (Adopted 10/4/85)
Rule 1110.2 Emissions from Gaseous- and Liquid-Fueled Internal Combustion Engines (Adopted 11/14/97)
Rule 1113 Architectural Coatings (Adopted 11/8/96)
Rule 1116.1 Lightering Vessel Operations-Sulfur Content of Bunker Fuel (Adopted 10/20/78)
Rule 1121 Control of Nitrogen Oxides from Residential-Type Natural Gas-Fired Water Heaters (Adopted 3/10/95)
Rule 1122 Solvent Degreasers (Adopted 7/11/97)
Rule 1123 Refinery Process Turnarounds (Adopted 12/7/90)
Rule 1129 Aerosol Coatings (rescinded 3/8/96)
Rule 1134 Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Adopted 8/8/97)
Rule 1136 Wood Products Coatings (Adopted 6/14/96)
Rule 1140 Abrasive Blasting (Adopted 8/2/85)
Rule 1142 Marine Tank Vessel Operations (Adopted 7/19/91)
Rule 1146 Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Adopted 5/13/94)
Rule 1146.1 Emission of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Adopted 5/13/94)
Rule 1146.2 Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers (Adopted 1/9/98)

Rule 1148 Thermally Enhanced Oil Recovery Wells (Adopted 11/5/82)
Rule 1149 Storage Tank Degassing (Adopted 7/14/95)
Rule 1168 Adhesive Applications (Adopted 2/13/98)
Rule 1171 Solvent Cleaning Operations (Adopted 9/13/96)
Rule 1173 Fugitive Emissions of Volatile Organic Compounds (Adopted 5/13/94)
Rule 1176 VOC Emissions from Wastewater Systems (Adopted 9/13/96)
Rule 1301 General (Adopted 12/7/95)
Rule 1302 Definitions (Adopted 12/7/95)
Rule 1303 Requirements (Adopted 5/10/96)
Rule 1304 Exemptions (Adopted 6/14/96)
Rule 1306 Emission Calculations (Adopted 6/14/96)
Rule 1313 Permits to Operate (Adopted 12/7/95)
Rule 1403 Asbestos Emissions from Demolition/Renovation Activities (Adopted 4/8/94)
Rule 1605 Credits for the Voluntary Repair of On-Road Vehicles Identified Through Remote Sensing Devices (Adopted 10/11/96)
Rule 1610 Old-Vehicle Scrapping (Adopted 5/9/97)
Rule 1612 Credits for Clean On-Road Vehicles (Adopted 9/8/95)
Rule 1620 Credits for Clean Off-Road Mobile Equipment (Adopted 9/8/95)
Rule 1701 General (Adopted 1/6/89)
Rule 1702 Definitions (Adopted 1/6/89)
Rule 1703 PSD Analysis (Adopted 10/7/88)
Rule 1704 Exemptions (Adopted 1/6/89)
Rule 1706 Emission Calculations (Adopted 1/6/89)
Rule 1713 Source Obligation (Adopted 10/7/88)
Regulation XVII Appendix (effective 1977)
Rule 1901 General Conformity (Adopted 9/9/94)
Rule 2000 General (Adopted 4/11/97)
Rule 2001 Applicability (Adopted 2/14/97)
Rule 2002 Allocations for Oxides of Nitrogen (NO_X) and Oxides of Sulfur (Sox) Emissions (Adopted 2/14/97)
Rule 2004 Requirements (Adopted 7/12/96) except (l)
Rule 2005 New Source Review for RECLAIM (Adopted 2/14/97) except (i)
Rule 2006 Permits (Adopted 12/7/95)
Rule 2007 Trading Requirements (Adopted 12/7/95)
Rule 2008 Mobile Source Credits (Adopted 10/15/93)
Rule 2010 Administrative Remedies and Sanctions (Adopted 10/15/93)
Rule 2011 Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Sulfur (SO_X) Emissions (Adopted 4/11/97)
Appendix A Volume IV—(Protocol for oxides of sulfur) (Adopted 3/10/95)
Rule 2012 Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Nitrogen (NO_X) Emissions (Adopted 4/11/97)
Appendix A Volume V—(Protocol for oxides of nitrogen) (Adopted 3/10/95)
Rule 2015 Backstop Provisions (Adopted 2/14/97) except (B)(1)(G) and (b)(3)(B)
Rule 2100 Registration of Portable Equipment (Adopted 7/11/97)
XXX Title V Permits
Rule 3000 General (Adopted 11/14/97)
Rule 3001 Applicability (Adopted 11/14/97)
Rule 3002 Requirements (Adopted 11/14/97)
Rule 3003 Applications (Adopted 11/14/97)
Rule 3004 Permit Types and Content (Adopted 11/14/97)
Rule 3005 Permit Revisions (Adopted 11/14/97)
Rule 3006 Public Participation (Adopted 11/14/97)
Rule 3007 Effect of Permit (Adopted 10/8/93)
XXXI Acid Rain Permit Program (Adopted 2/10/95)

(8) *The following requirements are contained in Ventura County Air Pollution Control District Requirements Applicable to OCS Sources*, February 2000:

Rule 2 Definitions (Adopted 11/10/98)
Rule 5 Effective Date (Adopted 5/23/72)
Rule 6 Severability (Adopted 11/21/78)
Rule 7 Zone Boundaries (Adopted 6/14/77)
Rule 10 Permits Required (Adopted 6/13/95)
Rule 11 Definition for Regulation II (Adopted 6/13/95)
Rule 12 Application for Permits (Adopted 6/13/95)
Rule 13 Action on Applications for an Authority to Construct (Adopted 6/13/95)
Rule 14 Action on Applications for a Permit to Operate (Adopted 6/13/95)
Rule 15.1 Sampling and Testing Facilities (Adopted 10/12/93)
Rule 16 BACT Certification (Adopted 6/13/95)
Rule 19 Posting of Permits (Adopted 5/23/72)
Rule 20 Transfer of Permit (Adopted 5/23/72)
Rule 23 Exemptions from Permits (Adopted 7/9/96)
Rule 24 Source Recordkeeping, Reporting, and Emission Statements (Adopted 9/15/92)
Rule 26 New Source Review (Adopted 10/22/91)
Rule 26.1 New Source Review—Definitions (Adopted 1/13/98)
Rule 26.2 New Source Review—Requirements (Adopted 1/13/98)
Rule 26.3 New Source Review—Exemptions (Adopted 1/13/98)
Rule 26.6 New Source Review—Calculations (Adopted 1/13/98)
Rule 26.8 New Source Review—Permit To Operate (Adopted 10/22/91)
Rule 26.10 New Source Review—PSD (Adopted 1/13/98)
Rule 28 Revocation of Permits (Adopted 7/18/72)
Rule 29 Conditions on Permits (Adopted 10/22/91)
Rule 30 Permit Renewal (Adopted 5/30/89)

Rule 32 Breakdown Conditions: Emergency Variances, A., B.1., and D. only. (Adopted 2/20/79)
Rule 33 Part 70 Permits—General (Adopted 10/12/93)
Rule 33.1 Part 70 Permits—Definitions (Adopted 10/12/93)
Rule 33.2 Part 70 Permits—Application Contents (Adopted 10/12/93)
Rule 33.3 Part 70 Permits—Permit Content (Adopted 10/12/93)
Rule 33.4 Part 70 Permits—Operational Flexibility (Adopted 10/12/93)
Rule 33.5 Part 70 Permits—Time frames for Applications, Review and Issuance (Adopted 10/12/93)
Rule 33.6 Part 70 Permits—Permit Term and Permit Reissuance (Adopted 10/12/93)
Rule 33.7 Part 70 Permits—Notification (Adopted 10/12/93)
Rule 33.8 Part 70 Permits—Reopening of Permits (Adopted 10/12/93)
Rule 33.9 Part 70 Permits—Compliance Provisions (Adopted 10/12/93)
Rule 33.10 Part 70 Permits—General Part 70 Permits (Adopted 10/12/93)
Rule 34 Acid Deposition Control (Adopted 3/14/95)
Rule 35 Elective Emission Limits (Adopted 11/12/96)
Rule 36 New Source Review—Hazardous Air Pollutants (Adopted 10/6/98)
Rule 42 Permit Fees (Adopted 6/22/99)
Rule 44 Exemption Evaluation Fee (Adopted 9/10/96)
Rule 45 Plan Fees (Adopted 6/19/90)
Rule 45.2 Asbestos Removal Fees (Adopted 8/4/92)
Rule 47 Source Test, Emission Monitor, and Call-Back Fees (Adopted 6/22/99)
Rule 50 Opacity (Adopted 2/20/79)
Rule 52 Particulate Matter-Concentration (Adopted 5/23/72)
Rule 53 Particulate Matter-Process Weight (Adopted 7/18/72)
Rule 54 Sulfur Compounds (Adopted 6/14/94)
Rule 56 Open Fires (Adopted 3/29/94)
Rule 57 Combustion Contaminants—Specific (Adopted 6/14/77)
Rule 60 New Non-Mobile Equipment-Sulfur Dioxide, Nitrogen Oxides, and Particulate Matter (Adopted 7/8/72)
Rule 62.7 Asbestos—Demolition and Renovation (Adopted 6/16/92)
Rule 63 Separation and Combination of Emissions (Adopted 11/21/78)
Rule 64 Sulfur Content of Fuels (Adopted 4/13/99)
Rule 67 Vacuum Producing Devices (Adopted 7/5/83)
Rule 68 Carbon Monoxide (Adopted 6/14/77)
Rule 71 Crude Oil and Reactive Organic Compound Liquids (Adopted 12/13/94)
Rule 71.1 Crude Oil Production and Separation (Adopted 6/16/92)
Rule 71.2 Storage of Reactive Organic Compound Liquids (Adopted 9/26/89)
Rule 71.3 Transfer of Reactive Organic Compound Liquids (Adopted 6/16/92)
Rule 71.4 Petroleum Sumps, Pits, Ponds, and Well Cellars (Adopted 6/8/93)
Rule 71.5 Glycol Dehydrators (Adopted 12/13/94)
Rule 72 New Source Performance Standards (NSPS) (Adopted 9/10/96)
Rule 74 Specific Source Standards (Adopted 7/6/76)
Rule 74.1 Abrasive Blasting (Adopted 11/12/91)
Rule 74.2 Architectural Coatings (Adopted 08/11/92)
Rule 74.6 Surface Cleaning and Degreasing (Adopted 11/10/98)
Rule 74.6.1 Cold Cleaning Operations (Adopted 7/9/96)
Rule 74.6.2 Batch Loaded Vapor Degreasing Operations (Adopted 7/9/96)
Rule 74.7 Fugitive Emissions of Reactive Organic Compounds at Petroleum Refineries and Chemical Plants (Adopted 10/10/95)
Rule 74.8 Refinery Vacuum Producing Systems, Waste-water Separators and Process Turnarounds (Adopted 7/5/83)
Rule 74.9 Stationary Internal Combustion Engines (Adopted 12/21/93)
Rule 74.10 Components at Crude Oil Production Facilities and Natural Gas Production and Processing Facilities (Adopted 3/10/98)
Rule 74.11 Natural Gas-Fired Residential Water Heaters-Control of NO_X (Adopted 4/9/85)
Rule 74.11.1 Large Water Heaters and Small Boilers (Adopted 9/14/99)
Rule 74.12 Surface Coating of Metal Parts and Products (Adopted 9/10/96)
Rule 74.15 Boilers, Steam Generators and Process Heaters (5MM BTUs and greater) (Adopted 11/8/94)
Rule 74.15.1 Boilers, Steam Generators and Process Heaters (1–5MM BTUs) (Adopted 6/13/95)
Rule 74.16 Oil Field Drilling Operations (Adopted 1/8/91)
Rule 74.20 Adhesives and Sealants (Adopted 1/14/97)
Rule 74.23 Stationary Gas Turbines (Adopted 10/10/95)
Rule 74.24 Marine Coating Operations (Adopted 9/10/96)
Rule 74.24.1 Pleasure Craft Coating and Commercial Boatyard Operations (Adopted 11/10/98)
Rule 74.26 Crude Oil Storage Tank Degassing Operations (Adopted 11/8/94)
Rule 74.27 Gasoline and ROC Liquid Storage Tank Degassing Operations (Adopted 11/8/94)
Rule 74.28 Asphalt Roofing Operations (Adopted 5/10/94)
Rule 74.30 Wood Products Coatings (Adopted 9/10/96)
Rule 75 Circumvention (Adopted 11/27/78)

Rule 76 Federally Enforceable Limits on Potential to Emit (Adopted 10/10/95)
Rule 100 Analytical Methods (Adopted 7/18/72)
Rule 101 Sampling and Testing Facilities (Adopted 5/23/72)
Rule 102 Source Tests (Adopted 11/21/78)
Rule 103 Continuous Monitoring Systems (Adopted 2/9/99)
Rule 154 Stage 1 Episode Actions (Adopted 9/17/91)
Rule 155 Stage 2 Episode Actions (Adopted 9/17/91)
Rule 156 Stage 3 Episode Actions (Adopted 9/17/91)
Rule 158 Source Abatement Plans (Adopted 9/17/91)
Rule 159 Traffic Abatement Procedures (Adopted 9/17/91)
Rule 220 General Conformity (Adopted 5/9/95)

FLORIDA

(1) The following requirements are contained in *State of Florida Requirements Applicable to OCS Sources*, January 11, 1995:

Florida Administrative Code-Department of Environmental Protection. The following sections of Chapter 62:
4.001 Scope of Part I (Adopted 8/31/88)
4.020 Definitions (Adopted 7/11/93)
4.021 Transferability of Definitions (Adopted 8/31/88)
4.030 General Prohibitions (Adopted 8/31/88)
4.040 Exemptions (Adopted 8/31/88)
4.050 Procedure to Obtain Permit; Application, except (4)(b) through (4)(l) and 4(r) (Adopted 11/23/94)
4.070 Standards for Issuing or Denying Permits; Issuance; Denial (Adopted 3/28/91)
4.080 Modification of Permit Conditions (Adopted 3/19/90)
4.090 Renewals (Adopted 7/11/93)
4.100 Suspension and Revocation (Adopted 8/31/88)
4.110 Financial Responsibility (Adopted 8/31/88)
4.120 Transfer of Permits (Adopted 3/19/90)
4.130 Plant Operation—Problems (Adopted 8/31/88)
4.160 Permit Conditions, except (16) and (17) (Adopted 7/11/93)
4.200 Scope of Part II (Adopted 8/31/88)
4.210 Construction Permits (Adopted 8/31/88)
4.220 Operation Permits for New Sources (Adopted 8/31/88)
4.510 Scope of Part III (Adopted 8/31/88)
4.520 Definitions (Adopted 7/11/90)
4.530 Procedures (Adopted 3/19/90)
4.540 General Conditions for all General Permits (Adopted 8/31/88)
210.100 Purpose and Scope (Adopted 11/23/94)
210.200 Definitions (Adopted 11/23/94)
210.300 Permits Required (Adopted 11/23/94)
210.360 Administrative Permit Corrections (Adopted 11/23/94)
210.370 Reports (Adopted 11/23/94)
210.400 Emission Estimates (Adopted 11/23/94)
210.500 Air Quality Models (Adopted 11/23/94)
210.550 Stack Height Policy (Adopted 11/23/94)
210.600 Enhanced Monitoring (Adopted 11/23/94)
210.650 Circumvention (Adopted 9/25/92)
210.700 Excess Emissions (Adopted 11/23/94)
210.900 Forms (Adopted 11/23/94)
210.980 Severability (Adopted 9/25/92)
212.100 Purpose and Scope (Adopted 2/2/93)
212.200 Definitions (Adopted 2/2/93)
212.300 Sources Not Subject to Prevention of Significant Deterioration or Nonattainment Requirements (Adopted 9/25/92)
212.400 Prevention of Significant Deterioration (Adopted 2/2/93)
212.410 Best Available Control Technology (BACT) (Adopted 9/25/92)
212.500 New Source Review for Nonattainment Areas (Adopted 2/2/93)
212.510 Lowest Achievable Emission Rate (LAER) (Adopted 9/25/92)
212.600 Source Specific New Source Review Requirements (Adopted 9/25/92)
212.700 Source Reclassification (Adopted 9/25/92)
256.100 Declaration and Intent (Adopted 11/30/94)
256.200 Definitions (Adopted 11/30/94)
256.300 Prohibitions (Adopted 11/30/94)
256.450 Open Burning Allowed (Adopted 6/27/91)
256.600 Industrial, Commercial, Municipal and Research Open Burning (Adopted 8/26/87)
256.700 Open Burning Allowed (Adopted 11/30/94)
272.100 Purpose and Scope (Adopted 11/23/94)
272.200 Definitions (Adopted 11/23/94)
272.300 Ambient Air Quality Standards (Adopted 11/23/94)
272.500 Maximum Allowable Increases (Prevention of Significant Deterioration) (Adopted 11/23/94)
272.750 DER Ambient Test Methods (Adopted 9/25/92)
273.200 Definitions (Adopted 9/25/92)
273.300 Air Pollution Episodes (Adopted 9/25/92)
273.400 Air Alert (Adopted 9/25/92)
273.500 Air Warning (Adopted 9/25/92)
273.600 Air Emergency (Adopted 9/25/92)
296.100 Purpose and Scope (Adopted 11/23/94)
296.200 Definitions (Adopted 11/23/94)
296.310 General Particulate Emission Limiting Standards (Adopted 11/23/94)
296.320 General Pollutant Emission Limiting Standards, except (2) (Adopted 2/2/93)
296.330 Best Available Control Technology (BACT) (Adopted 11/23/94)
296.400 Specific Emission Limiting and Performance Standards (Adopted 11/23/94)
296.500 Reasonably Available Control Technology (RACT)—Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_X) Emitting Facilities (Adopted 11/23/94)

296.570 Reasonably Available Control Technology (RACT)—Requirements for Major VOC- and NO_X-Emitting Facilities (Adopted 11/23/94)
296.600 Reasonably Available Control Technology (RACT)—Lead (Adopted 8/8/94)
296.601 Lead Processing Operations in General (Adopted 8/8/94)
296.700 Reasonably Available Control Technology (RACT)—Particulate Matter, except (2)(f) (Adopted 11/23/94)
296.800 Standards of Performance for New Stationary Sources (NSPS) (Adopted 11/23/94)
296.810 National Emission Standards for Hazardous Air Pollutants (NESHAP)—Part 61 (Adopted 11/23/94)
296.820 National Emission Standards for Hazardous Air Pollutants (NESHAP)—Part 63 (Adopted 11/23/94)
297.100 Purpose and Scope (Adopted 11/23/94)
297.200 Definitions (Adopted 11/23/94)
297.310 General Test Requirements (Adopted 11/23/94)
297.330 Applicable Test Procedures (Adopted 11/23/94)
297.340 Frequency of Compliance Tests (Adopted 11/23/94)
297.345 Stack Sampling Facilities Provided by the Owner of an Air Pollution Point Source (Adopted 11/23/94)
297.350 Determination of Process Variables (Adopted 11/23/94)
297.400 EPA Methods Adopted by Reference (Adopted 11/23/94)
297.401 EPA Test Procedures (Adopted 11/23/94)
297.411 DER Method 1 (Adopted 11/23/94)
297.412 DER Method 2 (Adopted 12/2/92)
297.413 DER Method 3 (Adopted 12/2/92)
297.414 DER Method 4 (Adopted 12/2/92)
297.415 DER Method 5 (Adopted 11/23/94)
297.416 DER Method 5A (Adopted 12/2/92)
297.417 DER Method 6 (Adopted 11/23/94)
297.418 DER Method 7 (Adopted 12/2/92)
297.419 DER Method 8 (Adopted 12/2/92)
297.420 DER Method 9 (Adopted 11/23/94)
297.421 DER Method 10 (Adopted 12/2/92)
297.422 DER Method 11 (Adopted 12/2/92)
297.423 DER Method 12—Determination of Inorganic Lead Emissions from Stationary Sources (Adopted 11/23/94)
297.424 DER Method 13 (Adopted 12/2/92)
297.440 Supplementary Test Procedures (Adopted 11/23/94)
297.450 EPA VOC Capture Efficiency Test Procedures (Adopted 11/23/94)
297.520 EPA Performance Specifications (Adopted 11/23/94)
297.570 Test Report (Adopted 11/23/94)
297.620 Exceptions and Approval of Alternate Procedures and Requirements (Adopted 11/23/94)

(b) Local requirements.
(1) [Reserved]

NORTH CAROLINA

(a) State requirements.
(1) The following requirements are contained in *State of North Carolina Air Pollution Control Requirements Applicable to OCS Sources,* August 21, 1992: The following sections of Subchapters 2D and 2H:

2D.0101 Definitions (Adopted 12/1/89)
2D.0104 Adoption by Reference Updates (Adopted 10/1/89)
2D.0201 Classification of Air Pollution Sources (Adopted 7/1/84)
2D.0202 Registration of Air Pollution Sources (Adopted 6/1/85)
2D.0303 Emission Reduction Plans (Adopted 7/1/84)
2D.0304 Preplanned Abatement Program (Adopted 7/1/88)
2D.0305 Emission Reduction Plan; Alert Level (Adopted 7/1/84)
2D.0306 Emission Reduction Plan; Warning Level (Adopted 7/1/84)
2D.0307 Emission Reduction Plan; Emergency Level (Adopted 7/1/84)
2D.0401 Purpose (Adopted 10/1/89)
2D.0501 Compliance with Emission Control Standards (Adopted 10/1/89)
2D.0502 Purpose (Adopted 6/1/85)
2D.0503 Particulates from Fuel Burning Indirect Heat Exchanger (Adopted 6/1/85)
2D.0505 Control of Particulate from Incinerators (Adopted 7/1/87)
2D.0510 Particulates: Sand, Gravel and Crushed Stone Operations (Adopted 1/1/85)
2D.0511 Particulates, SO_2 from Lightweight Aggregate Processes (Adopted 10/1/89)
2D.0515 Particulates from Miscellaneous Industrial Processes (Adopted 1/1/85)
2D.0516 Sulfur Dioxide Emissions Combustion Sources (Adopted 10/1/89)
2D.0518 Miscellaneous Volatile Organic Compound Emissions (Adopted 2/1/83)
2D.0519 Control of Nitrogen Dioxide Emissions (Adopted 10/1/89)
2D.0520 Control and Prohibition of Open Burning (Adopted 1/1/85)
2D.0521 Control of Visible Emissions (Adopted 8/1/87)
2D.0530 Prevention of Significant Deterioration (Adopted 10/1/89)
2D.0531 Sources in Nonattainment Area (Adopted 12/1/89)
2D.0532 Sources Contributing to an Ambient Violation (Adopted 10/1/89)
2D.0533 Stack Height (Adopted 7/1/87)
2D.0535 Excess Emissions Reporting and Malfunctions, (a) and (f) only. (Adopted 5/1/90)
2D.0537 Control of Mercury Emissions (Adopted 6/1/85)
2D.0601 Purpose and Scope (Adopted 7/1/84)
2D.0602 Definitions (Adopted 7/1/84)
2D.0604 Sources Covered by Implementation Plan Requirements (Adopted 7/1/88)
2D.0606 Other Coal or Residual Oil Burners (Adopted 5/1/85)

2D.0607 Exceptions to Monitoring and Reporting (Adopted 7/1/84)
2D.0901 Definitions (Adopted 12/1/89)
2D.0902 Applicability (Adopted 5/1/90)
2D.0903 Recordkeeping, Reporting, Monitoring (Adopted 12/1/89)
2D.0906 Circumvention (Adopted 1/1/85)
2D.0912 General Provisions on Test Methods and Procedures (Adopted 12/1/89)
2D.0914 Determination of VOC Emission Control System Efficiency (Adopted 1/1/85)
2D.0925 Petroleum Liquid Storage (Adopted 12/1/89)
2D.0933 Petroleum Liquid Storage in External Floating Roof Tanks (Adopted 12/1/89)
2D.0939 Determination of Volatile Organic Compound Vapor Emissions (Adopted 7/1/88)
2D.1101 Purpose (Adopted 5/1/90)
2D.1102 Applicability (Adopted 5/1/90)
2D.1103 Definition (Adopted 5/1/90)
2D.1104 Toxic Air Pollutant Guidelines (Adopted 5/1/90)
2D.1105 Facility Reporting, Recordkeeping (Adopted 5/1/90)
2D.1106 Determination of Ambient Air Concentrations (Adopted 5/1/90)
2D.1107 Multiple Facilities (Adopted 5/1/90)
2D.1108 Multiple Pollutants (Adopted 5/1/90)
2H.0601 Purpose and Scope (Adopted 10/1/89)
2H.0602 Definitions (Adopted 5/1/90)
2H.0603 Applications (Adopted 12/1/89)
2H.0609 Permit Fees (Adopted 8/1/88)
2H.0610 Permit Requirements for Toxic Air Pollutants (Adopted 5/1/90)

(b) Local requirements.

(1) [Reserved]

[57 FR 40806, Sept. 4, 1992, as amended at 58 FR 16626, Mar. 30, 1993; 58 FR 59173, Nov. 8, 1993; 59 FR 17271, Apr. 12, 1994; 59 FR 50846, Oct. 6, 1994; 60 FR 47293, Sept. 12, 1995; 60 FR 55328, Oct. 31, 1995; 61 FR 28758, June 6, 1996; 62 FR 41871, Aug.4, 1997; 65 FR 15870, Mar. 24, 2000; 66 FR 12984, Mar. 1, 2001]

PART 56—REGIONAL CONSISTENCY

Sec.
56.1 Definitions.
56.2 Scope.
56.3 Policy.
56.4 Mechanisms for fairness and uniformity—Responsibilities of Headquarters employees.
56.5 Mechanisms for fairness and uniformity—Responsibilities of Regional Office employees.
56.6 Dissemination of policy and guidance.
56.7 State agency performance audits.

AUTHORITY: Sec. 301(a)(2) of the Clean Air Act as amended (42 U.S.C. 7601).

SOURCE: 45 FR 85405, Dec. 24, 1980, unless otherwise noted.

§56.1 Definitions.

As used in this part, all terms not defined herein have the meaning given them in the Clean Air Act.

Act means the Clean Air Act as amended (42 U.S.C. 7401 *et seq.*).

Administrator, *Deputy Administrator*, *Assistant Administrator*, *General Counsel*, *Associate General Counsel*, *Deputy Assistant Administrator*, *Regional Administrator*, *Headquarters*, *Staff Office*, *Operational Office*, and *Regional Office* are described in part 1 of this title.

Mechanism means an administrative procedure, guideline, manual, or written statement.

Program directive means any formal written statement by the Administrator, the Deputy Administrator, the Assistant Administrator, a Staff Office Director, the General Counsel, a Deputy Assistant Administrator, an Associate General Counsel, or a division Director of an Operational Office that is intended to guide or direct Regional Offices in the implementation or enforcement of the provisions of the act.

Responsible official means the EPA Administrator or any EPA employee who is accountable to the Administrator for carrying out a power or duty delegated under section 301(a)(1) of the act, or is accountable in accordance with EPA's formal organization for a particular program or function as described in part 1 of this title.

§56.2 Scope.

This part covers actions taken by:

(a) Employees in EPA Regional Offices, including Regional Administrators, in carrying out powers and duties delegated by the Administrator under section 301(a)(1) of the act; and

(b) EPA employees in Headquarters to the extent that they are responsible for developing the procedures to be employed or policies to be followed by Regional Offices in implementing and enforcing the act.

§56.3 Policy.

It is EPA's policy to:

(a) Assure fair and uniform application by all Regional Offices of the criteria, procedures, and policies employed in implementing and enforcing the act;

(b) Provide mechanisms for identifying and correcting inconsistencies by standardizing criteria, procedures, and policies being employed by Regional Office employees in implementing and enforcing the act; and

(c) Insure an adequate quality audit for each State's performance in implementing and enforcing the act.

§ 56.4 Mechanisms for fairness and uniformity—Responsibilities of Headquarters employees.

(a) The Administrator shall include, as necessary, with any rule or regulation proposed or promulgated under parts 51 and 58 of this chapter[1] mechanisms to assure that the rule or regulation is implemented and enforced fairly and uniformly by the Regional Offices.

(b) The determination that a mechanism required under paragraph (a) of this section is unnecessary for a rule or regulation shall be explained in writing by the responsible EPA official and included in the supporting documentation or the relevant docket.

§ 56.5 Mechanisms for fairness and uniformity—Responsibilities of Regional Office employees.

(a) Each responsible official in a Regional Office, including the Regional Administrator, shall assure that actions taken under the act:

(1) Are carried out fairly and in a manner that is consistent with the Act and Agency policy as set forth in the Agency rules and program directives,

(2) Are as consistent as reasonably possible with the activities of other Regional Offices, and

(3) Comply with the mechanisms developed under § 56.4 of this part.

(b) A responsible official in a Regional Office shall seek concurrence from the appropriate EPA Headquarters office on any interpretation of the Act, or rule, regulation, or program directive when such interpretation may result in inconsistent application among the Regional Offices of the act or rule, regulation, or program directive.

(c) In reviewing State Implementation Plans, the Regional Office shall follow the provisions of the guideline, revisions to State Implementation Plans—Procedures for Approval/Disapproval Actions, OAQPS No. 1.2–005A, or revision thereof. Where regulatory actions may involve inconsistent application of the requirements of the act, the Regional Offices shall classify such actions as special actions.

§ 56.6 Dissemination of policy and guidance.

The Assistant Administrators of the Offices of Air, Noise and Radiation, and of Enforcement, and the General Counsel shall establish as expeditiously as practicable, but no later than one year after promulgation of this part, systems to disseminate policy and guidance. They shall distribute material under foregoing systems to the Regional Offices and State and local agencies, and shall make the material available to the public. Air programs policy and guideline systems shall contain the following:

(a) Compilations of relevant EPA program directives and guidance, except for rules and regulations, concerning the requirements under the Act.

(b) Procedures whereby each Headquarters program office and staff office will enter new and revised guidance into the compilations and cause superseded guidance to be removed.

(c) Additional guidance aids such as videotape presentations, workshops, manuals, or combinations of these where the responsible Headquarters official determines they are necessary to inform Regional Offices, State and local agencies, or the public about EPA actions.

§ 56.7 State agency performance audits.

(a) EPA will utilize the provisions of subpart B, Program Grants, of part 35 of this chapter, which require yearly evaluations of the manner in which grantees use Federal monies, to assure that an adequate evaluation of each State's performance in implementing and enforcing the act is performed.

(b) Within 60 days after comment is due from each State grantee on the

[1] Part 51 is entitled, ''Requirements for Preparation, Adoption, and Submittal of Implementation Plans.'' Part 58 is entitled, ''Ambient Air Quality Surveillance.''

evaluation report required by §35.538 of this chapter, the Regional Administrator shall incorporate or include any comments, as appropriate, and publish notice of availability of the evaluation report in the FEDERAL REGISTER.

PART 57—PRIMARY NONFERROUS SMELTER ORDERS

Subpart A—General

Sec.
57.101 Purpose and scope.
57.102 Eligibility.
57.103 Definitions.
57.104 Amendment of the NSO.
57.105 Submittal of required plans, proposals, and reports.
57.106 Expiration date.
57.107 The State or local agency's transmittal to EPA.
57.108 Comparable existing SIP provisions.
57.109 Maintenance of pay.
57.110 Reimbursement of State or local agency.
57.111 Severability of provisions.

Subpart B—The Application and the NSO Process

57.201 Where to apply.
57.202 How to apply.
57.203 Contents of the application.
57.204 EPA action on second period NSOs which have already been issued.
57.205 Submission of supplementary information upon relaxation of an SO_2 SIP emission limitation.

Subpart C—Constant Controls and Related Requirements

57.301 General requirements.
57.302 Performance level of interim constant controls.
57.303 Total plantwide emission limitation.
57.304 Bypass, excess emissions and malfunctions.
57.305 Compliance monitoring and reporting.

Subpart D—Supplementary Control System Requirements

57.401 General requirements.
57.402 Elements of the supplementary control system.
57.403 Written consent.
57.404 Measurements, records, and reports.
57.405 Formulation, approval, and implementation of requirements.

Subpart E—Fugitive Emission Evaluation and Control

57.501 General requirements.
57.502 Evaluation.
57.503 Control measures.
57.504 Continuing evaluation of fugitive emission control measures.
57.505 Amendments of the NSO.

Subpart F—Research and Development Requirements

57.601 General requirements.
57.602 Approval of proposal.
57.603 Criteria for approval.
57.604 Evaluation of projects.
57.605 Consent.
57.606 Confidentiality.

Subpart G—Compliance Schedule Requirements

57.701 General requirements.
57.702 Compliance with constant control emission limitation.
57.703 Compliance with the supplementary control system requirements.
57.704 Compliance with fugitive emission evaluation and control requirements.
57.705 Contents of SIP Compliance Schedule required by §57.201(d) (2) and (3).

Subpart H—Waiver of Interim Requirement for Use of Continuous Emission Reduction Technology

57.801 Purpose and scope.
57.802 Request for waiver.
57.803 Issuance of tentative determination; notice.
57.804 Request for hearing; request to participate in hearing.
57.805 Submission of written comments on tentative determination.
57.806 Presiding Officer.
57.807 Hearing.
57.808 Opportunity for cross-examination.
57.809 *Ex parte* communications.
57.810 Filing of briefs, proposed findings, and proposed recommendations.
57.811 Recommended decision.
57.812 Appeal from or review of recommended decision.
57.813 Final decision.
57.814 Administrative record.
57.815 State notification.
57.816 Effect of negative recommendation.
APPENDIX A TO PART 57—PRIMARY NONFERROUS SMELTER ORDER (NSO) APPLICATION

AUTHORITY: Secs. 110, 114, 119, 301, Clean Air Act, as amended (42 U.S.C. 7410, 7414, 7419, and 7601); sec. 406 of Pub. L. 95–95.

SOURCE: 50 FR 6448, Feb. 15, 1985, unless otherwise noted.

Subpart A—General

§ 57.101 Purpose and scope.

(a) *Applicability of the regulations.* The regulations in subparts A through H govern:

(1) The eligibility of smelters for a Primary Nonferrous Smelter Order (NSO) under section 119 of the Clean Air Act;

(2) The procedures through which an NSO can be approved or issued by EPA; and

(3) The minimum contents of each NSO required for EPA issuance or approval under section 119. Subpart I *et seq.*, will contain NSOs in effect for individual smelters.

(b) *State authority to adopt more stringent requrements.* Nothing in this part shall preclude a State from imposing more stringent requirements, as provided by section 116 of the Clean Air Act.

§ 57.102 Eligibility.

(a) A primary copper, lead, zinc, molybdenum, or other nonferrous smelter is eligible for an NSO if it meets the following conditions:

(1) The smelter was in existence and operating on August 7, 1977;

(2) The smelter is subject to an approved or promulgated sulfur dioxide (SO_2) State Implementation Plan (SIP) emission limitation which is adequate to ensure that National Ambient Air Quality Standards (NAAQS) for SO_2 are achieved without the use of any unauthorized dispersion techniques; and

(3) The Administrator determines, based on a showing by the smelter owner, that no means of emission limitation applicable to the smelter which would enable it to comply with its SIP stack emission limitation for SO_2 has been adequately demonstrated to be reasonably available (taking into account the cost of compliance, nonair quality health and environmental impact, and energy considerations) in accordance with § 57.201(d)(1).

(b) For the purposes of these regulations:

(1) The following means of emission limitation shall be considered adequately demonstrated for nonferrous smelters. (Taking into account nonair quality health and environmental impact and energy considerations, but not the cost of compliance).

(i) *Retrofit control technologies.*

(A) Sulfuric acid plant in conjunction with an adequately demonstrated replacement technology or process modification;

(B) Magnesium oxide (concentration) scrubbing;

(C) Lime/limestone scrubbing; and

(D) Ammonia scrubbing.

(ii) *Replacement or process modifications.*

(A) Flash smelting;

(B) Oxygen enrichment;

(C) Supplemental sulfur burning in conjunction with acid plant;

(D) Electric Furnace;

(E) Noranda process;

(F) Fluid bed roaster;

(G) Continuous smelting (Mitsubishi) process; and

(H) Strong stream/weak stream gas blending.

(2) Each adequately demonstrated means of emission limitation which would enable a smelter to comply with its SIP emission limitation for SO_2 shall be considered applicable to the smelter unless the smelter operator demonstrates that the use of a particular system at that smelter is technically unreasonable, for reasons specific to that site.

(3) An applicable means of emission limitation which would enable a smelter to comply with its SIP emission limitation for SO_2 shall be considered adequately demonstrated to be reasonably available to the smelter (taking into account the cost of compliance) if the information submitted under §§ 57.107(a) and 57.203(b) (plus any necessary supplemental information) shows, according to the criteria, procedures, and tests contained in appendix A to this part and in accordance with § 57.201(d)(1), that both of the following two tests are met.

(i) *The rate of return test.* The present value of the smelter's future net cash flow (during and after investment in constant control technology) is more than book value of the smelter's net investment in constant dollars.

(ii) *The profit protection test.* The constant control technology expenditure

reduces the present value of the smelter's forecast pretax profits by less than 50%.

(c) When applying for an NSO, a smelter must establish, for purposes of applying the financial eligibility tests, which adequately demonstrated constant control technology applicable to that smelter is the most economically feasible for use at that smelter.

[50 FR 6448, Feb. 15, 1985, as amended at 51 FR 10211, Mar. 25, 1986]

§ 57.103 Definitions.

(a) *The Act* means the Clean Air Act, as amended.

(b) *Active use* refers to an SO_2 constant control system installed at a smelter before August 7, 1977 and not totally removed from regular service by that date.

(c) *Adequate SO_2* emission limitation means a SIP emission limitation which was approved or promulgated by EPA as adequate to attain and maintain the NAAQS in the areas affected by the stack emissions without the use of any unauthorized dispersion technique.

(d) *Administrative Law Judge* means an administrative law judge appointed under 5 U.S.C. 3105 (see also 5 CFR part 930, as amended by 37 FR 16787), and is synonymous with the term ''Hearing Examiner'' as formerly used in Title 5 of the U.S. Code.

(e) *The Administrator* means the Administrator of the U.S. Environmental Protection Agency, or the Administrator's authorized representative.

(f) *Ambient air* shall have the meaning given by 40 CFR 50.1(e), as that definition appears upon promulgation of this subpart, or as hereafter amended.

(g) *Ambient air quality* refers only to concentrations of sulfur dioxide in the ambient air, unless otherwise specified.

(h) *An approved measure* refers to one contained in an NSO which is in effect.

(i) *Assistant Administrator for Air and Radiation* means the Assistant Administrator for Air and Radiation of the U.S. Environmental Protection Agency.

(j) *Constant controls, control technology, and continuous emission reduction technology* mean systems which limit the quantity, rate, or concentration, excluding the use of dilution, and emissions of air pollutants on a continuous basis.

(k) *Effective date of an NSO* means the effective date listed in the FEDERAL REGISTER publication of EPA's issuance or approval of an NSO.

(l) *EPA and the Agency* means the Administrator of the U.S. Environmental Protection Agency, or the Administrator's authorized representative.

(m) *Fugitive emissions* means any air pollutants emitted to the atmosphere other than from a stack.

(n) *Issuance* of an NSO means the final transmittal of the NSO pursuant to § 57.107(a) by an issuing agency (other than EPA) to EPA for approval, or the publication of an NSO issued by EPA in the FEDERAL REGISTER.

(o) *Issuing agency*, unless otherwise specifically indicated, means the State or local air pollution control agency to which a smelter's owner has applied for an NSO, or which has issued the NSO, or EPA, when the NSO application has been made to EPA. Any showings or demonstrations required to be made under this part to the issuing agency, when not EPA, are subject to independent determinations by EPA.

(p) *Malfunction* means any unanticipated and unavoidable failure of air pollution control equipment or process equipment or of a process to operate in a normal or usual manner. Failures that are caused entirely or in part by poor design, poor maintenance, careless operation, or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions. A malfunction exists only for the minimum time necessary to implement corrective measures.

(q) *Maximum production capacity* means either the maximum demonstrated rate at which a smelter has produced its principal metallic final product under the process equipment configuration and operating procedures prevailing on or before August 7, 1977, or a rate which the smelter is able to demonstrate by calculation is attainable with process equipment existing on August 7, 1977. The rate may be expressed as a concentrate feed rate to the smelter.

(r) *NAAQS and National Ambient Air Quality Standards*, unless otherwise

specified, refer only to the National Primary and Secondary Ambient Air Quality Standards for sulfur dioxide.

(s) *Scheduled maintenance* means any periodic procedure, necessary to maintain the integrity or reliability of emissions control performance, which can be anticipated and scheduled in advance. In sulfuric acid plants, it includes among other items the screening or replacement of catalyst, the retubing of heat exchangers, and the routine repair and cleaning of gas handling/cleaning equipment.

(t) *Smelter owner and operator* means the owner or operator of the smelter, without distinction.

(u) *Supplementary control system* (SCS) means any technique for limiting the concentration of a pollutant in the ambient air by varying the emissions of that pollutant according to atmospheric conditions. For the purposes of this part, the term supplementary control system does not include any dispersion technique based solely on the use of a stack the height of which exceeds good engineering practice (as determined under regulations implementing section 123 of the Act).

(v) *Unauthorized dispersion technique* refers to any dispersion technique which, under section 123 of the Act and the regulations promulgated pursuant to that section, may not be used to reduce the degree of emission limitation otherwise required in the applicable SIP.

(w) Unless otherwise specified in this part, all terms shall have the same meaning given them by the Act.

[50 FR 6448, Feb. 15, 1985, as amended at 57 FR 5328, Feb. 13, 1992]

§ 57.104 Amendment of the NSO.

An NSO shall be amended whenever necessary for compliance with the requirements and purposes of this part.

(a)(1) *Issuance of amendment.* A State or local issuing agency may issue an amendment of any NSO it has issued. Any amendment issued by a State or local issuing agency shall be subject to approval by EPA to the same extent as was the original NSO. Any smelter owner may apply to the agency which originally issued its NSO for an amendment of the NSO at any time. Such an application shall be accompanied by whatever documentation is required by that agency (or EPA) to support the requested amendment.

(2)(i) Notwithstanding the requirements of paragraph (a)(1) of this section, amendments to SIP compliance schedule interim compliance dates in State-issued NSO's need not be submitted for EPA approval if the amendment does not delay the interim date by more than three months from the date as approved by the Administrator and if the final compliance date is unchanged. Delays longer than 3 months shall be handled according to the provisions of § 57.104(a)(1).

(ii) Changes made in accordance with this subparagraph may be effective immediately but must be submitted to EPA within seven days. EPA will give public notice of receipt of such changes by publication of a Notice in the FEDERAL REGISTER.

(3) In any case in which the issuing agency fails to issue an amendment necessary for compliance with the requirements and purposes of this part, EPA may, after first giving the issuing Agency notice, issue such amendment.

(b) *Revision of SCS Manual.* Operation in accordance with the revised provisions of an SCS operational manual (see § 57.402(e)) shall not be considered a violation of an NSO while the application for approval of those revisions as NSO amendments is pending before the issuing agency (or EPA) for approval: *Provided,* that:

(1) No violations of NAAQS occur in the smelter's Designated Liability Area during that time; and

(2) The smelter operator has not been informed by the issuing agency or EPA that its application is not adequately documented, unless such deficiency has been remedied promptly.

(c) *Notice and opportunity for hearing.* Notice and opportunity for public hearing shall be provided before issuance of all major amendments.

§ 57.105 Submittal of required plans, proposals, and reports.

(a) The failure of a smelter owner to submit any plan, report, document or proposal as required by its NSO or by this part shall constitute a violation of its NSO.

(b) If the Administrator determines that a nonferrous smelter is in violation of a requirement contained in an NSO approved under these regulations, the Administrator shall, as provided by section 119(f) of the Act:

(1) Enforce such requirement under section 113 (a), (b), or (c) of the Act;

(2) Revoke the order after notice and opportunity for hearing;

(3) Give notice of noncompliance and commence action under section 120 of the act; or

(4) Take any appropriate combinations of these actions.

(c) Under section 304 of the Act, any person may commence a civil action against an owner or operator of a smelter which is alleged to be in violation or any order approved under this part.

§ 57.106 Expiration date.

Each NSO shall state its expiration date. No NSO issued under this regulation shall expire later than January 1, 1988.

§ 57.107 The State or local agency's transmittal to EPA.

(a) *Content and bases of the State or local agency's NSO*. Issuance of an NSO by a State or local agency shall be completed by the issuing agency's transmittal to the appropriate EPA Regional Office of:

(1) The text of the NSO;

(2) The application submitted by the smelter owner, except for appendix A to this part, all correspondence between the issuing agency and the applicant relating to the NSO, and any material submitted in support of the application;

(3) A concise statement of the State or local agency's findings and their bases; and

(4) All documentation or analyses prepared by or for the issuing agency in support of the NSO.

(b) *The State or local agency's enforcement plan*. The transmittal under paragraph (a) of this section shall be accompanied by a description of the issuing agency's plans for monitoring compliance with and enforcement of the NSO. The transmittal shall also include a description of the resources which will be used to implement those plans. If the enforcement plans appear inadequate, EPA may require that the NSO be modified such that the NSO will be adequately enforced.

§ 57.108 Comparable existing SIP provisions.

Notwithstanding any other provision of this part, an NSO may contain provisions to which the affected smelter is subject under the applicable EPA-approved State Implementation Plan (SIP) for sulfur dioxide in lieu of the corresponding provisions which would otherwise be required under this part if the Administrator determines that those SIP provisions are substantially equivalent to the corresponding NSO provisions which would otherwise be required, and if the Administrator determines that the smelter is in substantial compliance with those SIP provisions. For the purposes of this section, provisions to which the affected smelter is subject under the applicable EPA-approved State Implementation Plan are those which became effective before the smelter owner applied for the NSO.

§ 57.109 Maintenance of pay.

The Administrator will not approve or issue an NSO for any smelter unless he has approved or promulgated SIP provisions which are applicable to the smelter and which satisfy the requirements of section 110(a)(6) of the Clean Air Act.

§ 57.110 Reimbursement of State or local agency.

As a condition of issuing an NSO, any issuing agency may require the smelter operator to pay a fee to the State or local agency sufficient to defray the issuing agency's expenses in issuing and enforcing the NSO.

§ 57.111 Severability of provisions.

The provisions promulgated in this part and the various applications thereof are distinct and severable. If any provision of this part or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions, or the application of such provisions to other persons or circumstances, which

can be given effect without the invalid provision of application.

Subpart B—The Application and the NSO Process

§ 57.201 Where to apply.

Any eligible smelter may apply for an NSO to the appropriate EPA Regional Office or to the appropriate State or local air pollution control agency.

(a) When application is made to EPA, all parts of the application required to be submitted under this subpart shall be sent directly to the Director, Stationary Source Compliance Division (EN–341), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention: Confidential Information Unit. In addition, the smelter owner shall send a copy of the application, except that part required to be submitted under § 57.203(b) (eligibility), directly to the appropriate EPA Regional Office.

(b) When application is made to the appropriate State or local agency, the smelter owner shall submit one complete copy of all parts of the application required to be submitted under this subpart to that agency, in addition to the application requirements contained in paragraph (a) of this section. If the smelter owner is requesting an advance eligibility determination pursuant to § 57.203(b), such request must be made in writing and shall accompany the copy of the application being sent to the Director of the Stationary Source Compliance Division of the Environmental Protection Agency.

(c) If the smelter owner is requesting a waiver of the interim constant control requirement of § 57.301, such request must be sent directly to the Director, Stationary Source Compliance Division, at the time of application, in accordance with § 57.802.

(d) *The NSO Process.* (1) A smelter desiring an NSO shall apply for an NSO by submitting an application under subpart B including the financial information required in appendix A and including the information necessary to make the determinations required by this subparagraph and § 57.201(d)(2). The issuing agency shall analyze the financial information according to the financial eligibility test prescribed by subpart A and described in appendix A. The issuing Agency shall then determine whether the smelter is able to comply with its SIP on or before the date required in the SIP by installing adequately demonstrated technology which is reasonably available. See also § 57.102(a)(3). If the test demonstrates that adequately demonstrated technology is not reasonably available to the smelter to allow it to comply with the SIP by the required compliance date, the smelter is eligible for an NSO.

(2)(i) If the smelter is determined to be eligible for an NSO under paragraph (d)(1) of this section, the issuing Agency shall apply the appendix A financial eligibility tests again before issuing an NSO in order to determine if the smelter can comply with its SIP requirements on or before January 1, 1988 by installing adequately demonstrated technology which is reasonably available.

(ii) If application of the tests shows that the smelter could comply by or before January 1, 1988, the issuing agency shall notify the smelter of this determination, and shall not issue an NSO to the smelter unless the NSO contains a SIP compliance schedule meeting the requirements of § 57.705. Such a compliance schedule must provide for compliance with the smelter's SO_2 SIP as expeditiously as practicable and in no case later than January 1, 1988. A smelter must submit to the issuing agency information necessary to determine a compliance schedule meeting the requirements of § 57.705. This information shall be submitted by a smelter within thirty days after the smelter is notified by the issuing agency that a SIP compliance schedule is required. The Administrator may consider an NSO application to be withdrawn for SIP enforcement purposes if a smelter fails to submit such information within the time required under this paragraph.

(iii) If no adequately demonstrated technology is found to be reasonably available to enable a smelter to comply by January 1, 1988, it would be excused from the compliance schedule requirement in § 57.201(d)(2)(ii), but it would be subject to reevaluation of its ability to

comply by that date at any time during the term of the NSO. (See § 57.201(d)(3)).

(3) At any time during the term of an NSO which does not contain a SIP compliance schedule, EPA or the issuing agency may reevaluate the availability of technology to the smelter. If EPA or the issuing agency determines that adequately demonstrated technology is reasonably available to permit the smelter to comply with its SIP by or before January 1, 1988, the NSO shall be amended within 3 months time after such determination. The amendment shall require compliance with all SIP requirements by or before January 1, 1988, and shall include a compliance schedule meeting the requirements of § 57.705. The determination that adequately demonstrated technology is reasonably available shall be made by reapplying the same appendix A financial eligibility tests required by subpart B, updated by economic data reflecting current operating conditions and currently demonstrated control technology. Any such determination and amendment shall be governed by the provisions of this part and section 119 of the Clean Air Act.

(4) Notice and opportunity for public hearing in accordance with section 119 of the Clean Air Act must be provided before issuance of any NSO.

(e) A smelter that does not have any constant SO_2 controls or whose existing constant SO_2 controls when in full operation and optimally maintained are not sufficient to treat all strong SO_2 streams may apply for a waiver of the requirements of subpart C to install interim constant controls by submitting an application under subpart H. A waiver may be granted only with respect to the requirement to eliminate bypass of constant controls through the installation of new constant control equipment, not with respect to the requirements for optimum maintenance and operation of existing equipment. EPA shall then determine the smelter's ability to afford installation of the required additional interim constant SO_2 control equipment at the smelter based on financial eligibility information analyzed according to the financial test prescribed in appendix A. A waiver of the requirement for additional interim constant controls will be granted if EPA determines in accordance with the procedures of subpart H that imposition of this requirement would necessitate closure of the smelter for at least one year.

§ 57.202 How to apply.

(a) *Letter of intent.* To initiate an application for an NSO, the owner or operator of a smelter shall send a letter of intent to an appropriate air pollution control agency. The letter of intent shall contain a statement of the owner's intent to apply for an NSO, and an agreement to provide any information required under this part. The letter of intent shall be signed by a corporate official authorized to make such commitments. Upon receipt of any letter of intent by the issuing agency, the SIP emission limitation for sulfur dioxide, as to that applicant, shall be deemed suspended for 60 days. The 60 day suspension may be extended for good cause at the discretion of the Administrator.

(b) *Complete application.* (1) Within the period referred to in paragraph (a) of this section, the smelter owner shall submit its completed application pursuant to § 57.201. Receipt of all parts of a substantially complete application postmarked within the original or extended application period shall be deemed to continue the suspension of the SIP emission limitation for SO_2 until the issuing agency issues or declines to issue an NSO. This suspension shall in all cases terminate, however, 90 days after receipt of the substantially completed application, unless extended for good cause at the discretion of the Administrator. If, in the Administrator's judgment, good faith effort has been made to submit a complete application, additional time may be granted to allow for correction of minor deficiencies.

(2) If an issuing agency transmits an NSO to EPA for approval before the expiration of the suspension of the Federal SIP emission limitation, the suspension shall continue until EPA approves or disapproves the NSO.

§ 57.203 Contents of the application.

(a) *Claim of confidentiality*. The smelter owner may make a business confidentiality claim covering all or part of the information in the NSO application in accordance with 40 CFR part 2, subpart B (41 FR 36906 *et seq*., Sept. 1, 1976 as amended by 43 FR 39997 *et seq*., Sept. 8, 1978). A claim is effective only if it is made at the time the material is submitted to the issuing agency or EPA. A claim shall be made by attaching to the information a notice of confidentiality. Information claimed as confidential will be handled by EPA under the provisions of 40 CFR part 2, subpart B. If no claim accompanies the information, it may be made available to the public without further notice.

(b) Each smelter owner shall make the showing required by § 57.102(a)(3) by completing and submitting appendix A to this part and any necessary supplemental information to the issuing agency as a part of its application. Each smelter shall also submit as part of its application the information which, in conjunction with the information required by appendix A, is necessary for the issuing agency to make the determination required by § 57.201(d)(2). Any smelter owner or State may, at its option, simultaneously submit this material to EPA for an advance eligibility determination.

(c) *Current operating information*. A complete NSO application shall also contain the following information:

(1) A process flow diagram of the smelter, including current process and instrumentation diagrams for all processes or equipment which may emit or affect the emission of sulfur dioxide; the characteristics of all gas streams emitted from the smelter's process equipment (flow rates, temperature, volumes, compositions, and variations over time); and a list of all monitoring data and strip charts, including all data, charts, logs or sheets kept with respect to the operation of any process equipment which may emit or affect the emission of sulfur dioxide;

(2) The smelter's maximum daily production capacity (as defined in § 57.103(r)), the operational rate (in pounds of concentrate charged to the smelting furnace per hour) of each major piece of process equipment when the smelter is operating at that capacity; and the smelter's average and maximum daily production rate for each product, co-product, or by-product, by year, for the past four years;

(3) The optimal conversion efficiency (defined in terms of percent of total SO_2 removed from the input flow stream) of any acid plant or other sulfur dioxide control system under the normal process operating conditions (excluding malfunctions) most conducive to optimal conversion efficiency;

(4) The average conversion efficiency of any acid plant or other sulfur dioxide control system during normal process operations (excluding malfunctions), by month, during the past four years.

(5) The percent of the time the acid plant or other control system was available for service during each month for the past four years, excluding downtime for scheduled maintenance, and a full explanation of any major or recurring problems with the system during that time;

(6) The frequency and duration of times during the past four years when the SO_2 system was unavailable because of scheduled maintenance of the system;

(7) A description of all scheduled, periodic, shutdowns of the smelter during the past four years, including their purpose, frequency and duration; and the same information with respect to unscheduled shutdowns;

(8) The gas volume, rates, and SO_2 concentration which the control system was actually designed to accommodate, taking into account any modifications made after its installation;

(9) The average monthly sulfur balance across the process and control equipment, including fugitive emissions, for the past 4 years; and

(10) A description of engineering techniques now in use at the smelter to prevent the release of fugitive emissions into the atmosphere at low elevations.

(d) *The smelter owner's proposals*. The smelter owner shall submit as part of its application, draft NSO provisions which would implement the requirements of subparts C through G of this part. The issuing agency may use these

proposals as the basis for any NSO that may be granted, or may modify these proposals in any way it deems necessary in order to comply with the requirements of this part.

(e) A smelter may submit as part of its application, information necessary to determine any SIP compliance schedule which might be required under § 57.201(d)(2).

(f) *Additional information*. The smelter owner shall designate in its application a corporate officer responsible and authorized to supply supplemental technical and economic information and explanations as required by the issuing agency during the formulation of the NSO. Failure to supply such information and explanations shall constitute a failure to submit a complete application.

(g) *Request for a waiver of constant controls*. Any request for a waiver of the requirement interim constant control of all strpmg streams of § 57.301 shall be made in accordance with § 57.802. The criteria and procedures for granting the waiver are governed by subpart H of this part.

(h) Unless a smelter applies for a waiver in accordance with subpart H, a smelter shall submit as part of its application a proposed schedule for compliance with the interim constant control requirements of subpart C which satisfies the requirements of § 57.702.

§ 57.204 EPA action on second period NSOs which have already been issued.

(a) EPA may approve a second period NSO issued by a State before the date of publication of these regulations in the FEDERAL REGISTER, without requiring a complete reapplication under this subpart and new State proceedings, provided:

(1) The second period NSO was issued by the State consistent with the procedural requirements of section 119 of the Clean Air Act;

(2) EPA can make a determination that the smelter is eligible for a second period NSO and whether the smelter can comply with its SO_2 SIP limits on or before January 1, 1988 under the financial eligibility tests in these regulations on the basis of available information and such supplementary information as the Agency may request the smelter to submit; and

(3) The provisions of the NSO are consistent with the requirements of these regulations.

(b) Should EPA require a smelter to submit information before taking final action on an NSO referred to in paragraph (a), of this section, it shall specify a reasonable period for submission of such information in light of the nature of the information being required. The duration of such period shall not exceed the period allowed for submission of a complete application under § 57.202 (a) and (b).

(c) The Agency shall consider the SIP emission limitation for SO_2 to be suspended with respect to a smelter which received an NSO described in subpart A until EPA takes final action on such NSO. Such suspension shall terminate if the smelter does not submit supplementary information within the time specified under paragraph (b).

§ 57.205 Submission of supplementary information upon relaxation of an SO_2 SIP emission limitation.

(a) In the event an SO_2 SIP limit is relaxed subsequent to EPA approval or issuance of a second period NSO, the smelter issued the NSO shall submit to the issuing agency and EPA such supplementary information that EPA considers appropriate for purposes of determining whether the means of compliance with the new SIP limit are adequately demonstrated to be reasonably available under the financial eligibility tests specified in § 57.102(b)(3). The smelter shall submit such information within sixty days of notification by EPA. This time limit may be extended by EPA for good cause.

(b) Upon receipt of any supplementary information required under paragraph (a), the issuing agency shall promptly reevaluate the availability of the means of compliance with the new SIP limit under the NSO eligibility tests specified in § 57.102(b)(3). If the issuing agency determines that the demonstrated control technology necessary to attain the new SO_2 SIP limit is adequately demonstrated to be reasonably available under the eligibility tests, so as to permit the smelter to comply with the new SIP limit on or

before January 1, 1988, the NSO shall be amended within the time contemplated by § 57.202(a) after receipt of the supplementary information. Such amendment shall require compliance with the new SO_2 SIP limit as expeditiously as practicable in accordance with § 57.201(d)(3). The issuing agency, if not EPA, shall promptly submit its determination and any necessary NSO amendments to EPA.

(c) EPA shall take action to approve or disapprove the issuing agency's determination and NSO amendment, if any, within a reasonable time after receipt of such determination and amendment.

(d) If EPA disapproves the issuing agency's determination or NSO amendment, or if a smelter fails to submit any supplementary information as required under paragraph (a), EPA and/or the issuing agency shall take appropriate remedial action. EPA shall take appropriate remedial action if the issuing agency does not make any determination and amendment required by this section within the time contemplated by § 57.202(a).

Subpart C—Constant Controls and Related Requirements

§ 57.301 General requirements.

Each NSO shall require an interim level of sulfur dioxide constant controls to be operated at the smelter, unless a waiver of this requirement has been granted to the owner under subpart H of this part. Except as otherwise provided in § 57.304, the interim constant controls shall be properly operated and maintained at all times. The NSO shall require the following gas streams to be treated by interim constant controls:

(a) In copper smelters, off-gases from fluidized bed roasters, flash furnaces, NORANDA reactors, electric furnaces and copper converters;

(b) In lead smelters, off-gases from the front end of the sintering machine and any other sinter gases which are recirculated;

(c) In zinc smelters, off-gases from mult-hearth roasters, flash roasters and fluidized bed roasters; and

(d) In all primary nonferrous smelters, all other strong SO_2 streams.

(e) In all primary nonferrous smelters, any other process streams which were regularly or intermittently treated by constant controls at the smelter as of August 7, 1977.

§ 57.302 Performance level of interim constant controls.

(a) *Maximum feasible efficiency*. Each NSO shall require: that the smelter operate its interim constant control systems at their maximum feasible efficiency, including the making of any improvements necessary to correct the effects of any serious deficiencies; that the process and control equipment be maintained in the way best designed to ensure such operation; and that process operations be scheduled and coordinated to facilitate treatment of process gas streams to the maximum possible extent. Maximum feasible efficiency shall be expressed in the NSO in the form of a limitation on the concentration of SO_2 in the tail gas of each individual control system in combination with an appropriate averaging period, as provided below in paragraphs (b) and (c) of this section.

(b) *The limitation level for SO_2 concentration in the control system tail gas*. The level at which the concentration limitation is set shall take into account fluctuations in the strength and volume of process off-gases to the extent that those fluctuations affect the SO_2 content of the tail gas and cannot be avoided by improved scheduling and coordination of process operations. The limitation shall exclude the effect of any increase in emissions caused by process or control equipment malfunction. The limitation shall take into account unavoidable catalyst deterioration in sulfuric acid plants, but may prescribe the frequency of catalyst screening or replacement. The NSO shall also prohibit the smelter owner from using dilution air to meet the limitation.

(c) *Averaging period*. (1) The averaging period shall be derived in combination with the concentration limitation and shall take into account the same factors described in paragraph (b). The averaging period established under this paragraph should generally not exceed the following:

(i) For sulfuric acid plants on copper smelters, 12-hour running average;

(ii) For sulfuric acid plants on lead smelters, 6-hour running average;

(iii) For sulfuric acid plants on zinc smelters, 2-hour running average;

(iv) For dimethylaniline (DMA) scrubbing units on copper smelters, 2-hour running average.

(2) A different averaging period may be established if the applicant demonstrates that such a period is necessary in order to account for the factors described in paragraph (b) of this section: Provided, that the period is enforceable and satisfies the criteria of paragraph (a) of this section.

(d) *Improved performance.* (1) The performance level representing maximum feasible efficiency for any existing control system (e.g., a sulfuric acid plant or a DMA scrubber) shall require the correction of the effects of any serious deficiencies in the system. For the purpose of this paragraph, at least the following problems shall constitute serious deficiencies in acid plants:

(i) Heat exchangers and associated equipment inadequate to sustain efficient, autothermal operation at the average gas strengths and volumes received by the acid plant during routine process equipment operation;

(ii) Failure to completely fill all available catalyst bed stages with sufficient catalyst;

(iii) Inability of the gas pre-treatment system to prevent unduly frequent plugging or fouling (deterioration) of catalyst or other components of the acid plant; or

(iv) Blower capacity inadequate to permit the treatment of the full volume of gas which the plant could otherwise accommodate, or in-leakage of air into the flues leading to the plant, to the extent that this inadequacy results in bypassing of gas around the plant.

(2) Notwithstanding any contrary provisions of § 57.304(c) (malfunction demonstration), no excess emissions (as defined in § 57.304(a)) shall be considered to have resulted from a malfunction in the constant control system if the smelter owner has not upgraded serious deficiencies in the constant control system in compliance with the requirements of § 57.302(d)(1), unless the smelter owner demonstrates under § 57.304(c) that compliance with those requirements would not have affected the magnitude of the emission.

(e) *Multiple control devices.* (1) At any smelter where off-gas streams are treated by various existing control systems (e.g., multiple acid plants or a DMA scrubber and an acid plant), the NSO shall require the use of those systems in the combination that will result in the maximum feasible net SO_2 removal.

(2) To the extent that compliance with this requirement is demonstrated by the smelter operator to result in excess emissions during unavoidable start up and shut down of the control systems, those excess emissions shall not constitute violations of the NSO.

§ 57.303 Total plantwide emission limitation.

(a) *Calculation of the emission limitation.* Each NSO shall contain a requirement limiting the total allowable emissions from the smelter to the level which would have been associated with production at the smelter's maximum production capacity (as defined in § 57.103(r)) as of August 7, 1977. This limitation shall be expressed in units of mass per time and shall be calculated as the sum of uncontrolled process and fugitive emissions, and emissions from any control systems (operating at the efficiency prescribed under § 57.302). These emission rates may be derived from either direct measurements or appropriately documented mass balance calculations.

(b) *Compliance with the emission limitation.* Each NSO shall require the use of specific, enforceable testing methods and measurement periods for determining compliance with the limitation established under paragraph (a) of this section.

§ 57.304 Bypass, excess emissions and malfunctions.

(a) *Definition of excess emissions.* For the purposes of this subpart, any emissions greater than those permitted by the NSO provisions established under § 57.302 (performance level of interim constant controls) or § 57.303 (plantwide emission limitation) of this subpart shall constitute excess emissions.

Emission of any gas stream identified under § 57.301 (a), (b), (c), (d) or (e) of this subpart that is not treated by a sulfur dioxide constant control system shall also constitute an excess emission under this subpart.

(b) *The excess emission report.* Each NSO shall require the smelter to report all excess emissions to the issuing agency, as provided in § 57.305(b). The report shall include the following:

(1) Identity of the stack or other emission points where the excess emissions occurred;

(2) Magnitude of the excess emissions expressed in the units of each applicable emission limitation, as well as the operating data, documents, and calculations used in determining the magnitude of the excess emissions;

(3) Time and duration of the excess emissions;

(4) Identity of the equipment causing the excess emissions;

(5) Nature and cause of such excess emissions;

(6) Steps taken to limit the excess emissions, and when those steps were commenced;

(7) If the excess emissions were the result of a malfunction, the steps taken to remedy the malfunction and to prevent the recurrence of such malfunction; and

(8) At the smelter owner's election, the demonstration specified in paragraph (c) of this section.

(c) *Malfunction demonstration.* Except as provided in § 57.302(e)(2) or in paragraph (d) or (e) of this section, any excess emission shall be a violation of the NSO unless the owner demonstrates in the excess emissions report required under paragraph (b) of this section that the excess emission resulted from a malfunction (or an unavoidable start up and shut down resulting from a malfunction) and that:

(1) The air pollution control systems, process equipment, or processes were at all times maintained and operated, to the maximum extent practicable, in a manner consistent with good practice for minimizing emissions;

(2) Repairs were made as expeditiously as practicable, including the use of off-shift labor and overtime;

(3) The amount and duration of the excess emissions were minimized to the maximum extent practicable during periods of such emissions; and

(4) The excess emissions were not part of a recurring pattern indicative of serious deficiencies in, or inadequate operation, design, or maintenance of, the process or control equipment.

(d) *Scheduled maintenance exception.* Excess emissions occurring during scheduled maintenance shall not constitute violations of the NSO to the extent that:

(1) The expected additional annual sulfur dioxide removal by any control system (including associated process changes) for which construction had not commenced (as defined in 40 CFR 60.2 (g) and (i)) as of August 7, 1977 and which the smelter owner agrees to install and operate under subpart F, would have offset such excess emissions if the system had been in operation throughout the year in which the maintenance was performed;

(2) The system is installed and operated as provided in the NSO provisions established under subpart F; and

(3) The system performs at substantially the expected efficiency and reliability subsequent to its initial break-in period.

(e) An NSO may provide that excess emissions which occur during acid plant start-up as the result of the cooling of acid plant catalyst due to the unavailability of process gas to an acid plant during a prolonged SCS curtailment or scheduled maintenance are not excess emissions. If the NSO does so provide, it shall also require the use of techniques or practices designed to minimize these excess emissions, such as the sealing of the acid plant during prolonged curtailments, the use of auxiliary heat or SO_2 injected during the curtailment, or the preheating of the acid plant before start-up of the process equipment it serves.

(f) Requirements for a smelter with constant controls that applies for a waiver.

(1) If a smelter that has some interim constant controls applies for a waiver in accordance with subpart H, the following requirements shall apply pending action on the waiver application and following final action granting or approving a waiver:

(i) The NSO shall require the smelter to implement maintenance and operation measures designed to reduce to the maximum extent feasible the potential for bypass of existing interim constant controls.

(ii) Upon application for a waiver under subpart H, the smelter shall submit to the issuing agency for its approval and to EPA proposed maintenance and operation measures for compliance with the requirements of paragraph (i).

(iii) The remainder of this subpart shall apply except that: (A) The emission limitations required under this subpart shall be based only on existing constant control equipment as upgraded through the improved maintenance and operation required by this paragraph, and (B) bypass of existing controls shall not constitute excess emissions, provided the maintenance and operation requirements and emission limitations prescribed by the NSO are satisfied.

(2) After any denial of a waiver by the issuing Agency, or any disapproval by EPA of a waiver granted by the issuing agency, the NSO shall be amended consistent with the requirements of this subpart and § 57.702.

§ 57.305 Compliance monitoring and reporting.

(a) *Monitoring.* (1) Each NSO shall require compliance with the control system performance requirements established pursuant to this subpart to be determined through the use of continuous monitors for measuring SO_2 concentration.

(i) Such monitors must be installed, operated and maintained in accordance with the performance specifications and other requirements contained in appendix D to 40 CFR part 52 or part 60. The monitors must take and record at least one measurement of SO_2 concentration from the effluent of each control system in each 15-minute period. Failure of the monitors to record at least 95% of the 15-minute periods in any 30-day period shall constitute a violation of the NSO.

(ii) The sampling point shall be located at least 8 stack diameters (diameter measured at sampling point) downstream and 2 diameters upstream from any flow disturbance such as a bend, expansion, constriction, or flame, unless another location is approved by the Administrator.

(iii) The sampling point for monitoring emissions shall be in the duct at the centroid of the cross section if the cross sectional area is less than 4.645m^2 (50 ft^2) or at a point no closer to the wall than 0.914m (3 ft) if the cross sectional area is 4.645m^2 (50 ft^2) or more. The monitor sample point shall be in an area of small spatial concentration gradient and shall be representative of the concentration in the duct.

(iv) The measurement system(s) installed and used pursuant to this paragraph shall be subject to the manufacturer's recommended zero adjustment and calibration procedures at least once per 24-hour operating period unless the manufacturer specifies or recommends calibration at shorter intervals, in which case such specifications or recommendations shall be followed. Records of these procedures shall be made which clearly show instrument readings before and after zero adjustment and calibration.

(2) Each NSO shall require the monitoring of any ducts or flues used to bypass gases, required under this subpart to be treated by constant controls, around the smelter's sulfur dioxide constant control system(s) for ultimate discharge to the atmosphere. Such monitoring shall be adequate to disclose the time of the bypass, its duration, and the approximate volume and SO_2 concentration of gas bypassed.

(b) *Reporting.* (1) Each NSO shall require that the smelter maintain a record of all measurements required under paragraph (a) of this section. Results shall be summarized monthly and shall be submitted to the issuing agency within 15 days after the end of each month. The smelter owner shall retain a record of such measurements for one year after the NSO period terminates.

(2) Each NSO shall require that the smelter maintain a record of all measurements and calculations required under § 57.303(b). Results shall be summarized on a monthly basis and shall be submitted to the issuing agency at 6-month intervals. The smelter owner

shall retain a record of such measurements and calculations for at least one year after the NSO terminates.

(3) The report required under § 57.304(b) shall accompany the report required under paragraph (b)(1) of this section.

(c) *Quality assurance and continuous data*—(1) *Quality assurance.* Each NSO shall require that the smelter submit a plan for quality assurance to the issuing agency for approval and that all monitoring performed by continuous monitors shall be verified for quality assurance by the smelter. Such plans must follow current EPA guidelines for quality assurance, in order to be approvable.

(2) *Continuous data.* Manual source testing methods equivalent to 40 CFR part 60, appendix A shall be used to determine compliance if the continuous monitoring system malfunctions.

Subpart D—Supplementary Control System Requirements

§ 57.401 General requirements.

Except as provided in subpart E, each NSO shall require the smelter owner to prevent all violations of the NAAQS in the smelter's designated liability area (DLA) through the operation of an approved supplementary control system (SCS).

§ 57.402 Elements of the supplementary control system.

Each supplementary control system shall contain the following elements:

(a) *Air quality monitoring network.* An approvable SCS shall include the use of appropriate ambient air quality monitors to continuously measure the concentration of sulfur dioxide in the air in the smelter's DLA.

(1) The monitors shall be located at all points of expected SO_2 concentrations necessary to anticipate and prevent possible violations of NAAQS anywhere in the smelter's DLA. The determination of the locations where such concentrations may occur shall take into account all recorded or probable meteorological and operating conditions (including bypassing of control equipment), as well as the presence of other sources of SO_2 significantly affecting SO_2 concentrations in the DLA.

(2) The number and location of sites shall be based on dispersion modeling, measured ambient air quality data, meteorological information, and the results of the continuing review required by paragraph (f) of this section. The system shall include the use of at least 7 fixed monitors unless the issuing agency determines, on the basis of a demonstration by the smelter owner, that the use of fewer monitors would not limit coverage of points of high SO_2 concentration or otherwise reduce the capability of the smelter owner to prevent any violations of the NAAQS in the smelter's DLA.

(3) All monitors shall be continuously operated and maintained and shall meet the performance specifications contained in 40 CFR part 53. The monitors shall be capable of routine real time measurement of maximum expected SO_2 concentrations for the averaging times of SO_2 NAAQS.

(b) *Meteorological network.* The SCS must have a meteorological assessment capability adequate to predict and identify local conditions requiring emission curtailment to prevent possible violations of the NAAQS. The meteorological assessment capability shall provide all forecast and current information necessary for successful use of the SCS operational manual required by paragraph (e) of this section.

(c) *Designated liability area.* The system shall be required to prevent all violations of the NAAQS within the smelter's DLA. The DLA of any smelter is the area within which the smelter's emissions may cause or significantly contribute to violations of the NAAQS for SO_2 when the smelter is operating at its maximum production capacity under any recorded or probable meterological conditions. The boundaries of that area shall be specified in the NSO.

(1) Unless an acceptable demonstration is made under paragraph (c)(2) of this section, the DLA shall be a circle with a center point at the smelter's tallest stack and a minimum radius as given in the following table:

RADIUS FOR SO_2 EMISSIONS AT MAXIMUM PRODUCTION CAPACITY [1]

Emissions rate in tons per hour	Emission rate in grains per sec.	Radius in kilometers
16 or less	4,000 or less	11
24	6,000	16
32	8,000	24
40	10,000	32
48 or more	12,000 or more	40

[1] Maximum emission rates for periods not to exceed 24 hours. Minimum radii may be determined from the table by linear interpolation.

(2) The NSO may provide for a DLA with different boundaries if the smelter owner can demonstrate through the use of appropriate dispersion modeling and ambient air quality monitoring data that the smelter's controlled emissions could not cause or significantly contribute to a violation of the NAAQS beyond the boundaries of such a different area under any recorded or probable meteorological conditions.

(3) A violation of the NAAQS in the DLA of any smelter shall constitute a violation of that smelter's NSO, unless the issuing agency determines on the basis of a showing by the smelter owner that the smelter owner had taken all emission curtailment action indicated by the SCS operational manual and that the violation was caused in significant part by:

(i) Emissions of another source(s) which were in excess of the maximum permissible emissions applicable to such source(s),

(ii) Fugitive emissions of another source(s), or

(iii) The smelter's own fugitive emissions: *Provided*, that the smelter is in compliance with all requirements of or under subpart E of this part.

(4) For the purposes of this section, maximum permissible emissions for other sources are the highest of:

(i) SIP emission limitation;

(ii) Orders in effect under section 113(d) of the Clean Air Act; or

(d) *Overlapping designated liability areas*. Notwithstanding any other provisions of this subpart, the following requirements shall apply whenever the designated liability areas of 2 or more smelters do, or may, overlap:

(1) In the case of any NSO applicant that would have a DLA which would overlap with the DLA of any other smelter that has applied for an NSO or has an NSO in effect, the NSO applicant shall include in its application an enforceable joint plan, agreed to by such other smelter(s). In determining whether a joint plan is required, the NSO applicant shall calculate its DLA according to the table in paragraph (c)(1) of this section. The DLA of the other smelter shall be calculated according to the table in paragraph (c)(1) unless the other smelter has an NSO in effect, in which case the boundaries in that NSO shall be used. The enforceable joint plan shall provide for:

(i) Emission curtailment adequate to ensure that the NAAQS will not be violated in any areas of overlapping DLAs; and

(ii) Conclusive prospective allocation of legal liability in the event that the NAAQS are violated in the area of overlapping DLAs.

Such plans may, but need not, include the operation of a joint SCS system. Each NSO shall require adherence by the NSO applicant owner to the joint plan for emission curtailment and allocation of liability, unless the issuing agency determines, pursuant to the provisions of paragraph (c)(2) of this section, that the NSO applicant's DLA does not overlap with that of any other smelter.

(2) In the case of any NSO applicant that would have a DLA which would overlap with the DLA of any other smelter whose owner has not applied for an NSO (and does not have an NSO in effect), the NSO applicant's submittal shall contain a written consent, signed by a corporate official empowered to do so. The consent shall state that if, at any time thereafter, the owner of the other smelter applies for an NSO, and the other smelter's DLA would overlap with the NSO applicant's DLA, the NSO applicant will negotiate and submit an enforceable joint plan for emission curtailment and allocation of liability (as described in paragraph (d)(1) of this section). In determining whether it is necessary to submit such a consent, each smelter's DLA shall be calculated according to the table set forth in paragraph (c)(1) of this section. The consent shall state that a joint plan shall be submitted within 90 days of the issuing agency's

notification to the NSO applicant of receipt of the other smelter's letter of intent, unless the issuing agency determines that the DLAs do not overlap. Failure of the NSO applicant to submit such a plan shall constitute grounds for denial of its NSO application or a violation of an effective NSO, as applicable.

(e) *The SCS operational manual.* Each NSO shall require the smelter to be operated in accordance with the provisions of an SCS operational manual approved by the issuing agency. The SCS operational manual shall describe the circumstances under which, the extent to which, and the procedures through which emissions shall be curtailed to prevent violations of the NAAQS in the smelter's DLA. Failure to curtail emissions when and as much as indicated by the manual or to follow the provisions of the manual implementing the requirements of paragraph (e)(3) of this section shall constitute a violation of the NSO.

(1) The operational manual shall prescribe emission curtailment decisions based on the use of real time information from the air quality monitoring network dispersion model estimates of the effect of emissions on air quality, and meteorological observations and predictions.

(2) The operational manual shall also provide for emission curtailment to prevent violation of the NAAQS within the smelter's DLA which may be caused in part by stack emissions, and to the extent practicable fugitive emissions, from any other source (unless that other source is a smelter subject to an NSO).

(3) The SCS operational manual shall include (but not be limited to):

(i) A clear delineation of the authority of the SCS operator to require all other smelter personnel to implement the operator's curtailment decisions;

(ii) The maintenance and calibration procedures and schedules for all SCS equipment;

(iii) A description of the procedures to be followed for the regular acquisition of all meteorological information necessary to operate the system;

(iv) The ambient concentrations and meteorological conditions that will be used as criteria for determining the need for various degrees of emission curtailment;

(v) The meteorological variables as to which judgments may be made in applying the criteria stated pursuant to paragraph (e)(3)(iv) of this section;

(vi) The procedures through which and the maximum time period within which a curtailment decision will be made and implemented by the SCS operator;

(vii) The method for immediately evaluating the adequacy of a particular curtailment decision, including the factors to be considered in that evaluation;

(viii) The procedures through which and the time within which additional necessary curtailment will immediately be effected; and

(ix) The procedures to be followed to protect the NAAQS in the event of a mechanical failure in any element of the SCS.

(f) *Continuing review and improvement of the SCS.* Each NSO shall require the smelter owner to conduct an active program to continuously review the design and operation of the SCS to determine what measures may be available for improving the performance of the system. Among the elements of this program shall be measures to locate and examine possible places both inside and outside the DLA where unmonitored NAAQS violations may be occurring. Such measures shall include the use of modeling as appropriate and mobile ambient air quality monitors, following up on information and complaints from members of the public, and other appropriate activities. The NSO shall also require the submission of a semi-annual report to the issuing agency detailing the results of this review and specifying measures implemented to prevent the recurrence of any violations of NAAQS.

§ 57.403 Written consent.

(a) *The consent.* The NSO shall include a written consent, signed by a corporate official empowered to do so, in the following form:

As a condition of receiving a Primary Nonferrous Smelter Order (NSO) under Section 119 of the Clean Air Act, for the smelter operated by (name of company) at (location),

the undersigned official, being empowered to do so, consents for the company as follows:

(1) In any civil proceeding (judicial or administrative) to enforce the NSO, the company will not contest:

(a) Liability for any violation of the National Ambient Air Quality Standards for sulfur dioxide in the smelter's designated liability area (DLA), except on the ground that a determination under 40 CFR 57.402(c)(3) was clearly wrong; or

(b) The conclusive allocation of liability under NSO provisions satisfying 40 CFR 57.402(d)(1) between the company's smelter and any other smelter(s) for any violation of the National Ambient Air Quality Standards for sulfur dioxide in an area of overlapping DLAs.

(2) The issuing agency (as defined in 40 CFR 57.103) will be allowed unrestricted access at reasonable times to inspect, verify calibration of, and obtain data from ambient air quality monitors operated by the company under the requirements of the NSO.

(b) *Rights not waived by the consent.* This consent shall not be deemed to waive any right(s) to judicial review of any provisions of an NSO that are otherwise available to the smelter owner or operator under section 307(b) of the Clean Air Act.

§ 57.404 Measurements, records, and reports.

(a) *Measurements.* Each NSO shall require the smelter owner to install, operate, and maintain a measurement system(s) for continuously monitoring sulfur dioxide emissions and stack gas volumetric flow rates in each stack (except a stack used exclusively for bypassing control equipment) which could emit 5 percent or more of the smelter's total potential (uncontrolled) hourly sulfur dioxide emissions.

(1) Such monitors shall be installed, operated, and maintained in accordance with the performance specifications and other requirements contained in appendices D and E to 40 CFR part 52. The monitors must take and record at least one measurement of sulfur dioxide concentration and stack gas flow rate from the effluent of each affected stack in each fifteen-minute period. (The NSO shall require the smelter operator to devise and implement any procedures necessary for compliance with these performance specifications.)

(2) The sampling point shall be located at least eight stack diameters (diameter measured at sampling point) downstream and two diameters upstream from any flow disturbance such as a bend, expansion, constriction, or flame, unless another location is approved by the Administrator.

(3) The sampling point for monitoring emissions shall be in the duct at the centroid of the cross section if the cross sectional area is less than 4.645 m^2 (50 ft^2) or at a point no closer to the wall than 0.914m (3 ft) if the cross sectional area is 4.645 m^2 (50 ft^2) or more. The monitor sample point shall be in an area of small spatial concentration gradient and shall provide a sample which is representative of the concentration in the duct.

(4) The measurement system(s) installed and used pursuant to this paragraph shall be subject to the manufacturer's recommended zero adjustment and calibration procedures at least once per 24-hour operating period unless the manufacturer specifies or recommends calibration at shorter intervals, in which case such specifications or recommendations shall be followed. Records of these procedures shall be made which clearly show instrument readings before and after zero adjustment and calibration.

(5) The results of such monitoring, calibration, and maintenance shall be submitted in the form and with the frequency specified in the NSO.

(b) *Records.* Each NSO shall require the smelter owner to maintain records of the air quality measurements made, meteorological information acquired, emission curtailment ordered (including the identity of the persons making such decisions), and calibration and maintenance performed on SCS monitors during the operation of the SCS. These records shall be maintained for the duration of the NSO.

(c) *Reports.* Each NSO shall require the smelter owner to:

(1) Submit a monthly summary indicating all places and times at which the NAAQS for SO_2 were violated in the smelter's DLA, and stating the SO_2 concentrations at such times;

(2) Immediately notify EPA and the State agency any time concentrations of SO_2 in the ambient air in the smelter's DLA reaches 0.3 part per million (800 micrograms/cubic meter), 24-hour

average, or exceed the warning stage in any more stringent emergency plan in the applicable State Implementation Plan; and

(3) Make such other reports as may be specified in the NSO.

§ 57.405 Formulation, approval, and implementation of requirements.

(a) *SCS content of the application*. The requirements of § 57.203(d) shall be satisfied with respect to this subpart as follows:

(1) Each NSO application shall include a complete description of any supplementary control system in operation at the smelter at the time of application and a copy of any SCS operational manual in use with that system.

(2) Each NSO application shall contain proposed NSO provisions for compliance with the requirements of §§ 57.401, 57.402 (c), (d), and (f), 57.403, 57.404, and 57.405 (b)(2).

(3) Each NSO application shall include a specific plan for the development of a system fulfilling the requirements of § 57.402(a), (b), and (e) (covering air quality monitoring network, meteorological network, and the SCS operational manual).

(b) *SCS content of the order*. (1) Each NSO shall include an approved version of the plan described in paragraph (a)(3) of this section and shall provide increments of progress towards its completion. Each NSO shall require, upon completion of the measures specified in the approved plan, submission of a report which describes each element of the SCS and explains why the elements satisfy the requirements of the plan and submission of a copy of the SCS operational manual developed under the plan.

(2) Each NSO shall require the submission of a final report, within 6 months of the required date for completion of the measures specified in the approved plan evaluating the performance and adequacy of the SCS developed pursuant to the approved plan. The report shall include:

(i) A detailed description of how the criteria that form the basis for particular curtailment decisions were derived;

(ii) A complete description of each SCS element listed in § 57.402 (a) through (d) (covering monitoring, meteorology, and the DLA), and an explanation of why the elements fulfill the requirements of those sections;

(iii) A reliability study demonstrating that the SCS will prevent violations of the NAAQS in the smelter's DLA at all times. The reliability study shall include a comprehensive analysis of the system's operation during one or more three-month seasonal periods when meteorological conditions creating the most serious risk of NAAQS violations are likely to occur. Where it is impossible, because of time restraints, to include in such a study and analysis of the three month seasonal period with meteorological conditions creating the most serious risk of NAAQS violations, the study shall analyze the system's operation on the basis of all available information. The NSO shall provide that in such case, a supplemental reliability study shall be submitted after the end of the worst case three-month period as a part of the next semi-annual report required under § 57.402(f).

(iv) A copy of the current SCS operational manual.

(c) *Amendment of the NSO*. Each NSO shall be amended, if necessary, within 3 months of completion of the measures required under the SCS development plan and also, if necessary, within three months of submission of the final report or any supplement to the final report required under paragraph (b)(2) of this section, to reflect the most current approved elements of the SCS and, as appropriate, to fulfill all other requirements of this subpart. Each NSO shall also be subsequently amended (as provided in § 57.104) whenever necessary as a result of the program required by § 57.402(f) or to reflect improved SCS operating procedures or other system requirements.

Subpart E—Fugitive Emission Evaluation and Control

§ 57.501 General requirements.

(a) Each NSO shall require the smelter owner to use such control measures as may be necessary to ensure that the

smelter's fugitive emissions do not result in violations of the NAAQS for SO_2 in the smelter's DLA.

(b) A smelter which is operating under an NSO containing a SIP compliance schedule established in accordance with § 57.705 is required to be making progress toward compliance with any fugitive control requirements contained in its respective SIP and need not meet the other requirements contained in this subpart.

(c) A smelter which is subject to an NSO which does not contain a SIP compliance schedule must meet the provisions of §§ 57.502 and 57.503.

§ 57.502 Evaluation.

(a) *Evaluation at the time of application.* Any smelter owner may demonstrate at the time of application for an NSO that the smelter's SO_2 fugitive emissions will not cause or significant contribute to violations of the NAAQS in the smelter's DLA. If such demonstration is not made, the smelter owner shall submit the design and workplan for a study adequate to assess the sources of significant fugitive emissions from the smelter and their effects upon ambient air quality.

(b) Evaluation during the first 6 months of the NSO. The design and workplan of the study shall be approved, if adequate, by the issuing agency and included in the NSO. The study shall commence no later than the date when the NSO becomes effective and an analysis of its results shall be submitted to the issuing agency within 6 months of the effective date of the NSO. The study shall include an appropriate period during which the ambient air shall be monitored to determine the impact of fugitive emissions of sulfur dioxide, arsenic (at copper smelters only), lead (at lead and zinc smelters only), and total suspended particulates on the ambient air quality in the smelter's DLA.

§ 57.503 Control measures.

The NSO of any smelter subject to the requirements of § 57.502(b) shall be amended, if necessary, within 6 months of EPA's receipt of the analysis specified in § 57.502(b), as provided in § 57.704(c) to implement the requirement of § 57.501. Measures required to be implemented may include:

(a) *Additional supplementary control.* The use of the supplementary control system, if the additional use of the system does not interfere with the smelter owner's ability to meet the requirements of subpart D; and

(b) *Engineering and maintenance techniques.* The use of engineering and maintenance techniques to detect and prevent leaks and capture and vent fugitive emissions through appropriate stacks. These techniques include but are not limited to:

(1) For reactors, installation and proper operation of primary hoods;

(2) For roasters, installation and proper operation of primary hoods on all hot calcine transfer points;

(3) For furnaces, installation and proper operation of primary hoods on all active matte tap holes, matte launders, slag skim bays, and transfer points;

(4) For converters, installation and proper operation of primary hoods for blowing operations, and where appropriate, secondary hoods for charging and pouring operations;

(5) For sintering machines, installation and proper operation of primary hoods on the sinter bed, all hot sinter ignition points, all concentrate laydown points, and all hot sinter transfer points;

(6) For blast furnaces, installation and proper operation of primary hoods on all active slag and lead bullion furnace tap holes and transfer points;

(7) For dross reverberatory furnaces, installation and proper operation of primary hoods on all active charging and discharging points;

(8) Maintenance of all ducts, flues and stacks in a leak-free condition to the maximum extent possible;

(9) Maintenance of all process equipment under normal operating conditions in such a fashion that out-leakage of fugitive gases will be prevented to the maximum extent possible;

(10) Secondary or tertiary hooding on process equipment where necessary; and

(11) Partial or complete building evacuation as appropriate.

§ 57.504 Continuing evaluation of fugitive emission control measures.

Each NSO shall require the smelter owner to conduct an active program to continuously review the effectiveness of the fugitive emission control measures implemented pursuant to § 57.503 in maintaining the NAAQS and, if such measures are not sufficiently effective, to evaluate what additional measures should be taken to assure that the NAAQS will be maintained with a reasonably degree of reliability. The NSO shall also require submission of a semiannual report to the issuing Agency detailing the results of this review and evaluation. Such a report may be submitted as part of the report required under § 57.402(f).

§ 57.505 Amendments of the NSO.

An NSO shall be amended within three months of submission of any report required under § 57.504 so as to require additional fugitive emission control measures if such report establishes that such additional measures are necessary to assure that the NAAQS will be maintained with a reasonable degree of reliability.

Subpart F—Research and Development Requirements

§ 57.601 General requirements.

(a) This subpart is not applicable to NSOs which contain a SIP compliance schedule in accordance with § 57.705.

(b) The requirements of this subpart may be waived with respect to a smelter if the owner of that smelter submits with its NSO application a written certification by a corporate official authorized to make such a certification that the smelter will either comply with its SO_2 SIP limits by January 2, 1988 or close after January 1, 1988 until it can comply with such limits.

(c) Except as provided in paragraphs (a) and (b), each NSO shall require the smelter to conduct or participate in a specific research and development program designed to develop more effective means of compliance with the sulfur dioxide control requirements of the applicable State Implementation Plan than presently exist.

§ 57.602 Approval of proposal.

(a) *The smelter owner's proposal.* The smelter owner's NSO application shall include a proposed NSO provision for implementing the requirement of § 57.601, a fully documented supporting analysis of the proposed program, and an evaluation of the consistency of the proposed program with the criteria listed in § 57.603. The application shall also specify:

(1) The design and substantive elements of the research and development program, including the expected amount of time required for their implementation;

(2) The annual expected capital, operating, and other costs of each element in the program;

(3) The smelter's current production processes, pollution control equipment, and emissions which are likely to be affected by the program;

(4) Potential or expected benefits of the program;

(5) The basis upon which the results of the program will be evaluated; and

(6) The names, positions, and qualifications of the individuals responsible for conducting and supervising the project.

(b) *EPA approval.* (1) If the issuing agency will not be EPA, the smelter owner or the issuing agency may also submit to EPA the information specified in paragraph (a) of this section at the same time the information is submitted to the issuing agency. As soon as possible after the receipt of the information described in paragraph (a) of this section, EPA shall certify to the issuing agency and to the applicant whether or not in the judgment of the Administrator the smelter owner's final proposals are approvable. If EPA does not receive an advance copy of the proposal, the ultimate approval will occur when the NSO is approved rather than in advance of receipt of the NSO.

(2) A prerequisite for approval of an R&D proposal by EPA and any issuing agency is that the planned work must yield the most cost effective technology possible.

(c) *Optional preproposal.* The smelter owner may, at its option, submit to EPA for its approval and comment a preproposal generally describing the project the owner intends to propose

under paragraph (a) of this section. A preproposal may be submitted to EPA any time prior to the submission of a proposal under paragraph (a) of this section. As soon as possible after the receipt of a preproposal, EPA shall certify to the applicant (and to any other issuing agency, as applicable) whether or not the project would be approvable. This certification may include comments indicating necessary modifications which would make the project approvable.

§ 57.603 Criteria for approval.

The approvability of any proposed research and development program shall be judged primarily according to the following criteria:

(a) The likelihood that the project will result in the use of more effective means of emission limitation by the smelter within a reasonable period of time and that the technology can be implemented at the smelter in question, should the smelter be placed on a SIP compliance schedule at some future date when adequately demonstrated technology is reasonably available;

(b) Whether the proposed funding and staffing of the project appear adequate for its successful completion;

(c) Whether the proposed level of funding for the project is consistent with the research and development expenditure levels for pollution control found in other industries;

(d) The potential that the project may yield industrywide pollution control benefits;

(e) Whether the project may also improve control of other pollutants of both occupational and environmental significance;

(f) The potential effects of the project on energy conservation; and

(g) Other non-air quality health and environmental considerations.

§ 57.604 Evaluation of projects.

The research and development proposal shall include a provision for the employment of a qualified independent engineering firm to prepare written reports at least annually which evaluate each completed significant stage of the research and development program, including all relevant information and data generated by the program. All reports required by this paragraph shall be submitted to EPA and also to the issuing agency if it is not EPA.

§ 57.605 Consent.

Each NSO shall incorporate by reference a binding written consent, signed by a corporate official empowered to do so, requiring the smelter owner to:

(a) Carry out the approved research and development program;

(b) Grant each issuing agency and EPA and their contractors access to any information or data employed or generated in the research and development program, including any process, emissions, or financial records which such agency determines are needed to evaluate the technical or economic merits of the program;

(c) Grant physical access to representatives and contractors of each issuing agency to each facility at which such research is conducted;

(d) Grant the representatives and contractors of EPA and the issuing agency reasonable access to the persons conducting the program on behalf of the smelter owner for discussions of progress, interpretation of data and results, and any other similar purposes as deemed necessary by EPA or any issuing agency.

§ 57.606 Confidentiality.

The provisions of section 114 of the Act and 40 CFR part 2 shall govern the confidentiality of any data or information provided to EPA under this subpart.

Subpart G—Compliance Schedule Requirements

§ 57.701 General requirements.

This section applies to all smelters applying for an NSO. Each NSO shall require the smelter owner to meet all of the requirements within the NSO as expeditiously as practicable but in no case later than the deadlines contained in this subpart or any other section of these regulations. For requirements not immediately effective, the NSO shall provide increments of progress and a schedule for compliance. Each schedule must reflect the extent to

which any required equipment or systems are already in place and the extent to which any required reports or studies have already been completed. Requirements for smelters to submit compliance schedules and the procedures which they must follow are outlined below.

§ 57.702 Compliance with constant control emission limitation.

(a) This section applies to all smelters which receive an NSO, but only to the extent this section is compatible with any SIP compliance schedule required by §§ 57.201(d)(2) and 57.705.

(b) Any NSO issued to a smelter not required to immediately comply with the requirements of subpart G under § 57.701 shall contain a schedule for compliance with those requirements as expeditiously as practicable but in no case later than 6 months from the effective date of the NSO, except as follows: Where a waiver is requested in accordance with subpart H, an NSO may be issued without a schedule for compliance with the requirements for which a waiver is being considered consistent with subpart H, pending a final decision on the request under subpart H. If a waiver is requested in accordance with subpart H, compliance with the requirements of subpart C which were deferred as a result of such request shall be achieved as expeditiously as practicable after, but in no case later than 6 months from a final decision by the issuing agency to deny a waiver under subpart H or disapproval by EPA of a waiver granted by the issuing agency. The time limits specified herein may be extended only if a smelter operator demonstrates that special circumstances warrant more time, in which case the compliance schedule shall require compliance as expeditiously as practicable. An NSO which does not contain a schedule for compliance with all the requirements of subpart C because a waiver has been requested in accordance with subpart H shall be amended in accordance with § 57.104 within three months after a final decision under subpart H so as to either grant a waiver of any remaining requirements of subpart C, or deny such a waiver and place the smelter on a compliance schedule for meeting those requirements. If the issuing agency grants a waiver and such waiver is disapproved by EPA, the issuing agency shall promptly amend the NSO so as to place the smelter on a compliance schedule meeting any remaining requirements of subpart C.

(c) Any schedule required under this section shall contain the following information and increments of progress to the extent applicable:

(1) Description of the overall design of the SO_2 control system(s) to be installed;

(2) Descriptions of specific process hardware to be used in achieving compliance with interim SO_2 constant controls including gas capacity values;

(3) The date by which contracts will be let or purchase orders issued to accomplish any necessary performance improvements;

(4) The date for initiating on-site construction or installation of necessary equipment;

(5) The date by which on-site construction or installation of equipment is to be completed; and

(6) The date for achievement of final compliance with interim emission limitations.

§ 57.703 Compliance with the supplementary control system requirements.

This section applies to all nonferrous smelters applying for an NSO.

(a) Schedules for smelters with existing SCS. Each NSO shall require immediately upon issuance of the NSO operation of any existing supplementary control system and immediately upon the effective date of the NSO the assumption of liability for all violations of the NAAQS detected by any monitor in the SCS system. Each NSO shall require that within six months of the effective date of the NSO the smelter complete any measures specified in the smelter's approved SCS development plan not implemented at the time the NSO is issued, and assume liability for all violations of the NAAQS detected anywhere in the DLA (except as provided in subpart D of these regulations). Other requirements of subpart D such as the requirements for submission of reports records, and for ongoing

evaluation of the SCS shall be complied with at the times specified in subpart D and § 57.701.

(b) Compliance schedule for smelters with no existing SCS system. Where a smelter has no SCS at the time of issuance of the NSO, the NSO shall require compliance with the requirements of subpart D according to the following schedule:

(1) Within six months after the effective date of the NSO the smelter shall install all operating elements of the SCS system, begin operating the system, complete all other measures specified in its approved SCS development plan, begin compliance with the requirements of § 57.404, and assume liability for any violations of the NAAQS within its designated liability area (except as provided by subpart D), detected by the SCS monitors in place.

(2) Within nine months thereafter the smelter shall submit the SCS Report, assume liability for all violations of the NAAQS detected anywhere within its designated liability area, and comply with all other requirements of subpart D, except for those which subpart D specifies are to be satisfied at or after the close of such nine-month period, including requirements for submission of studies, reports, and records, and the requirements for continued review and evaluation of the SCS.

§ 57.704 Compliance with fugitive emission evaluation and control requirements.

This section applies only to smelters not required to submit SIP Compliance Schedules under § 57.705. Each NSO shall require that smelters satisfy each of the requirements of subpart E as expeditiously as practicable, taking into account the extent to which those requirements have already been satisfied, and in any event, within any deadlines specified below.

(a) *Plan for fugitive emission control.* The NSO shall provide that within a reasonable period after the submission of the report on the fugitive emission control study required by § 57.502, but within a period allowing sufficient time for compliance with the requirement of § 57.503 for amendment of the NSO, the smelter owner shall submit to the issuing agency for its approval a proposed fugitive emission control plan, including increments of progress, for compliance with the requirements of §§ 57.501 and 57.503.

(b) *SCS Report.* If the fugitive emission control plan submitted under paragraph (a) of this section proposes to meet the requirements of §§ 57.501 and 57.503 through the additional use of a supplementary control system, the plan shall demonstrate that the use of supplementary controls at that smelter to prevent violations of the NAAQS resulting from fugitive emissions is practicable, adequate, reliable, and enforceable. The plan shall contain increments of progress providing for completion of the implementation of each additional measure, and for corresponding compliance with the requirements of pararaphs (b) and (c) of § 57.404, within four months of approval of the plan by the issuing agency. The plan shall also provide that within three months after completion of implementation of those additional measures, the smelter shall fully comply with the requirements of §§ 57.401 and 57.501 (including the assumption of liability for violations of NAAQS within its designated liability area), and shall submit and additional SCS report for the approval of the issuing agency. This additional final report shall correspond to that submitted under § 57.405(b)(2), except that it need not contain the 3-month study described in § 57.405(b)(2)(iii).

(c) *NSO amendment.* The amendments of the NSO required under § 57.503 shall be affected by the issuing agency as follows:

(1) With respect to the additional use of SCS, upon approval or promulgation of the plan submitted under paragraph (a) of this section and upon approval or promulgation of the requirements for the system described in the additional SCS Report under paragraph (b) of this section;

(2) With respect to the additional use of engineering techniques, upon approval or promulgation of the compliance schedule required by paragraph (a) of this section.

§ 57.705 Contents of SIP Compliance Schedule required by § 57.201(d) (2) and (3).

This section applies to smelters which are required to submit a SIP Compliance Schedule as discussed below.

(a) Each SIP Compliance Schedule required by § 57.201(d) (2) and (3) must contain the following elements:

(1) Description of the overall design of the SO_2 control system(s) to be installed;

(2) Descriptions of specific process hardware to be used in achieving compliance with the SIP emission limitation including gas capacity values;

(3) The date by which contracts will be let or purchase orders issued to accomplish any necessary performance improvements;

(4) The date for initiating on-site construction or installation of necessary equipment;

(5) The date by which on-site construction or installation of equipment is to be completed;

(6) The date for achievement of final compliance with SIP emission limitations; and

(7) Any other measures necessary to assure compliance with all SIP requirements as expeditiously as practicable.

(b) *Operations of SCS.* Smelters to which § 57.705 is applicable must comply with all elements of § 57.703.

Subpart H—Waiver of Interim Requirement for Use of Continuous Emission Reduction Technology

§ 57.801 Purpose and scope.

(a) This subpart shall govern all proceedings for the waiver of the interim requirement that each NSO provide for the use of constant controls.

(b) In the absence of specific provisions in this subpart, and where appropriate, questions arising at any stage of the proceeding shall be resolved at the discretion of the Presiding Officer or the Administrator, as appropriate.

§ 57.802 Request for waiver.

(a) *General.* (1) Each smelter owner requesting a waiver shall complete, sign, and submit appendix A (Test for Eligibility for Interim Waiver). Copies of appendix A may be obtained from any EPA Regional Administrator, or from the Director, Stationary Source Compliance Division (EN–341), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460. Claims of confidentiality shall be made as provided in § 57.203.

(2) The smelter owner shall append to the completed and signed appendix A full copies of all documents, test results, studies, reports, scientific literature and assessments required by appendix A. To the extent that the material consists of generally available published material, the smelter owner may cite to the material in lieu of appending it to appendix A. The smelter owner shall specificially designate those portions of any documents relied upon and the facts or conclusions in appendix A to which they relate.

(b) *Effect of submitting incomplete application.* (1) The Administrator, or a person designated by him to review applications for waivers, may advise the smelter owner in writing whenever he determines that additional information is needed in order to make the waiver eligibility determinations required by section 119(d)(2) of the Act. The smelter owner shall promptly supply such information. All additional information requested under this paragraph and filed in the manner required by paragraph (d) shall be deemed part of appendix A.

(2) Failure to comply with the requirements of paragraphs (a) and (b)(1) of this section shall be grounds for denial of the requested waiver.

(c) *Time for requesting waivers.* Any request for a waiver must be submitted to the Administrator by the smelter owner at the time of the application for an NSO from the State or the Administrator, as the case may be. Where a smelter was issued a second period NSO by a State before these regulations went into effect, a request for a waiver shall be made and a completed appendix A shall be submitted, within sixty days of the effective date of these regulations, unless an extension is granted by the Administrator, or his designee, for good cause.

(d) *Submission of request.* A copy of appendix A (plus attachments) which has

been completed for the purpose of requesting a waiver of constant control requirements shall be filed with the Administrator, addressed as follows: Director, Stationary Source Compliance Division (EN–341), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attn: Confidential Information Unit.

(e) *Eligibility*. A smelter shall be eligible for consideration under this subpart only if it establishes that (1) its existing strong stream controls, if any, lack the capacity while in full operation to treat all strong stream sulfur dioxide emissions and (2) bypass of strong stream controls due to excess strong stream sulfur dioxide emissions cannot be avoided with improved operation and maintenance of existing strong stream controls and process equipment.

(f) *Criteria for decision*. The Administrator shall grant or approve a waiver, whichever is appropriate, for any eligible smelter as to which he finds, in accordance with the methods and procedures specified in appendix A, that:

(1) The higher of the two net present values of future cash flows completed under the two alternative sets of assumptions set forth in the instructions to schedule D.6 in appendix A in less than liquidation (salvage) value; or

(2) The smelter's average variable costs at all relevant levels of production (after installation of interim constant control equipment) would exceed the weighted average price of smelter output for one year or more.

§ 57.803 Issuance of tentative determination; notice.

(a) *Tentative determination*. (1) The EPA staff shall formulate and prepare:

(i) A ''Staff Computational Analysis,'' using the financial information submitted by the smelter owner under § 57.802 to evaluate the economic circumstances of the smelter for which the waiver is sought;

(ii) A tentative determination as to whether an interim requirement for the use of constant controls would be so costly as to necessitate permanent or prolonged temporary cessation of operations at the smelter for which the waiver is requested. The tentative determination shall contain a ''Proposed Report and Findings'' summarizing the conclusions reached in the Staff Computational Analysis, discussing the estimated cost of interim controls, and assessing the effect upon the smelter of requiring those controls. The tentative determination shall also contain a proposed recommendation that the waiver be granted or denied, based upon the Proposed Report and Findings, and stating any additional considerations supporting the proposed recommendation. This tentative determination shall be a public document.

(2) In preparing the Proposed Report and Findings, the EPA staff shall attempt to the maximum extent feasible to avoid revealing confidential information which, if revealed, might damage the legitimate business interests of the applicant. The preceding sentence notwithstanding, the tentative determination shall be accompanied by a listing of all materials considered by EPA staff in developing the tentative determination. Subject to the provisions of § 57.814(a), full copies of all such materials shall be included in the administrative record under § 57.814, except that, to the extent the material consists of published material which is generally available, full citations to that material may be given instead.

(b) *Public notice*. Public notice of EPA's tentative determination to grant or deny an application for a waiver shall be given by:

(1) Publication at least once in a daily newspaper of general circulation in the area in which the smelter is located; and

(2) Posting in the principal office of the municipality in which the smelter is located.

(c) *Individual notice*. Individual notice of EPA's tentative determination to grant or deny an application for a waiver shall be mailed to the smelter owner by certified mail, return receipt requested, and to the air pollution control agency for the State in which the smelter is located.

(d) *Request for individual notice.* EPA shall mail notice of its tentative determination to grant or deny an application for waiver to any person upon request. Each such request shall be submitted to the Administrator in writing, shall state that the request is for individual notice of tentative determination to grant or deny any application for a waiver under section 119(d) of the Clean Air Act, and shall describe the notice or types of notices desired (e.g., all notices, notices for a particular Region, notices for a particular State, notice for a particular city).

(e) *Form of notice.* The notice of tentative determination required to be distributed under paragraphs (b), (c), and (d) of this section shall include, in addition to any other materials, the following:

(1) A summary of the information contained in appendix A;

(2) The tentative determination prepared under paragraph (a) of this section: Provided, that except in the case of the smelter owner, a summary of the basis for the grant or denial of the waiver may be provided in lieu of the formal determinations required by paragraph (a)(1) of this section;

(3) A brief description of the procedures set forth in § 57.804 for requesting a public hearing on the waiver request, including a statement that such request must be filed within 30 days of the date of the notice;

(4) A statement that written comments on the tentative determination submitted to EPA within 60 days of the date of the notice will be considered by EPA in making a final decision on the application; and

(5) The location of the administrative record and the location at which interested persons may obtain further information on the tentative determination, including a copy of the index to the record, the tentative determination prepared under paragraph (a) of this section, and any other nonconfidential record materials.

§ 57.804 Request for hearing; request to participate in hearing.

(a) *Request for hearing.* Within 30 days of the date of publication or receipt of the notice required by § 57.803, any person may request the Administrator to hold a hearing on the tentative determination by submitting a written request containing the following:

(1) Identification of the person requesting the hearing and his interest in the proceeding;

(2) A statement of any objections to the tentative determination; and

(3) A statement of the issues which such person proposes to raise for consideration at such hearing.

(b) *Grant or denial of hearing; notification.* Whenever (1) the Administrator has received a written request satisfying the requirements of paragraph (a) of this section which presents genuine issues as to the effect on the smelter of the requirement for use of constant controls, or (2) the Administrator determines in his discretion that a hearing is necessary or appropriate the Administrator shall give written notice of his determination to each person requesting such hearing and the smelter owner, and shall provide public notice of his determination in accordance with § 57.803(b). If the Administrator determines that a request filed under paragraph (a) of this section does not comply with the requirements of paragraph (a) or does not present genuine issues, he shall be given written notice of his decision to deny a hearing to the person requesting the hearing.

(c) *Form of notice of hearing.* Each notice of hearing disseminated under paragraph (b) of this section shall contain:

(1) A statement of the time and place of the hearing;

(2) A statement identifying the place at which the official record on the application for waiver is located, the hours during which it will be open for public inspection, and the documents contained in the record as of the date of the notice of hearing;

(3) The due date for filing a written request to participate in the hearing under paragraph (d) of this section;

(4) The due date for making written submissions under 57.805; and

(5) The name, address, and office telephone number of the hearing Clerk for the hearing.

(d) *Request to participate in hearing.* Each person desiring to participate in any hearing granted under this section, including any person requesting such a

hearing, shall file a written request to participate with the Hearing Clerk by the deadline set forth in the notice of hearing. The request shall include:

(1) A brief statement of the interest of the person in the proceeding;

(2) A brief outline of the points to be addressed;

(3) An estimate of the time required; and

(4) If the request is submitted by an organization, a nonbinding list of the persons to take part in the presentation. As soon as practicable, but in no event later than two weeks before the scheduled date of the hearing, the Hearing Clerk shall make available to the public and shall mail to each person who asked to participate in the hearing a hearing schedule.

(e) *Effect of denial of or absence of request for hearing.* If no request for a hearing is made under this section, or if all such requests are denied under paragraph (b) of this section, the tentative determination issued under § 57.803 shall be treated procedurally as if it were a recommended decision issued under § 57.811(b)(2), except that for purposes of §§ 57.812 and 57.813 the term ''hearing participant'' shall be construed to mean the smelter owner and any person who submitted comments under § 57.803(e)(4).

§ 57.805 Submission of written comments on tentative determination.

(a) *Main comments.* Each person who has filed a request to particpate in the hearing shall file with the Hearing Clerk no later than 30 days before the scheduled start of the hearing (or such other date as may be set forth in the notice of hearing) any comments which he has on the request for waiver and EPA's tentative determination, based on information which is or reasonably could have been available to that person at the time.

(b) *Reply comments.* Not later than two weeks after a full transcript of the hearing becomes available (or such other date as may be set forth in the notice of hearing), each person who has filed a request to participate in the hearing shall file with the Hearing Clerk any comments he may have on:

(1) Written comments submitted by other participants pursuant to paragraph (a) of this section;

(2) Written comments submitted in response to the notice of hearing;

(3) Material in the hearing record; and

(4) Material which was not and could not reasonably have been available prior to the deadline for submission of main comments under paragraph (a) of this section.

(c) *Form of comments.* All comments should be submitted in quadruplicate and shall include any affidavits, studies, tests or other materials relied upon for making any factual statements in the comments.

(d) *Use of comments.* (1) Written comments filed under this section shall constitute the bulk of the evidence submitted at the hearing. Oral statements at the hearing should be brief, and restricted either to points that could not have been made in written comments, or to emphasizing points which are made in the comments, but which the participant believes can be more forcefully urged in the hearing context.

(2) Notwithstanding the foregoing, within two weeks prior to either deadline specified by paragraph (a) of this section for the filing of main comments, any person who has filed a request to participate in the hearing may file a request with the Presiding Officer to submit all or part of his main comments orally at the hearing in lieu of submitting written comments. The Presiding Officer shall, within one week, grant such request if he finds that such person will be prejudiced if he is required to submit such comments in written form.

§ 57.806 Presiding Officer.

(a) *Assignment of Presiding Officer.* (1) The Administrator shall, as soon as practicable after the granting of a request for hearing under § 57.803, request that the Chief Administrative Law Judge assign an Administrative Law Judge as Presiding Officer. The Chief Administrative Law Judge shall thereupon make the assignment.

(2) If the parties to the hearing waive their right to have the Agency or an Administrative Law Judge preside at

the hearing, the Administrator shall appoint an EPA employee who is an attorney to serve as presiding officer.

(b) *Powers and duties of Presiding Officer*. It shall be the duty of the Presiding Officer to conduct a fair and impartial hearing, assure that the facts are fully elicited, and avoid delay. The Presiding Officer shall have authority to:

(1) Chair and conduct administrative hearings held under this subpart;

(2) Administer oaths and affirmations;

(3) Receive relevant evidence: Provided, that the administrative record, as defined in § 57.814, shall be received in evidence;

(4) Consider and rule upon motions, dispose of procedural requests, and issue all necessary orders;

(5) Hold conferences for the settlement or simplification of the issues or the expediting of the proceedings; and

(6) Do all other acts and take all measures necessary for the maintenance of order and for the efficient, fair and impartial conduct of proceedings under this subpart.

[50 FR 6448, Feb. 15, 1985, as amended at 57 FR 5328, Feb. 13, 1992]

§ 57.807 Hearing.

(a) *Composition of hearing panel*. The Presiding Officer shall preside at the hearing held under this subpart. An EPA panel shall also take part in the hearing. In general, the membership of the panel shall consist of EPA employees having special expertise in areas related to the issues to be addressed at the hearing, including economists and engineers. For this reason, the membership of the panel may change as different issues are presented for discussion.

(b) *Additional hearing participants*. Either before or during the hearing, the Presiding Officer, after consultation with the panel, may request that a person not then scheduled to participate in the hearing (including an EPA employee or a person identified by any scheduled hearing participant as having knowledge concerning the issues raised for discussion at the hearing) make a presentation or make himself available for cross-examination at the hearing.

(c) *Questioning of hearing participants*. The panel members may question any person participating in the hearing. Cross-examination by persons other than panel members shall not be permitted at this stage of the proceeding except where the Presiding Officer determines, after consultation with the panel, that circumstances compel such cross-examination. However, persons in the hearing audience, including other hearing participants, may submit written questions to the Presiding Officer for the Presiding Officer to ask the participants, and the Presiding Officer may, after consultation with the panel, and in his sole discretion, ask these questions.

(d) *Submission of additional material*. Participants in the hearing shall submit for the hearing record such additional material as the hearing panel may request within 10 days following the close of the hearing, or such other period of time as is ordered by the Presiding Officer. Participants may also submit additional information for the hearing record on their own accord within 10 days after the close of the hearing.

(e) *Transcript*. A verbatim transcript shall be made of the hearing.

§ 57.808 Opportunity for cross-examination.

(a) *Request for cross-examination*. After the close of the panel hearing conducted under this part, any participant in that hearing may submit a written request for cross-examination. The request shall be received by EPA within one week after a full transcript of the hearing becomes available and shall specify:

(1) The disputed issue(s) of material fact as to which cross-examination is requested. This shall include an explanation of why the questions at issue are factual, rather than of an analytical or policy nature; the extent to which they are in dispute in the light of the record made thus far, and the extent to which and why they can reasonably be considered material to the decision on the application for a waiver; and

(2) The person(s) the participant desires to cross-examine, and an estimate

of the time necessary. This shall include a statement as to why the cross-examination requested can be expected to result in full and true disclosure resolving the issue of material fact involved.

(b) *Order granting or denying request for cross-examination.* As expeditiously as practicable after receipt of all requests for cross-examination under paragraph (a) of this section, the Presiding Officer, after consultation with the hearing panel, shall issue an order either granting or denying each such request, which shall be disseminated to all persons requesting cross-examination and all persons to be cross-examined. If any request for cross-examination is granted, the order shall specify:

(1) The issues as to which cross-examination is granted;

(2) The persons to be cross-examined on each issue;

(3) The persons allowed to conduct cross-examination;

(4) Time limits for the examination of witnesses; and

(5) The date, time and place of the supplementary hearing at which cross-examination shall take place. In issuing this ruling, the Presiding Officer may determine that one or more participants have the same or similar interests and that to prevent unduly repetitious cross-examination, they should be required to choose a single representative for purposes of cross-examination. In such a case, the order shall simply assign time for cross-examination by that single representative without identifying the representative further.

(c) *Supplementary hearing.* The Presiding Officer and at least one member of the original hearing panel shall preside at the supplementary hearing. During the course of the hearing, the Presiding Officer shall have authority to modify any order issued under paragraph (b) of this section. A verbatim transcript shall be made of this hearing.

(d) *Alternatives to cross-examination.* (1) No later than the time set for requesting cross-examination, a hearing participant may request that alternative methods of clarifying the record (such as the submittal of additional written information) be used in lieu of or in addition to cross-examination. The Presiding Officer shall issue an order granting or denying such request at the time he issues (or would have issued) an order under paragraph (b) of this section. If the request is granted, the order shall specify the alternative provided and any other relevant information (e.g., the due date for submitting written information).

(2) In passing on any request for cross-examination submitted under paragraph (a) of this section, the Presiding Officer may, as a precondition to ruling on the merits of such request, require that alternative means of clarifying the record be used whether or not a request to do so has been made under the preceding paragraph. The person requesting cross-examination shall have one week to comment on the results of utilizing such alternative means, following which the Presiding Officer, as soon as practicable, shall issue an order granting or denying such person's request for cross-examination.

§ 57.809 Ex parte communications.

(a) *General.* (1) No interested person outside the Agency or member of the Agency trial staff shall make or knowingly cause to be made to any member of the decisional body an *ex parte* communication relevant to the merits of the proceedings.

(2) No member of the decisional body shall make or knowingly cause to be made to any interested person outside the Agency or member of the Agency trial staff an ex parte communication relevant to the merits of the proceedings.

(b) *Effect of receipt of ex parte communication.* (1) A member of the decisional body who receives or who makes or knowingly causes to be made a communication prohibited by this subsection shall place in the record all written communications or memoranda stating the substance of all oral communications together with all written responses and memoranda stating the substance of all responses.

(2) Upon receipt by any member of the decisionmaking body of an ex parte communication knowingly made or knowingly caused to be made by a party or representative of a party in violation of this section, the person

presiding at the stage of the hearing then in progress may, to the extent consistent with justice and the policy of the Clean Air Act, require the party to show cause why its claim or interest in the proceedings should not be dismissed, denied, disregarded, or otherwise adversely affected on account of such violation.

(c) *Definitions.* For purposes of this section, the following definitions shall apply:

(1) *Agency trial staff* means those Agency employees, whether temporary or permanent, who have been designated by the Agency as available to investigate, litigate, and present the evidence arguments and position of the Agency in the evidentiary hearing or non-adversary panel hearing. Appearance as a witness does not necessarily require a person to be designated as a member of the Agency trial staff;

(2) *Decisional body* means any Agency employee who is or may be reasonably expected to be involved in the decisional process of the proceeding including the Administrator, Presiding Officer, the Regional Administrator (if he does not designate himself as a member of the Agency trial staff), and any of their staff participating in the decisional process. In the case of a non-adversary panel hearing, the decisional body shall also include the panel members whether or not permanently employed by the Agency;

(3) *Ex parte communication* means any communication, written or oral, relating to the merits of the proceeding between the decisional body and an interested person outside the Agency or the Agency trial staff which was not originally filed or stated in the administrative record or in the hearing. Ex parte communications do not include:

(i) Communications between Agency employees other than between the Agency trial staff and the member of the decisional body;

(ii) Discussions between the decisional body and either:

(A) Interested persons outside the Agency, or;

(B) The Agency trial staff if all parties have received prior written notice of such proposed communications and have been given the opportunity to be present and participate therein.

(4) *Interested person outside the Agency* includes the smelter owner, any person who filed written comments in the proceeding, any person who requested the hearing, any person who requested to participate or intervene in the hearing, any participant or party in the hearing and any other interested person not employed by the Agency at the time of the communications, and the attorney of record for such persons.

[50 FR 6448, Feb. 15, 1985, as amended at 57 FR 5328, Feb. 13, 1992]

§ 57.810 Filing of briefs, proposed findings, and proposed recommendations.

Unless otherwise ordered by the Presiding Officer, each hearing participant may, within 20 days after reply comments are submitted under § 57.805(b), or if a supplementary hearing for the purpose of cross-examination has been held under § 57.808(c), within 20 days after the transcript of such supplemental hearing becomes available or if alternative methods of clarifying the record have been used under § 57.808(d), within 20 days after the alternative methods have been employed, file with the Hearing Clerk and serve upon all other hearing participants proposed findings and proposed recommendations to replace in whole or in part the findings and recommendations contained in the tentative determination. Any such person may also file, at the same time, a brief in support of his proposals, together with references to relevant pages of transcript and to relevant exhibits. Within 10 days thereafter each participant may file a reply brief concerning alternative proposals. Oral argument may be held at the discretion of the Presiding Officer on motion of any hearing participant or sua sponte.

§ 57.811 Recommended decision.

As soon as practicable after the conclusion of the hearing, one or more responsible employees of the Agency shall evaluate the record for preparation of a recommended decision and shall prepare and file a recommended decision with the Hearing Clerk. The employee(s) preparing the decision will generally be members of the hearing panel and may include the Presiding

Officer. Such employee(s) may consult with and receive assistance from any member of the hearing panel in drafting a recommended decision and may also delegate the preparation of the recommended decision to the panel or to any member or members of it. This decision shall contain the same elements as the tentative determination. After the recommended decision has been filed, the Hearing Clerk shall serve a copy of such decision on each hearing participant and upon the Administrator.

§ 57.812 Appeal from or review of recommended decision.

(a) *Exceptions.* (1) Within 20 days after service of the recommended decision, any hearing participant may take exception to any matter set forth in such decision or to any adverse order or ruling of the Presiding Officer prior to or during the hearing to which such participant objected, and may appeal such exceptions to the Administrator by filing them in writing with the Hearing Clerk. Such exceptions shall contain alternative findings and recommendations, together with references to the relevant pages of the record and recommended decision. A copy of each document taking exception to the recommended decision shall be served upon every other hearing participant. Within the same period of time each party filing exceptions shall file with the Administrator and shall serve upon all hearing participants a brief concerning each of the exceptions being appealed. Each brief shall include page references to the relevant portions of the record and to the recommended decision.

(2) Within 10 days of the service of exceptions and briefs under paragraph (a)(1) of this section, any hearing participant may file and serve a reply brief responding to exceptions or arguments raised by any other hearing participant together with references to the relevant portions of the record, recommended decision, or opposing brief. Reply briefs shall not, however, raise additional exceptions.

(b) *Sua sponte review by the Administrator.* Whenever the Administrator determines *sua sponte* to review a recommended decision, notice of such intention shall be served upon the parties by the Hearing Clerk within 30 days after the date of service of the recommended decision. Such notice shall include a statement of issues to be briefed by the hearing participants and a time schedule for the service and filing of briefs.

(c) *Scope of appeal or review.* The appeal of the recommended decision shall be limited to the issues raised by the appellant, except when the Administrator determines that additional issues should be briefed or argued. If the Administrator determines that briefing or argument of additional issues is warranted, all hearing participants shall be given reasonable written notice of such determination to permit preparation of adequate argument.

(d) *Argument before the Administrator.* The Administrator may, upon request by a party or sua sponte, set a matter for oral argument. The time and place for such oral argument shall be assigned after giving consideration to the convenience of the parties.

§ 57.813 Final decision.

(a) *After review.* As soon as practicable after all appeal or other review proceedings have been completed, the Administrator shall issue his final decision. Such a final decision shall include the same elements as the recommended decision, as well as any additional reasons supporting his decisions on exceptions filed by hearing participants. The final decision may accept or reject all or part of the recommended decision. The Administrator may consult with the Presiding Officer, members of the hearing panel or any other EPA employee in preparing his final decision. The Hearing Clerk shall file a copy of the decision on all hearing participants.

(b) *In the absence of review.* If no party appeals a recommended decision to the Administrator and if the Administrator does not review it sua sponte, he shall be deemed to have adopted the recommended decision as the final decision of the Agency upon the expiration of the time for filing any exceptions under § 57.812(a).

(c) *Timing of judicial review.* For purposes of judicial review, final Agency action on a request for a waiver of the

interim requirement that each NSO provide for the use of constant controls shall not occur until EPA approves or disapproves the issuance of an NSO to the source requesting such a waiver.

§ 57.814 Administrative record.

(a) *Establishment of record.* (1) Upon receipt of request for a waiver, an administrative record for that request shall be established, and a Record and Hearing Clerk appointed to supervise the filing of documents in the record and to carry out all other duties assigned to him under this subpart.

(2) All material required to be included in the record shall be added to the record as soon as feasible after its receipt by EPA. All material in the record shall be appropriately indexed. The Hearing Clerk shall make appropriate arrangements to allow members of the public to copy all nonconfidential record materials during normal EPA business hours.

(3) Confidential record material shall be indexed under paragraph (a)(2). Confidential record material shall, however, be physically maintained in a separate location from public record material.

(4) Confidential record material shall consist of the following:

(i) Any material submitted pursuant to § 57.802 for which a proper claim of confidentiality has been made under section 114(c) of the Act and 40 CFR part 2; and

(ii) The Staff Computational Anaylsis prepared under § 57.803

(b) *Record for issuing tentative determination.* The administrative record for issuing the tentative determination required by § 57.803 shall consist of the material submitted under § 57.802 and any additional materials supporting the tentative determination.

(c) *Record for acting on requests for cross-examination.* The administrative record for acting on requests for cross-examination under § 57.808 shall consist of the record for issuing the tentative determination, all comments timely submitted under §§ 57.803(e)(4) and 57.805, the transcript of the hearing, and any additional material timely submitted under § 57.807(d).

(d) *Record for preparation of recommended decision.* The administrative record for preparation of the recommended decision required by § 57.811 shall consist of the record for acting on request for cross-examination, the transcript of any supplementary hearing held under § 57.808(c), any materials timely submitted in lieu of or in addition to cross-examination under § 57.808(d), and all briefs, proposed findings of fact and proposed recommendations timely submitted under § 57.810.

(e) *Record for issuance of final decision.* (1) Where no hearing has been held, the administrative record for issuance of the Administrator's final decision shall consist of the record for issuing the tentative determination, any comments timely submitted under § 57.803(e)(4), any briefs or reply briefs timely submitted under § 57.812 (a) through (c), and the transcript of any oral argument granted under § 57.812(d).

(2) Where a hearing has been held, the administrative record for issuance of the Administrator's final decision shall consist of the record of preparation of the recommended decision, any briefs or reply briefs submitted under § 57.812 (a) through (c), and the transcript of any oral argument granted under § 57.812(d).

§ 57.815 State notification.

The Administrator shall give notice of the final decision in writing to the air pollution control agency of the State in which the smelter is located.

§ 57.816 Effect of negative recommendation.

No waiver of the interim requirement for the use of constant controls shall be granted by the Administrator or a State unless the Administrator or a State first takes into account the Administrator's report, findings, and recommendations as to whether the use of constant controls would be so costly as to necessitate permanent or prolonged temporary cessations of operation of the smelter.

APPENDIX A TO PART 57—PRIMARY NONFERROUS SMELTER ORDER (NSO) APPLICATION

INSTRUCTIONS

1. *General Instructions*
1.1 Purpose of the Application
1.2 NSO Financial Tests

1.3 Confidentiality
2. *NSO Financial Reporting Overview*
2.1 Revenue and Cost Assignment
2.2 Transfer Prices on Affiliated Party Transactions
2.3 Forecasting Requirements
2.4 EPA Furnished Forecast Data
2.5 Applicant Generated Forecasts
2.6 Weighted Average Cost of Capital for Nonferrous Metal Producers
2.7 Horizon Value
2.8 Data Entry
2.9 Use of Schedules
2.10 Use of Exhibits

DETAILED INSTRUCTIONS FOR EACH SCHEDULE

A.1 Historical Revenue Data
A.2 Historical Cost Data
A.3 Historical Profit and Loss Summary
A.4 Historical Capital Investment Summary
B.1 Pre-Control Revenue Forecast
B.2 Pre-Control Cost Forecast
B.3 Pre-Control Forecast Profit and Loss Summary
B.4 Constant Controls Revenue Forecast
B.5 Constant Controls Cost Forecast
B.6 Constant Controls Forecast Profit and Loss Summary for the Profit Protection Test
B.7 Profit Protection Test
C.1 Constant Controls Forecast Profit and Loss Summary for the Rate of Return Test
C.2 Constant Controls Sustaining Capital Investment Forecast
C.3 Historical Capital Investment in Constant Dollars
C.4 Rate of Return Test
C.5 Horizon Value of Cash Flows for the Rate of Return Test
D.1 Interim Controls Revenue Forecast
D.2 Interim Controls Cost Forecast
D.3 Interim Controls Forecast Profit and Loss Summary
D.4 Interim Controls Sustaining Capital Investment Forecast
D.5 Cash Proceeds from Liquidation
D.6 Permanent Waiver from Interim Controls Test
D.7 Horizon Value of Cash Flows for the Interim Controls Test

1. General Instructions

1.1 Purpose of the application. This application provides financial reporting schedules and the accompanying instructions for EPA's determination of eligibility for a nonferrous smelter order (NSO), and for a waiver of the interim constant controls requirement of an NSO. Although the determination of eligiblity for an NSO is prequisite for the determination of a waiver, appendix A, as a matter of convenience to applicants, includes both the NSO and waiver tests and reporting schedules.

In order to support an NSO eligibility determination, the applicant must submit operating and financial data as specified by the schedules included in this application. Specific instructions for completing each schedule are provided in subsequent sections of the instructions. In general, applicants must provide:

(a) Annual income statements, balance sheets and supporting data covering the five most recent fiscal years for the smelter for which the NSO requested.

(b) Forecasts of operating revenues, operating costs, net income from operations and capital investments for the firm's smelter operations subject to this application, on the basis of anticipated smelter operations without any sulfur dioxide air pollution control facilities that have not been installed as of the NSO application date.

(c) Forecasts of operating revenues, operating costs, net income from operations and capital investments for the firm's smelter operations subject to this application, on the basis of anticipated smelter operations with expected additional sulfur dioxide control facilities required to comply with the smelter's SIP emission limitation.

(d) For smelters applying for a waiver of interim constant controls, forecasts of operating revenues, operating costs, and capital investments for the firm's smelter operations prepared on the basis of two alternative assumptions: (1) Installation of additional pollution control facilities required to comply with interim constant control requirements, no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of an NSO, and closure of the smelter after January 1, 1988; and (2) installation of additional pollution control facilities required to comply with interim constant control requirements, installation of any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, and continued operation of the smelter after January 1, 1988.

1.2 NSO financial tests. EPA will use separate tests to determine eligibility for an NSO and to evaluate applications for a waiver of the interim constant control requirement. The two tests for NSO eligibility employ a present value approach for determining the reasonable availability of constant control technology that will enable an applicant to achieve full compliance with its SIP sulfur dioxide emission limitation. The tests for the waiver of the interim constant control requirements employ variable costing and discounted cash flow standards for evaluating an applicant's economic capability to implement those requirements.

1.2.1 *NSO Eligibility Tests.* Each applicant must establish that the system of production and/or constant control technology that will enable the smelter to achieve full compliance with its SIP SO_2 emission limitation

standard is not reasonably available. An applicant will determine financial eligibility for an NSO by passing at least one of the following two tests.

(a) *Profit Protection Test.* The smelter will experience a reduction in pre-tax profits of 50 percent or more after undertaking the required installation of constant controls.

(b) *Rate of Return Test.* The smelter will earn a rate of return on historical net investment, expressed in constant dollars, below the industry average cost of capital after undertaking the required installation of constant controls.

1.2.2 *Temporary Waiver from Interim Controls.* Applicants that do not have an existing constant control system or whose constant controls are not sufficient when in operation and optimally maintained to treat all strong streams in accordance with subpart C, may apply for a waiver of the requirements of subpart C with respect to any interim constant controls not already installed. Applicants will be eligible for a temporary waiver of the requirement for interim constant controls not already installed, if they can establish pursuant to the procedures in this application that the imposition of such control requirements would economically necessitate closure of the smelter facility for a period of one year or longer. The economic justification for a non-permanent closure under this temporary waiver test is defined as a situation in which the smelter's projected operating revenues for one or more years during which the NSO is in effect are inadequate to cover variable operating costs anticipated after installing the required interim control technology. Temporary waivers will be granted for only the period of time over which applicants can establish an inability by the firm to cover its variable operating costs. Interim control waiver requests based on the smelter's projected inability to earn adequate income after installation of interim pollution control equipment will be subject to the permanent waiver test.

1.2.3 Permanent Waiver from Interim Controls. Applicants that do not have an existing constant control system or whose constant controls are not sufficient when in operation and optimally maintained to treat all strong streams in accordance with subpart C, may apply for a waiver of the requirements of subpart C with respect to any interim constant controls not already installed. Applicants will be eligible for a permanent waiver of the requirement for interim constant controls not already installed, if they can establish pursuant to the procedures in this application that an imposition of such control requirements would necessitate permanent closure of the smelter. Economic justification for a permanent closure is defined as a situation in which the present value of future cash flows anticipated from the smelter after installing the required interim control technology is less than the smelter's current salvage value under an orderly plan of liquidation. Future cash flows are determined under two alternative assumptions. The higher present value of cash flows computed under these assumptions is then compared to salvage value.

1.2.4 EPA Contact for NSO Inquiries. Inquiries concerning this portion of the requirements for NSO application should be addressed to Laxmi M. Kesari, Environmental Protection Agency, EN 341, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

1.2.5 Certification. The NSO Certification Statement must be signed by an authorized officer of the applicant firm.

1.3 Confidentiality. Applicants may request that information contained in this application be treated as confidential. Agency regulations concerning claims of confidentiality of business information are contained in 40 CFR part 2, subpart B (41 FR 36902 *et seq.*, September 1, 1976, as amended by 43 FR 39997 *et seq.*, September 8, 1978). The regulations provide that a business may, if it desires, assert a business confidentiality claim covering part or all of the information furnished to EPA. The claim must be made at the same time the applicable information is submitted. The manner of asserting such claims is specified in 40 CFR 2.203(b). Information covered by such a claim will be handled by the Agency in accordance with procedures set forth in the subpart B regulations. EPA will not disclose information on a business that has made a claim of confidentiality, except to the extent of and in accordance with 40 CFR part 2, subpart B. However, if no claim of confidentiality is made when information is furnished to EPA, the information may be made available to the public without notice to the business.

2. NSO Financial Reporting Overview

2.1 Revenue and Cost Assignment. The amounts assigned to operations of the smelter subject to this NSO application should include (1) revenues and costs directly attributable to the smelter's operating activities and (2) indirect operating costs shared with other segments of the firm to the extent that a specific causal and beneficial relationship can be identified for the allocation of such costs to the smelter. Do not allocate revenues and costs associated with central administrative activities for which specifc causal and beneficial relationships to the activities of the smelter cannot be established. Nonallocable items include, but are not restricted to, amounts such as dividend and interest income on centrally administered portfolio investments, central corporate administrative office expenses and, except for schedules supporting the Profit Protection

Test, interest on long-term debt financing arrangements. Provide a detailed explanation of amounts classified as nontraceable on a separate schedule and attach as part of Exhibit B.

2.2 Transfer Prices on Affiliated Part Transactions. Certain transactions by the smelter subject to an NSO application may reflect sales to or purchases from ''affiliated'' customers or suppliers with whom the smelter has a common bond of ownership and/or managerial control. In preparing this application, affiliated party transactions shall be defined as transactions with any entity that the firm, or its owners, controls directly or indirectly either through an ownership of 10 percent or more of the entity's voting interests or through an exercise of managerial responsibility. Applicants must attach as part of Exhibit B supporting schedules explaining the pricing policies established on affiliated party transactions incorporated in the financial reporting schedules.

Prices on inter-segment material and product transfers within a firm, or on external purchases from and sales to other affiliated suppliers and customers, may differ from the prices on comparable transactions with unaffiliated suppliers and customers. In this event, applicants also must present in the Exhibit B supporting schedules and incorporate in the NSO financial reporting schedules appropriate adjustments for restating affiliated party transactions. Affiliated party transactions must be restated at either (a) equivalent prices on comparable transactions with unaffiliated parties if such price quotations can be obtained or (b) prices that provide the selling entity with a normal profit margin above its cost of sales if a meaningful comparison with unaffiliated transaction prices cannot be established.

A ''normal'' profit margin is defined as the gross operating profit per dollar of operating revenue that will provide an average after-tax rate of return on permanent capital (total assets less current liabilities). This average rate of return is defined differently for the historical and forecast periods. The applicant must use a rate of return of 8.0 percent for the *historical* period. This figure is based on a historoical average earned rate of return for the nonferrous metals industry.[1] EPA may update this figure periodically. The updates will be available in the rulemaking docket or from the INFORMATION CONTACT noted in the FEDERAL REGISTER. For the *forecast* period, the applicant must use a rate of return equal to the current weighted average cost of capital for the nonferrous metals industry, as computed in Section 2.6.

[1] The derivation of this figure is explained in two memoranda to EPA (Item Nos. II–A–1 and IV–A–6a in EPA Docket No. A–82–35).

Forecast smelting charges for integrated smelters can be computed from forecast market smelting charges. Integrated copper smelters may use as the basis of their forecast revenues the forecast copper smelting charges provided by EPA, adjusted as described in Section 2.4.1. An applicant may submit other forecasts, providing the forecast methodology is in accordance with the guidelines in Section 2.5 and fully documented as part of Exhibit B.

2.3 Forecasting Requirements. NSO applicants must provide the Agency with financial forecasts in Schedules B.1 through B.6 and C.1 through C.2. Applicants requesting either a temporary or permanent waiver from interim constant control requirements also must provide an additional set of financial forecasts in Schedules D.1 through D.4.

2.3.1 Forecast Period. The forecast period must include at least two full years following completion and startup of the required pollution control system. The forecast period shall be from 1984 through 1990 for an NSO application filed in 1984. If an application is filed in a later year, the 1984 through 1990 period should be adjusted accordingly. All references in this appendix to the period 1984 through 1990 should be interpreted accordingly.

2.3.2 Forecast Adjustment by Control Case. Some line items that have the same title in several schedules may contain different information because they are based on different assumptions regarding pollution controls. Production interruptions or curtailments due to the installation of pollution control facilities may require adjustmens to certain revenue and cost estimates in the repective control cases. For example, production curtailments associated with supplementary control systems may be the basis for the pre-control case, yet are eliminated when constant controls replace supplementary control systems in the constant controls case. The application of pollution control techniques that involve process changes in the smelter's operations (e.g., conversion to flash smelting) also may require specific forecasts by applications of associated impacts on incremental operating revenues and costs.

2.3.3 Nominal Dollar Basis. Applicants must make their financial forecasts in terms of nominal dollars. Forecasts of selected parameters provided by EPA will furnish quidelines to an applicant in preparing the required cost and revenue estimates. In particular, copper smelting charges provided in nominal-dollar terms must be used dierctly by the applicant as given; i.e., the stipulated charge estimates should not be inflated.

2.3.4 Tolling Service Equivalent Basis. Applicants must express all revenue forecasts on a tolling service equivalent basis. Thus,

forecast revenues are computed as the product of the forecast quantity of processed concentrate, the forecast average product grade of the concentrate (the percent of metal in the concentrate), and the forecast smelting charge. Smelters that are not tolling smelters and that do not use the copper smelting charges provided by EPA (as described in Section 2.4.1) can forecast a smelting charge from forecast product grade of the concentrate, percent recovery, and product and concentrate prices. The forecast prices and derivation of the smelting charge must be in accordance with the guidelines in Section 2.5, and the methodology must be fully documented in Exhibit B.

2.4 EPA Furnished Forecast Data. In making projection for the period 1984 through 1990, applicants must, except as noted below, use the indices provided by EPA. The table below presents yearly values for each index (expressed as annual percentage rates of change) to be used by smelters applying for an NSO before January 1, 1985. If forecasts are needed for 1991 and EPA has not provided new forecasts, applicants should use the Data Resources, Inc. forecasts for 1991 (Docket Item No. IV–A–6c) and the average of CRU's forecasts for 1989 and 1990 (expressed in 1991 dollars).

	1984	1985	1986	1987	1988	1989	1990
Copper smelting charge [1] (cents per pound)	14.5	14.6	16.0	15.3	15.3	15.5	15.4
Annual Percentage Rates of Change							
Wages	5.0	5.7	5.8	6.1	6.4	6.7	7.0
Energy prices:							
Electricity	7.0	8.8	8.1	8.3	7.1	4.9	5.5
Natural gas	3.6	5.7	9.3	8.7	9.2	8.0	8.4
Coal	5.1	7.0	8.9	9.0	9.7	9.7	9.7
Fuel oil	1.6	4.2	7.7	6.8	9.8	9.5	9.9
GNP price deflator	4.8	5.0	5.0	5.2	5.8	5.8	5.9

[1] Reference charge for calculating smelter-specific copper smelting charges as described in Section 2.4.1.

2.4.1 Copper smelting charge. EPA will supply a forecast of reference copper smelting charges. These charges, which are f.o.b. U.S. mine, are based on an estimate of export smelting charges and on the differential value of copper in the U.S. and the world market. They must be used in forecasting unaffiliated party revenues for the period following the expiration of existing contracts and in forecasting affiliated party revenues for the entire forecast period. The applicant may submit its own smelting charge forecast for the post-contract period, provided that such forecast is in accordance with the guidelines in Section 2.5 and fully documented and substantiated as part of Exhibit B.

The EPA forecast export charge represents the world market copper smelting charge with copper valued at the London Metal Exchange (LME) copper price. This charge serves as the reference charge for the applicant copper smelter in calculating its smelting charges. Applicant copper smelters must derive their smelting charges from this world market charge as described in paragraph (a) below.

The applicant may adjust the derived smelter-specific smelting charge to account for other factors, provided the adjustments are fully documented as part of Exhibit B. An example of such a factor is the unit deduction for metallurgical losses in smelting. Adjustment for this factor is discussed in paragraph (b) below.

(a) The derivation of a smelter-specific smelting charge from the world market charge is based on assumptions regarding transportation costs and the U.S. producer-world copper price differential. The EPA forecast export charge is the forecast smelting charge available at a Japanese smelter, with copper valued at the London Metal Exchange copper price. The charge includes no freight costs, which must be paid by the mine. A U.S. smelter determines its smelting charge to a mine by meeting the combined world market smelting charge, adjusted to reflect copper valued at the U.S. producer price, and the transportation charge from the mine to the Japanese smelter. This combined price is the highest that a mine is willing to pay for smelting.

The smelter's net smelting charge is equal to the combined world smelting charge, adjusted to the U.S. producer price for copper (i.e., the export forecast charge plus the U.S. producer price premium), and the transportation cost between the mine and a Far East smelter, minus the cost of transporting the concentrate between the mine and the applicant smelter.

The applicant smelter's net smelting charge for concentrate from an individual mine is computed by first adding the U.S. producer Price-LME world price differential to the EPA-supplied forecast. The cost of transporting copper from the U.S. mine to the Far East is then added to this figure. The

net smelting charge is obtained by subtracting from this total the cost of transporting copper from the mine to the applicant smelter. In making these calculations, an applicant must supply (and fully document in Exhibit B), the freight cost between the mine and the Far East and between the mine and the smelter. This freight cost must be converted to nominal dollars of the respective forecast years by applying the GNP percentage price change forecasts supplied by EPA or smelter-provided forecasts of transportation price changes. The smelter-provided forecasts of transportation price changes must comply with guidelines regarding such forecasts in Section 2.5.

An applicant must use a 3 cent per pound U.S. producer price premium (relative to the LME price) in calculating the smelter's net smelting charge. The applicant may substitute its own forecasts of the U.S. producer price premium if it can substantiate such forecasts in accordance with the guidelines in Section 2.5 regarding applicant-provided smelting charge forecasts of principal products. All supporting documentation for such applicant-supplied forecasts must be supplied in Exhibit B. Any updates of the producer price premium will be available in the rulemaking docket or from the INFORMATION CONTACT noted in the FEDERAL REGISTER.

The following two representative examples illustrate this methodology for making the transportation and U. S. producer price premium adjustment.

(1) The applicant smelter, located in Arizona, obtains concentrate from an adjacent mine. The freight charge from mine to smelter is zero. The mine is willing to pay the applicant smelter an amount no higher than the sum of the world market smelting charge (adjusted for the copper value differential) and the transportation cost of shipping copper from the mine to the Far East. This combined cost is the net charge received by the applicant smelter. If the export smelting charge is 12 cents per pound and the freight cost between the mine and the Far East is 13 cents per pound, the applicant smelter would calculate a net smelting charge equal to 28 cents: 12 cents plus 3 cents (for the U.S. producer price premium) plus 13 cents (for the freight cost between the mine and the Far East).

(2) The applicant smelter obtains concentrate from a nonadjacent mine. The mine will pay a charge no higher than the total market smelting charge, valued at the U.S. producer price, and the transportation costs between the mine and a Far East smelter. The applicant's net smelting charge is equal to this combined cost minus the transportation costs for shipping the concentrate between mine and applicant smelter.

Suppose that the mine to Far East freight charge is 13 cents per pound and the mine to applicant smelter freight charge is 4 cents per pound. If the export smelting charge is 12 cents per pound, the net smelting charge is equal to 24 cents per pound: 12 cents plus 3 cents (for the U.S. producer price premium) plus 13 cents (for the freight cost to the Far East) minus 4 cents (for the freight cost to the applicant smelter).

(b) The EPA forecast charges are based on a one unit deduction for metallurgical losses. This means that if a concentrate grades 25 percent copper, the mine is only credited with 24 percent for metal return. The one unit deduction on 25 percent concentrate is equivalent to a 96 percent payment for contained copper. Should a smelter recover less than 96 percent, its revenue would be less than the EPA forecast smelting charge. Should a smelter recover more than 96 percent, its revenue would be greater than the EPA forecast smelting charge.

2.4.2 Indices (Annual Percentage Changes). These indices, which are expressed as annual percentage rate changes in price (wages, energy prices, and GNP price deflator) must be used only for estimating the rate of price increases for the forecast period following the expiration of the applicant's current contracts. The applicant may use alternative forecasts of annual percentage changes for the forecast period following the expiration of current contracts, if justification is provided. Any such alternative forecasts must be prepared by a widely-recognized forecasting authority with expertise comparable to that of the forecaster relied upon by EPA. In addition, the documentation of these forecasts must be comparable to that provided by EPA's forecaster.

The wage indices are to be applied to wage paid to manufacturing labor. The energy price indices are to be applied to prices of the respective energy products. The GNP price deflators are to be applied to prices for non-metal, non-labor, and non-energy inputs.

2.5 Applicant Generated Forecasts. Within the specified limitations, applicants may submit a method of forecasting smelting charges and by-product, co-product and other prices. The method selected must be explained and unit prices or costs provided where applicable. The forecast elements must be compatible with an applicant's historical cost and revenue elements to permit direct comparisons of historical and forecast data. Applicants must attach as part of Exhibit B appropriate schedules explaining variances between forecast and historical unit costs for the smelter.

Forecasts of the smelting charges of the smelter's principal product (i.e., copper, lead, zinc, etc.) may be prepared either by an independent forecasting authority or by the smelter's in-house personnel. If the forecasts are prepared by an independent forecasting authority, the following conditions must be satisfied: (1) The forecasting authority must

have expertise comparable to that of the forecaster relied upon by EPA. (2) As much documentation of the forecasting methodology as can reasonably be obtained must be made available to EPA. Such documentation must, at a minimum, be comparable to the documentation supporting EPA smelting charge forecasts.[2]

If the smelting charge forecasts are prepared by in-house personnel, the following conditions must be met: (1) The in-house forecasts must be certified as being based on sound methodology by an independent forecasting authority with expertise comparable to that of the forecaster who prepared the EPA-supplied smelting charges. The independent forecasting authority shall also provide a brief explanation of the basis for the conclusion reached in the certification. (2) The smelter owner shall provide EPA with the documentation of the forecasting methodology employed, which must at a minimum be comparable to the extent of documentation supporting EPA's smelting charge forecasts. The smelter owner shall also make available upon request by EPA such additional documentation of the methodology and underlying data as EPA considers appropriate for evaluation of the forecasts.

Forecasts of freight cost changes, which are applied to the freight costs used in calculating a smelter's net smelting charges, must be prepared by a widely-recognized forecasting authority. The forecaster's expertise must be comparable to that of the forecaster relied upon by EPA in forecasting the annual percentage changes in wages, energy prices, and GNP. The documentation of these forecasts must be comparable to that provided by EPA's forecaster.

To the maximum extent practicable, byproduct, co-product and (when applicable) unaffiliated smelting charges must be stated at market prices adjusted to f.o.b. smelter. Adjustments of these pricing bases must be made to reflect differences in grades and types of production. All adjustments must be consistent with expected sales, grades and types of concentrate processed. Applicants must attach as part of Exhibit B schedules describing and explaining the methods used to forecast these revenue items and the adjustments required for these revenue forecasts.

Applicants must explain fully any changes from the historical data that are required to forecast labor productivity, ore-concentrate grade and composition, materials and energy consumption per unit of output, yield rates and other physical input/output relationships.

Existing contractual terms must be used in forecasting those sales or input costs or prices to which the applicant is committed by contracts. The use of contract-dictated prices must be disclosed and supported by attaching as part of Exhibit B the terms and duration of labor and other supplier arrangements.

Cost of compliance estimates need not be to the accuracy of final design/bid estimates; feasibility grade estimates will be acceptable. Updated cost of compliance estimates used in internal five year plans or specially prepared estimates of costs of compliance will generally be satisfactory.

2.6 Weighted Average Cost of Capital for Nonferrous Metal Producers. The industry average cost of capital is a weighted average of the rates of return for equity and debt. Its components are the interest rate and the return on equity specific to the nonferrous metals industry.

2.6.1 Computation.[3] The applicant must compute the cost of capital according to the following formula:

$$R = (0.65 \times E) + (0.182 \times I)$$

where

R = weighted average cost of capital
E = return on equity
I = interest rate.

The components are calculated as follows.

(a) *Return on equity for the nonferrous metals industry*. The 20 year Treasury bond yield to maturity plus a risk premium of 8.6 percent.

(b) *Interest Rate*. The 20 year Treasury bond yield to maturity plus a risk premium of 3.0 percent.

(c) *Source of the 20 Year Treasury bond yield*. *Federal Reserve Bulletin*, most recent monthly issue. Use the average yield for the most recent full month.

2.6.2 Discount Factor. The discount factor corresponding to the weighted average cost of capital for any forecast year is computed according to the following equation:

$$DF = \frac{1}{(1+R)} N$$

where

DF = discount factor
R = weighted average cost of capital
N = the number of years in the future (e.g., for the applicant applying in 1984, N = for the forecast year 1985).

The horizon value, which is described in Section 2.7, is computed as of 1990, the end of the detailed forecast period. The discount factor to be applied to the horizon value is

[2] Documentation of the EPA forecasts is provided as part of Item NO. IV–A–2 in EPA Docket No. A–82–35.

[3] The derivation of the formula and the basis of the parameters are explained in two memoranda to EPA (Item Nos. II–A–1 and IV–A–6a in EPA Docket No. A–82–35).

the same as for any other 1990 figure. For example, if the application is made in 1984, the value of N is 7.

2.7 Horizon Value. The horizon value is the present value of a stream of cash flows or net income for 15 years beyond the last forecast year. Applicants must compute the horizon value by capitalizing the average forecast value of the last two forecast years using the current real weighted cost of capital. The line item instructions for schedules having a horizon value entry will specify the values to be capitalized.

The applicant averages the values of the last two years after expressing both values in terms of the last year's dollars. The two-year average value is then multiplied by 9.6. This is the factor associated with capitalizing a 15 year value stream at the current *real* weighted cost of capital of 6.2 percent.

Applicants must use a separate schedule to calculate the horizon value for the Rate of Return Test and the Interim Controls Test (Schedule C.5 and D.7, respectively). These separate schedules adjust for potential overstatements in the horizon value cash flows that may be caused by control equipment depreciation reported for tax purposes.

2.8 Data Entry

2.8.1 Rounding. All amounts (including both dollar values and physical units) reported in the schedules and exhibits accompanying this application must be rounded to the nearest thousand and expressed in thousands of dollars or units unless otherwise indicated in the instructions.

2.8.2 Estimates. Where an applicant's records cannot produce the specific data required by this application, the use of estimates will be allowed if a meaningful estimate can be made without significant distortion of the reported results. Data estimates must be supported by attaching on a separate sheet of paper as a part of Exhibit B an explanation identifying where such estimates are used and showing explicitly how the estimates were made.

2.8.3 Missing Data. Applicants must provide, where applicable, all operating and financial data requested by this application. Only substantially complete applications can be accepted for processing by the Agency. Questions concerning data entries for which information is not provided by or cannot reasonably be estimated from the applicant's existing accounting records should be addressed to the EPA Contact for NSO Inquiries.

2.8.4 Historical Period. The annual data requested in the historical schedules, Schedules A.1 through A.4, must be reported for each of the five fiscal years immediately preceding the year in which this application is filed. The historical period shall be from fiscal years 1979 through 1983 for an NSO application filed in 1984. If an application is filed in a later year, the references in this appendix to the period 1979 through 1983 should be interpreted accordingly.

2.9 Use of schedules. All applicants must complete Schedules A.1 through A.4, which record historical revenues, cost, and capital investment data. These schedules will be used by EPA to assist in evaluating forecast data. Completion of the remaining schedules depends on the test required of the applicant.

2.9.1 NSO Eligibility. An NSO applicant must pass one of the following two tests and complete the corresponding schedules.

(a) *Profit Protection Test*. The applicant must complete Schedules B.1 through B.7 to determine eligibility under the Profit Protection Test. Schedules B.1 and B.2 report the base case (without constant controls) revenue and cost forecast, respectively, and Schedule B.3 summarizes Schedules B.1 and B.2. Base case production forecasts should reflect any production curtailments associated with interim controls currently (preforecast) installed on smelters. Schedules B.4 and B.5 report the revenue and cost forecast, respectively, for the constant controls case, and Schedule B.6 summarizes Schedules B.4 and B.5 for the Profit Protection Test.

Schedule B.7 presents the calculations for the Profit Protection Test. The applicant enters the forecast profits from Schedules B.3 and B.6. The present value of the forecast profits is then computed for each case. If the present value of forecast pre-tax profits with constant controls is less than 50 percent of the present value of forecast pre-tax profits without controls (base case) the smelter passes the test and is eligible for an NSO. The smelter also passes the test if the present value of forecast pre-tax profits without controls (base case) is negative.

(b) *Rate of Return Test*. The applicant must complete Schedules B.4, B.5, and C.1 through C.5 to determine eligibility under the Rate of Return Test. Schedules B.4 and B.5 report the revenue and cost forecast, respectively, for the constant controls case, and Schedule C.1 summarizes Schedules B.4 and B.5 for the Rate of Return Test. Schedule C.2 reports forecast sustaining capital investment for the constant controls case. Schedule C.3 reports historical net investment for the most recent fiscal year expressed in constant dollars, i.e., dollars of the year in which the application is made.

Schedule C.4 presents the calculations for the Rate of Return Test. The applicant reports in Schedule C.4 the forecast cash flows from Schedules C.1 and C.2 and the horizon value from Schedule C.5, computes their present value, and subtracts the value of invested capital in constant dollars (taken from Schedule C.3) to yield net present value. If the net present value is less than zero, the smelter passes the test and is eligible to receive an NSO. This result indicates that the smelter is expected to earn a rate of

return less than the industry average cost of capital.

2.9.2 Interim Control Waivers. An applicant for a waiver from interim controls must complete either a portion or all of Schedules D.1 through D.7, depending on whether the application is for a temporary or permanent waiver.

(a) *Temporary Waiver from Interim Controls Test*. The applicant must complete Schedules D.1 through D.3 to establish eligibility for a temporary waiver from interim controls. Schedules D.1 and D.2 report forecast revenue and cost data under the assumption of installation of interim constant control equipment and no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of the NSO. Schedule D.3 summarizes Schedules D.1 and D.2 and calculates gross operating profit. If gross operating profit is negative for any year during which the NSO is in effect, the applicant is eligible for a temporary waiver.

(b) *Permanent Waiver from Interim Controls Test*. The applicant must complete Schedules D.1 through D.7. All schedules except for Schedule D.5 must be completed twice, based on two alternative assumptions: (1) installation of interim constant control equipment, no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of the NSO, and closure of the smelter after January 1, 1988; and (2) installation of interim constant control equipment, installation of any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, and continued operation of the smelter after January 1, 1988.

Schedules D.1 and D.2 report forecast revenue and cost data under each assumption. Schedule D.3 summarizes Schedules D.1 and D.2, and Schedule D.4 reports forecast sustaining capital under each assumption. Schedule D.5 reports cash proceeds from liquidation.

Schedule D.6 presents the calculations for the permanent waiver test. In Schedule D.6, the applicant reports cash flow projections from Schedules D.3 and D.4 and the horizon value from Schedule D.7, computes their present value and subtracts the current salvage value (taken from Schedule D.5) to yield net present value. The higher of the two net present value figures computed under the two alternative assumptions must be used in the test. If the higher net present value figure is negative, the applicant is eligible for a permanent waiver.

2.10 Use of exhibits. In addition to data required by the schedules included in this application, the following information must be attached as exhibits.

2.10.1 Exhibit A. Background information on the firm's organizational structure and its associated accounting and financial reporting systems for primary nonferrous activities. This information must include, where applicable, the firm's:

(a) Operating association with an ownership control in consolidated subsidiaries, unconsolidated subsidiaries, joint ventures and other affiliated companies.

(b) Organizational subdivision of its primary nonferrous activities into profit centers, cost centers and/or related financial reporting entities employed to control the operation of its mines, concentrators, smelters, refineries and other associated facilities.

(c) Material and product flows among the smelter subject to this NSO application, other integrated facilities and its affiliated suppliers and/or customers. In the case of integrated facilities, applicants must provide process flow diagrams depicting the operating interrelationships among its mines, concentrators, smelters, refineries and other integrated facilities. For both integrated and nonintegrated facilities, applicants also must describe the proportion contributed to its primary nonferrous activities by material purchases from and product sales to affiliated suppliers and customers.

(d) Annual operating capacity over the five most recent fiscal years for the smelter subject to this application. Operating capacity must be defined in terms of the total quantity of throughput that could have been processed with the available facilities after giving appropriate allowance to normal downtime requirements for maintenance and repairs. Operating capacity data also must consider both capacity balancing requirements among processing steps and annual processing yield rates attainable for each facility.

(e) Weighted average analysis of concentrates processed and tonnage produced annually over each of the five most recent fiscal years by the smelter subject to this application.

(f) Accounting system and policies for recording investment expenditures, operating revenues, operating costs and income taxes associated with its primary nonferrous activities. Applicants also must provide a complete description of allocation techniques employed for assigning investments, revenues, costs and taxes to individual profit, cost of departmental centers for which costs are accumulated. Applicants must further indicate the relationship of cost and/or departmental accounting entities to the firm's established profit centers.

(g) Annual five-year operating and capital expenditure plans (or budgets) by individual nonferrous profit center. These documents must include previous plans prepared for the five preceding fiscal years as well as the current one-year and five-year operating and

capital expenditure plans. At least the current one-year and five-year plans must provide a specific breakdown of investment expenditures and operating costs associated with the operation and maintenance of each profit center's existing and proposed pollution control facilities.

2.10.2 Exhibit B. Supplemental description and explanation of items appearing in the financial reporting schedules. Other parts of Section 2 and the detailed instructions for the Schedules specify the information required in Exhibit B.

2.10.3 Exhibit C. Financial data documentation. Applicants must document annual balance sheet, income statement and supporting data reported for the firm's preceding five fiscal years or for that portion of the past five years during which the firm engaged in smelter operations. This documentation must be provided by attaching to the application:

(a) SEC 10–K reports filed by the parent corporation for each of the preceding five fiscal years.

(b) Certified financial statements prepared on a consolidated basis for the parent corporation and its consolidated subsidiaries. This requirement may be omitted for those years in which SEC 10–K reports have been attached to this Exhibit.

(c) Business Segment Information reports filed with the Securities and Exchange Commission by the firm for each of the preceding five years (as available).

Schedule A.1—Historical Revenue Data

General. Use Schedule A.1 to report annual historical revenue data for fiscal years 1979 through 1983. Revenues include product sales and associated operating revenues, net of returns and allowances, from smelter sales and/or transfers of copper, lead, zinc and molybdenum or other nonferrous metal products and tolling services to both unaffiliated and affiliated customers. The line items in Schedule A.1 are explained in the following instructions.

Lines 01, 14, 27 and 40—Primary Nonferrous Product Sales. Report for each year the total quantity of copper, lead, zinc and molybdenum or other nonferrous metal product sales.

Lines 02, 15, 28 and 41—Unaffiliated Customer Sales. Report for each year the respective quantities of copper, lead, zinc and molybdenum or other nonferrous metal product sales to unaffiliated customers.

Lines 03, 16, 29 and 42—Unaffiliated Customer Revenues. Report for each year the total operating revenues derived from smelter sales of copper, lead, zinc and molybdenum or other nonferrous metals to unaffiliated customers.

Lines 04, 17, 30 and 43—Unaffiliated Customer Prices. Report for each year the average unit price received on smelter sales of copper, lead, zinc and molybdenum or other nonferrous metals to unaffiliated customers. The prices are computed as operating revenues reported on Lines 03, 16, 29 and 42 divided by the quantities reported on Lines 02, 15, 28 and 41, respectively.

Lines 05, 18, 31 and 44—Average Product Quality Grade. Report for each year the average quality rating assigned to copper, lead, zinc and molybdenum or other nonferrous metal products purchased by the smelter's unaffiliated customers.

Lines 06, 19, 32 and 45—Affiliated Customers Sales. Report for each year the respective quantities of copper, lead, zinc and molybdenum or other nonferrous metal product sales to affiliated customers.

Lines 07, 20, 33 and 46—Affiliated Customer Revenues. Report for each year the total operating revenues derived from smelter sales of copper, lead, zinc and molybdenum or other nonferrous metals to affiliated customers. These revenues should be stated at prices equivalent to those received on comparable sales to unaffiliated customers as described in Section 2.2. Attach as part of Exhibit B an explanation of the methodology used to state affiliated customer revenues.

Lines 08, 21, 34 and 47—Affiliated Customer Prices. Report for each year the average unit price received on smelter sales of copper, lead, zinc and molybdenum or other nonferrous metals to affiliated customers. The prices are computed as operating revenues reported on Lines 07, 20, 33 and 46 divided by the quantities reported on Lines 06, 19, 32 and 45, respectively.

Lines 09, 22, 35 and 48—Average Product Quality Grade. Report for each year the average quality rating assigned to copper, lead, zinc and molybdenum or other nonferrous metal products purchased by the smelter's affiliated customers.

Lines 10, 23, 36 and 49—Total Primary Product Revenues. Report for each year total operating revenues derived from the smelter's sales to unaffiliated and affiliated customers of copper (Lines 03+07), lead (Lines 16+20), zinc (Lines 29+33) and molybdenum or other nonferrous metals (Lines 42+46).

Lines 11, 24, 37 and 50—Transfer Price Adjustments. Report for each year operating revenue adjustments required to equate affiliated customer transfer prices with unaffiliated customer market prices on smelter sales of copper, lead, zinc and molybdenum or other nonferrous metals. Attach as part of Exhibit B an explanation of the method used for restating transfer prices where such adjustments are necessary.

Lines 12, 25, 38 and 51—Other Revenue Adjustments. Report for each year sales returns and allowances and other adjustments applicable to the smelter's revenues derived from copper, lead, zinc and molybdenum or other nonferrous metal product sales. Attach as

part of Exhibit B a schedule reporting the types and amounts of such adjustments.

Lines 13, 26, 39 and 52—Adjusted Product Revenues. Enter for each year the sums of Lines 10 through 12 for adjusted copper sales (Line 13), Lines 23 through 25 for adjusted lead sales (Line 26), Lines 36 through 38 for adjusted zinc sales (Line 39) and Lines 49 through 51 for adjusted molybdenum or other nonferrous metal sales (Line 52).

Line 53—Primary Metal Revenues. Enter for each year the sum of Lines 13, 26, 39 and 52.

Line 54—Toll Concentrates Processed. Report for each year the total quantity of toll concentrates processed.

Lines 55 to 58—Customer Toll Revenues. Report for each year the quantity of toll concentrates processed for unaffiliated customers (Line 55), total operating revenues derived from this processing (Line 56), average price charged per ton of concentrate processed (Line 57=Line 56/55) and the average quality rating assigned to toll concentrates processed for unaffiliated customers (Line 58).

Lines 59 to 62—Affiliated Customer Toll Revenues. Report for each year the quantity of toll concentrates processed for affiliated customers (Line 59), total operating revenues derived from such processing (Line 60), average price charged per ton of concentrate processed (Line 61=Line 60/59) and the average quality rating (Line 62) assigned to toll concentrates processed for affiliated customers.

Line 63—Tolling Service Revenues. Enter for each year the total of amounts reported on Lines 56 and 60.

Line 64—Transfer Price Adjustments. Report for each year operating revenue adjustments required to equate affiliated customer transfer prices with market prices charged to unaffiliated customers on the smelter's tolling services. Attach as part of Exhibit B an explanation of the method used for restating transfer prices where such adjustments are necessary.

Line 65—Other Revenue Adjustments. Report for each year other adjustments applicable to the smelter's tolling service revenues. Attach as part of Exhibit B a schedule reporting the types and amounts of such adjustments.

Line 66—Adjusted Tolling Service Revenues. Enter for each year the total of Lines 63 through 65.

Line 67—Co-Product Revenues. Report for each year the net revenues from sales of co-products derived from the smelter's operations. Attach as part of Exhibit B a schedule showing by individual type of co-product, the quantity produced and sold, market price per unit of sales and total revenues derived from the co-product sales.

Line 68—Pollution Control By-product Revenues. Report for each year revenues from the sale of by-products derived from operation of the smelter's pollution control facilities. Attach as part of Exhibit B a schedule showing by type of by-product produced, the quantity of output, market price received per unit of output sold and total revenue derived from the by-product sales.

Line 69—Other By-product Revenues. Report for each year revenues from the sales of gold, silver and other by-products derived from the smelter's operations. Attach as part of Exhibit B a schedule providing additional documentation as specified in the instruction for Line 68.

Line 70—Total Co-product and By-product Revenues. Enter for each year the total of Lines 67 through 69.

Schedule A.2—Historical Cost Data

General. Use Schedule A.2 to report annual historical cost and input quantities for smelter operations for fiscal years 1979 through 1983. The line items in Schedule A.2 are explained in the following instructions.

Line 01—Total Quantity Purchased. Report for each year the total quantity of concentrates purchased by the smelter. This will be sum of Lines 02 and 06. Do not include the quantity of toll concentrates.

Line 02—Quantity Purchased. Report for each year the total quantity of concentrates purchased from unaffiliated suppliers by the smelter. Attach as a part of Exhibit B a description of the types and grades of these concentrates. Do not include the quantity of toll concentrates.

Line 03—Concentrate Cost. Report for each year the outlays paid to unaffiliated suppliers for concentrates. Attach as part of Exhibit B an explanation of the method(s) used in determining these outlays and relationship between concentrate prices and the types and grades of concentrates purchased from unaffiliated suppliers.

Line 04—Average Unit Price. Report for each year the average unit price paid for purchases of concentrates from unaffiliated suppliers. Generally, this value will be equivalent to Line 03 divided by Line 02. If this equivalency does not hold, attach as a part of Exhibit B an explanation of the variance.

Line 05—Average Concentrate Grade. Report for each year the average concentrate grade of concentrates purchased from unaffiliated suppliers. Attach as part of Exhibit B an explanation of this average. The average should correspond to the average price reported in Line 04.

Line 06—Quantity Purchased. Report for each year the total quantity of concentrates purchased from affiliated suppliers by the smelter. Attach as part of Exhibit B a description of the types and grades of these concentrates. Do not include the quantity of toll concentrates.

Line 07—Concentrate Cost. Report for each year the actual outlays paid to affiliated

suppliers for concentrates. Attach as part of Exhibit B an explanation of the method(s) used in determining these outlays and relationship between concentrate prices and the types and grades of concentrates purchased from affiliated suppliers. Do not reflect any adjustments to market prices here.

Line 08—Average Unit Price. Report for each year the average unit price paid for purchases of concentrates from affiliated suppliers. Generally, this value will be equivalent to Line 07 divided by Line 06. If this equivalency does not hold, attach as part of Exhibit B an explanation of the variance.

Line 09—Average Concentrate Grade. Report for each year the average concentrate grade of concentrates purchased from affiliated suppliers. Attach as part of Exhibit B an explanation of this average. The average should correspond to the average price reported in Line 08.

Line 10—Total Concentrate Cost. Enter for each year the sum of Lines 03 and 07.

Line 11—Transfer Price Adjustments. Enter for each year the amounts required to adjust outlays paid to affiliated suppliers to market value. Refer to Section 2.2 for instructions on the restatement of affiliated party transactions. Attach as part of Exhibit B a description and the computations of any required cost adjustments.

Line 12—Other Cost Adjustments. Enter for each year the amounts of any other cost adjustments required such as freight or allowances. Attach as part of Exhibit B the identification and the derivation of these adjustments.

Line 13—Adjusted Concentrate Cost. Enter for each year the adjusted concentrate cost reflecting the adjustments reported in Lines 11 and 12.

Line 14—Direct Labor Hours. Report for each year the quantity of direct labor hours required to support the processing levels previously reported. Attach as part of Exhibit B an explanation of the labor productivity factor involved.

Line 15—Average Hourly Wage Rate. Report for each year the average wage rate paid per unit of direct labor input. Attach as part of Exhibit B a description of direct labor costs factors under existing labor contracts and an explanation of the method(s) used to determine wage rates.

Line 16—Total Wage Payments. Enter for each year the product of Lines 14 and 15.

Line 17—Supplemental Employee Benefits. Report adjustments required to direct labor costs for other employee compensation under supplemental benefit plans. Attach as part of Exhibit B a description of such plans and their costs and an explanation of the method(s) used to determine such costs.

Line 18—Total Production Labor Cost. Enter for each year the total of Lines 16 and 17.

Lines 19, 22, 25, 28 and 31—Energy Quantities. Report for each year the quantity of energy by type required to support the processing levels reported in the smelter's revenue. Attach as part of Exhibit B, an explanation of energy use factors and qualities considered in determining the smelter's energy requirements.

Lines 20, 23, 26, 29 and 32—Unit Prices. Report for each year a price paid per unit of energy input by type of energy. Attach as part of Exhibit B, a description of the energy price factors under existing energy contracts and an explanation of the method(s) used to determine unit energy prices.

Lines 21, 24, 27, 30 and 33—Total Payments. Enter for each year the products of quantity and prices paid for electricity (Lines 19×20), natural gas (Lines 22×23), coal (Lines 25×26), fuel oil (Lines 28×29), and other (Lines 31×32).

Line 34—Total Energy Costs. Enter for each year the total of Lines 21, 24, 27, 30 and 33.

Schedule A.3—Historical Profit and Loss Summary

General. Use Schedule A.3 to report annual revenues, cost and income taxes assignable to operation of the smelter subject to this NSO application for fiscal years 1979 through 1983. Assignable revenues and costs should include only the results of transactions either (1) directly associated with smelter operations or (2) for which the applicant can establish a causal and beneficial relationship with smelter operations pursuant to instructions in Section 2.1. The line items in Schedule A.3 are explained in the following instructions.

Line 01—Primary Metal Sales. Enter the totals reported in Schedule A.1, Line 40.

Line 02—Co-Product and By-Product Sales. Report for each year annual revenues, net or returns and allowances, derived from smelter sales and/or transfers of co-products and by-products to both unaffiliated and affiliated customers. Attach as part of Exhibit B a supporting schedule for each major co-product and by-product component of smelter revenues. Segregate the revenues reported by major co-product and by-product components into their unaffiliated customer and affiliated customer elements. Report for each component's unaffiliated and affiliated customer revenue elements the (1) average grade of product sold, (2) actual quantity sold, (3) average price per unit, and (4) total smelter revenues. Also show for each product line any adjustments required to restate transfer prices and explain the basis for such adjustments. Refer to Section 2.2 for instructions on the restatement of affiliated customer revenues.

Line 03—Tolling Service Revenues. Enter the totals reported in Schedule A.1, Line 53.

Line 04—Other Operating Revenues. Report for each year annual revenues directly associated with smelter operations that have not previously been reported on Lines 01 through 03. Attach as part of Exhibit B a schedule

showing the types and amounts of sales reported as other operating revenue. The following non-operating revenue and income items should *not* be included as other operating revenue or as a part of revenues reported on Lines 01 through 03.

Royalties, licensing fees and other income from intangibles.

Interest and dividend income on portfolio investments.

Equity in income (loss) of unconsolidated subsidiaries and affiliates.

Gain (loss) from discontinued operations and disposal of property.

Minority interest adjustment to consolidated subsidiary income.

Extraordinary items.

Line 05—Total Operating Revenue. Enter for each year the total of Lines 01 through 04.

Line 06—Concentrates Processed. Report the cost of concentrates processed and sold or transferred to unaffiliated and affiliated customers from Schedule A.2, Line 13. Concentrates purchased from unaffiliated suppliers should be valued at the actual prices paid. Concentrates purchased from affiliated suppliers should be valued at or, if necessary, restated to equivalent prices quoted by unaffiliated suppliers. If prices used to report revenues are c.i.f. and concentrate costs are f.o.b. smelter, all transportation charges paid on the smelter's or buyer's account should be excluded from smelter expense. Attach as part of Exhibit B supporting schedules showing the:

Annual value of concentrate purchases classified according to purchases from unaffiliated and affiliated suppliers.

Cost of sales adjustments to concentrate purchases for net annual additions to or withdrawals from concentrate inventories, freight-in on concentrate purchases and inventory spoilage.

Impact on cost of sales for restating, where applicable, the cost of concentrate purchases from affiliated suppliers to the equivalent prices paid to unaffiliated suppliers.

Volumes, grades and net prices of concentrate purchases from unaffiliated and affiliated suppliers by type of concentrate purchased.

Volumes, grades and net prices associated with toll concentrates processed by type of concentrate.

Line 07—Other Materials Costs. Report for each year annual costs incurred for flux, refractories, coke and other materials used by the smelter in its processing of concentrates. Materials purchased from unaffiliated suppliers should be valued at the actual prices paid after adjustment for transportation costs incurred. Materials purchased from affiliated suppliers should be valued at or, if necessary, restated to equivalent prices quoted by unaffiliated suppliers. Include in Exhibit B supporting schedules showing the:

Annual value of material purchases classified according to purchases from unaffiliated and affiliated suppliers.

Cost of sales adjustments to material purchases for net annual additions to or withdrawals from material inventories, freight costs on material purchases and inventory loss.

Impact on cost of sales for restating, where applicable, the costs of material purchases from affiliated suppliers to equivalent prices paid to unaffiliated suppliers.

Classification of other material costs by major cost factors for each cost component that exceeds 20 percent of any line item in the cost of sales schedule.

Line 08—Production Labor Costs. Report for each year total direct labor costs incurred by the smelter for processing purchased and toll concentrates, Schedule A.2, Line 18. Include in Exhibit B supporting schedules showing the:

Manhours and wage rates for major labor classifications.

Potential impact on wage rates of provision in the smelter's current labor contracts.

Explanation of major variances observed in direct labor costs over the five-year period as a result of factors such as strikes or new labor contracts.

Line 09—Energy Costs. Enter the totals reported in Schedule A.2, Line 34.

Line 10—Pollution Control Costs. Report for each year expenses incurred for operating and maintaining pollution control facilities. All by-product credits associated with pollution control facility operations should be eliminated and reported on Line 02. Depreciation and amortization charges against the smelter's pollution control facilities should be reported separately on Line 18. Attach as part of Exhibit B supporting schedules showing the:

Major pollution control cost elements with their values classified according to direct and indirect cost factors.

Techniques used to allocate indirect pollution control costs to major cost pools.

Line 11—Production Overhead. Report for each year the total costs for indirect labor, indirect materials and other production overhead costs associated with the smelter. Attach as part of Exhibit B a schedule showing annual overhead costs by major cost components associated with the smelter's operations. For each cost component, where appropriate, identify the quantity and unit price element of overhead costs.

Line 12—Other Production Costs. Report for each year annual smelter overhead and other production costs not previously reported on Lines 06 through 11. By-product credits, if any, should be eliminated and reported on

Line 02 as operating revenues. Attach as part of Exhibit B supporting schedules showing the:

Major cost elements classified according to direct and indirect production costs.

Disaggregation of major overhead cost components into their fixed and variable cost elements.

Allocation techniques used in assigning indirect overload costs to the major cost components.

Elements of overhead costs represented by purchases from affiliated suppliers and adjustments, if any, required to restate these costs on the basis of equivalent prices paid to unaffiliated supplier.

Line 13—Total Cost of Sales. Enter for each year the total of Lines 06 through 12.

Line 14—Gross Operating Profit. Enter for each year the difference between Lines 05 and 13.

Line 15—Selling, General & Administrative (SG&A) Expenses. Report for each year SG&A expenses attributable to the smelter's annual operating activities. Exclude those operating costs to be reported separately on Lines 16 through 21 and those costs for which causal and beneficial relationships to the smelter cannot be established. Attach as part of Exhibit B supporting schedules (1) segregating SG&A expenses by major expense components, (2) classifying the major expense components according to those costs incurred directly by smelter operations and costs allocated to the smelter from indirect cost pools, and (3) explaining the basis used for indirect cost allocations.

Line 16—Taxes, Other Than Income Tax. Report for each year all taxes (exclusive of Federal, State, local and foreign income taxes) assignable to the smelter's operations. Attach as part of Exhibit B, a schedule that (1) segregates these operating taxes by major component, (2) classifies each component according to direct and indirect cost elements, and (3) explains the basis used for indirect cost allocations.

Line 17—Research Costs. Report for each year research costs (exclusive of capitalized costs reported in Schedule A.4) that are assignable to the smelter's annual operations. Attach as part of Exhibit B a schedule (1) segregating exploration and research costs by major expense components, (2) classifying each expense component according to direct and indirect cost elements, and (3) explaining the basis used for indirect cost allocations.

Line 18—Pollution Control Depreciation and Amortization. Report for each year annual depreciation and amortization charges attributable to the smelter's investment in pollution control facilities and equipment. Reported charges should be computed in accordance with depreciation and amortization methods adopted for tax reporting purposes by the firm. Attach explanatory supporting schedules as part of Exhibit B.

Line 19—Other Facility Depreciation and Amortization. Report for each year annual depreciation and amortization charges (exclusive of charges reported on Line 18) assignable to the smelter's operations. Attach explanatory supporting schedules as part of Exhibit B.

Line 20—Interest on Short-Term Debt. Report for each year interest expense and associated financial charges on current liabilities in accordance with the assignment instructions in Section 2.1. Do not include interest on the portion of long-term debt due within the current year for each reporting period.

Line 21—Miscellaneous Operating Expenses. Report for each year any additional expenses assignable to the smelter's annual operations. Attach as part of Exhibit B a schedule (1) segregating these additional expenses into major expense components, (2) classifying each expense component according to costs incurred directly by the smelter and costs allocated to the smelter from indirect cost pools, and (3) explaining the basis used for indirect cost allocations.

Line 22—Total Other Operating Expenses. Enter for each year the total of Lines 15 through 21.

Line 23—Income from Operations. Enter for each year the difference between Lines 14 and 22.

Line 24—Gain/(Loss) from Disposition of Property. Report net gains or losses recognized during each year from disposition of property, plant and equipment. Report such gains or losses in accordance with the firm's normal practice for certified financial statement reporting. If such gains or losses are not significant and are classified otherwise, no reclassification need be made. A note to this effect must be included in Exhibit B.

Line 25—Miscellaneous Income and Expenses. Report minority interest in income, foreign currency translation effects, and other nonoperating income and expenses directly assignable to the smelter and not recognized elsewhere on this schedule. Report such items in accordance with the accounting methods used for certified financial reporting purposes.

Line 26—Total Other Income and Expenses. Enter for each year the sum of Lines 24 and 25.

Line 27—Net Taxable Income. Enter for each year the difference between Lines 23 and 26.

Schedule A.4—Historical Capital Investment Summary

General. Use Schedule A.4 to report annual end-of-period asset investments and current liabilities for fiscal years 1979 through 1983. These figures must correspond with the revenues and costs associated with operation of the smelter subject to this NSO application as reported in Schedule A.3.

The amounts assigned to the subject smelter should include both (1) investments and liabilities directly identifiable with the smelter's operating activities and (2) asset investments shared with other segments to the extent that a specific causal and beneficial relationship can be established for the intersegment allocation of such investments. Do not allocate to the smelter the costs of assets maintained for general corporate purposes. Provide a detailed explanation of amounts classified as nontraceable on a separate schedule and attach as part of Exhibit B.

Applicants shall also restate trade receivables and payables for transfer price adjustments on the smelter's transactions with affiliated customers. The line items in Schedule A.4 are explained in the following instructions.

Line 01—Cash on Hand and Deposit. Report for each year total cash balances assignable to the smelter's operations at the end of each year on the basis of causal and beneficial relationships with total corporate activities. Attach as part of Exhibit B in explanation of the basis used for allocation.

Line 02—Temporary Cash Investments. Report for each year temporary cash investments in time deposits or other short-term securities. Include only those investments either held by the smelter to meet current-period tax payments or other budgeted expenditures specifically identifiable with the smelter's continued operation. Exclude any temporary cash investments for which no specific future outlay requirement can be identified.

Attach as part of Exhibit B a schedule classifying temporary cash investments according to identifiable budgeted expenditure requirements.

Lines 03 and 04—Net Trade Receivables. Report for each year trade accounts and notes, net of reserves for uncollectible items, assignable to the smelter in relation to its unaffiliated (Line 03) and affiliated (Line 04) customer sales and transfers. Trade receivables reported by the smelter as due from affiliated customers should be stated or, if necessary, restated on credit terms equivalent to those received by unaffiliated customers on a sale of comparable products. Attach as part of Exhibit B a schedule showing adjustments in the smelter's receivables investments required to equate trade credit terms extended to affiliated and unaffiliated customers.

Lines 05 and 06—Inventory Investments. Report for each year respective end-of-period investments in raw material, work-in-process and finished good inventories held to support the smelter's production and sale of products (Line 05) and associated inventories of other materials and supplies (Line 06). These inventories must be valued at current market prices. Inventory purchases from affiliated suppliers should also be stated at current market prices or, if necessary, restated at current market prices prevailing on purchases from unaffiliated suppliers. Attach explanatory supporting schedules as part of Exhibit B.

Line 07—Other Current Assets. Report for each year prepaid expenses, deferred charges, non-trade notes and accounts receivable, and other assets classified as current for certified financial statement reporting purposes that are assignable to the smelter's operations. Attach as part of Exhibit B a schedule classifying these other current assets according to their types and amounts.

Line 08—Total Current Assets. Enter for each year the total of Lines 01 through 07.

Lines 09 to 14—Property, Plant and Equipment. Report for each year by individual line item property, plant and equipment investments assignable to smelter operations. Include in gross facility investments at the end of each period both (1) property, plant and equipment directly associated with the smelter's operations and (2) facilities shared with other operating segments to the extent that a causal and beneficial relationship can be established for the inter-segment allocation of such facility investments.

Attach as part of Exhibit B a schedule reporting by individual line item the annual capital expenditures on additional property, plant and equipment investments in the smelter's operations. Further classify these annual capital expenditures into both (1) investments required to maintain the smelter versus investments in smelter expansion and improvement and (2) direct facility versus joint-use facility investments. Explain the method used for allocating capital expenditures on joint-use facilities to the smelter's operations. Refer to Line 17 instructions for additional reporting requirements on the smelter's facility investments.

Line 15—Total Smelter Investment. Enter for each year the total of Lines 09 through 14.

Line 16—Accumulated Depreciation and Amortization. Report for each year accumulated depreciation, amortization and other valuation charges recorded for certified financial statement reporting purposes in relation to smelter investment as reported on Line 15. Other valuation charges are defined in Financial Accounting Standards Board (FASB) Statement No. 19 as losses recognized in connection with an impairment in the value of an unimproved property below its acquisition cost. Refer to Line 17 instructions for additional reporting requirements on smelter facility investments.

Line 17—Net Smelter Investment. Enter for each year the difference between Lines 15 and 16. Attach as part of Exhibit B a schedule classifying gross facility investments, accumulated depreciation, amortization charges, and net facility investments by major pollution control and non-pollution

control components. Identify for each asset component the direct versus joint-use investments assigned to the smelter and explain the basis used to allocate amounts associated with joint-use facilities to the smelter.

Line 18—Other Non-Current Assets. Report for each year other assets assignable to the smelter's operations. Attach as part of Exhibit B a schedule reporting by type and amount the major components of such investments.

Line 19—Total Smelter Capital Investment. Enter for each year the total of Lines 08, 17 and 18.

Line 20 and 21—Trade Accounts and Notes Payable. Report for each year trade accounts and notes due on the smelter's purchases from unaffiliated suppliers (Line 20) and on its intersegment transfers or purchases from affiliated suppliers (Line 21). Trade payables reported by the smelter as due to affiliated suppliers should be stated or, if necessary, restated on terms equivalent to those received from unaffiliated suppliers on a purchase of comparable materials. Attach as part of Exhibit B a schedule showing adjustments required on the smelter's trade payables to equate trade credit terms received from affiliated and unaffiliated suppliers.

Line 22—Other Expense Accruals. Report for each year payments classified as current for salaries and wages, other employee benefits, operating taxes and related operating expenses assignable to the smelter's operations. Attach as part of Exhibit B a schedule classifying by type and amount the major components of such accruals.

Line 23—Current Notes Payable. Report for each year payments due to nontrade creditors on short-term financing arrangements directly associated with the smelter's operations. Exclude current installments due on long-term debt financing arrangements, notes due to offices and directors, intersegment loans or advances and loans or advances from affiliated operating segments.

Line 24—Other Current Liabilities. Report for each year other nontrade payables classified as current obligations assignable to the smelter's operations.

Line 25—Total Current Liabilities. Enter for each year the total of Lines 20 through 24.

Line 26—Net Smelter Capital Investment. Enter for each year the difference between Lines 19 and 25.

Schedule B.1—Pre-Control Revenue Forecast

General. Use Schedule B.1 to report annual forecasts of operating revenues anticipated during the years 1984 through 1990 from operation of the smelter subject to this NSO application. These pre-control revenue projections should be based on revenues and production associated with operating the smelter without any SO_2 air pollution controls that have not been installed as of the NSO application date. Forecast smelter revenues should be expressed on a tolling service equivalent basis as described in Section 2.3.4.

Copper smelters that will process concentrates containing an average of 1,000 pounds per hour or more of arsenic during the forecast period should assume that they will use best engineering techniques to control fugitive emissions of arsenic. All smelters should also assume that they will be required to meet all other regulatory requirements in effect at the time the application is made.

The line items in Schedule B.1 are explained in the following instructions. Attach as part of Exhibit B schedules to (1) explain the methods used to make the required forecasts, (2) explain differences, if any, between historical trends and the forecasts and (3) provide data and information to support the forecasts.

Lines 01 and 05—Concentrates Processed. Report for each year the forecast quantity of concentrates processed for unaffiliated parties (Line 01) and affiliated parties (Line 05).

Lines 02 and 06—Smelting Charge. Report for each year the forecast smelting charge for unaffiliated parties (Line 02) and affiliated parties (Line 06). See Section 2.4 for forecast copper smelting charges furnished by EPA.

Lines 03 and 07—Total Smelter Revenues. Report for each year the forecast total operating revenues derived from processing concentrates. The total for unaffiliated parties (Line 03) is equal to the product of Lines 01, 02, and 04, and for affiliated parties (Line 07), the product of Lines 05, 06, and 08.

Lines 04 and 08—Average Product Grade. Report for each year the forecast average quality rating assigned to concentrates processed for unaffiliated parties (Line 04) and affiliated parties (Line 08).

Line 09—Total Co-Product Revenues. Report for each year the forecast net revenues from sales of co-products derived from the smelter's operations. Attach as part of Exhibit B a schedule showing by individual type of co-product, the forecast quantity produced and sold, forecast market price per unit of sales, and forecast total revenues derived from the co-product sales.

Line 10—Total By-product Revenues From Pollution Control Facilities. Report for each year forecast revenues from the sale of by-products derived from operation of the smelter's pollution control facilities, excluding any SO_2 air pollution controls that have not been installed as of the NSO application date. Attach as part of Exhibit B a schedule showing by type of by-product produced (e.g., sulfuric acid) the forecast quantity of output, forecast market price per unit of output sold, and forecast total revenue derived from the by-product sales.

Line 11—Total By-product Revenues From Other Smelter Processing. Report forecast revenues from the sales of gold, silver, and

other by-products derived from the smelter's operations. Attach as part of Exhibit B a schedule providing additional documentation as specified in the instructions for Line 10.

Line 12—Total Co-product and By-product Revenues. Enter for each year the total of Lines 09 through 11.

Schedule B.2—Pre-Control Cost Forecast

General. Use Schedule B.2 to report annual forecasts of operating costs anticipated during the years 1984 through 1990 from operation of the smelter subject to this NSO application. These pre-control cost projections should be based on costs and production associated with operating the smelter without any SO_2 air pollution controls that have not been installed as of the NSO application date.

Copper smelters that will process concentrates containing an average of 1,000 pounds per hour or more of arsenic during the forecast period should assume that they will use best engineering techniques to control fugitive emissions of arsenic. All smelters should also assume that they will be required to meet all other regulatory requirements in effect at the time the application is made.

The line items in Schedule B.2 are explained in the following instructions. Attach as part of Exhibit B schedules to (1) explain the methods used to make the required forecasts, (2) explain differences, if any, between historical trends and the forecasts, and (3) provide data and information to support the forecasts.

Line 01—Direct Labor Hours. Report for each year the quantity of direct labor hours required to support the processing levels previously reported. Attach as part of Exhibit B an explanation of the labor productivity factors involved.

Line 02—Average Hourly Wage Rate. Report for each year the forecast average wage rate per unit of direct labor input. Attach as part of Exhibit B a description of direct labor cost factors under any existing labor contracts that extend to the forecast period and an explanation of the methodology used to forecast wage rates. EPA-provided forecast wage indices are reported in Section 2.4.

Line 03—Total Wage Payments. Enter for each year the product of Lines 01 and 02.

Line 04—Supplemental Employee Benefits. Report for each year adjustments required to direct labor costs for other employee compensation under supplemental benefit plans. Attach as part of Exhibit B a description of such plans and their costs and an explanation of the methodology used to forecast such costs. EPA-provided forecast wage indices are reported in Section 2.4.

Line 05—Total Production Labor Cost. Enter for each year the total of Lines 03 and 04.

Lines 06, 09, 12, 15 and 18—Energy Quantities. Report for each year the quantity of energy by type required to support the processing levels reported in the smelter's revenue. Attach as part of Exhibit B an explanation of energy characteristics and use factors considered in forecasting the smelter's future energy requirements.

Lines 07, 10, 13, 16, and 19—Unit Prices. Report for each year the forecast price per unit of energy input by type of energy. Attach as part of Exhibit B a description of the energy price factors under any existing energy contracts that extend to the forecast period and an explanation of the methodology used to forecast unit energy prices. EPA-provided forecast energy indices are reported in Section 2.4.

Lines 08, 11, 14, 17, and 20—Total Payments. Enter for each year the products of quantity and prices paid for electricity (Lines 06×07), natural gas (Lines 09×10), coal (Lines 12×13), fuel oil (Lines 15×16), and other (Lines 18×19).

Line 21—Total Energy Costs. Enter for each year the total of Lines 08, 11, 14, 17, and 20.

Schedule B.3—Pre-Control Forecast Profit and Loss Summary

General. Use Schedule B.3 to report annual forecasts of operating revenues and operating costs derived in Schedules B.1 and B.2 for the years 1984 through 1990. The transfer of line items from Schedules B.1 and B.2 to this Schedule is explained in the following instructions.

Line 01—Smelter Revenues-Unaffiliated Parties. Enter the totals reported in Schedule B.1, Line 03.

Line 02—Smelter Revenues-Affiliated Parties. Enter the totals reported in Schedule B.1, Line 07.

Line 03—Co-product and By-product Sales Revenues. Enter the totals reported in Schedule B.1, Line 12.

Line 04—Other Operating Revenues. Report operating revenues anticipated from sources not accounted for under Lines 01 through 03. Refer to instructions for Line 04 of Schedule A.3 for items that should not be included in ''Other Operating Revenues.'' Attach as part of Exhibit B a schedule showing annual amounts forecast by individual revenue component for ''other'' operating revenues associated with the smelter's forecast pre-control operations. Identify in the supporting schedule any differences in the ''other'' revenue components reported in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 05—Total Operating Revenues. Enter for each year the total of Lines 01 through 04.

Line 06—Material Costs. Report total costs forecast for flux, refractories, coke and other materials directly associated with the smelter's processing of concentrates. Attach as part of Exhibit B a schedule showing the annual amounts forecast by major material cost components. For each cost component, identify the forecast quantity and unit price

elements of material cost and explain the basis for forecasting these quantity and price elements. Identify in the supporting schedule any differences in the ''other'' material cost components shown in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 07—Production Labor Costs. Enter the totals reported in Schedule B.2, Line 05.

Line 08—Energy Costs. Enter the totals reported in Schedule B.2, Line 21.

Line 09—Pollution Control Costs. Report the total costs forecast for expenses identifiable with operation and maintenance of all pollution control equipment and facilities except any SO2 air pollution controls that have not been installed as of the NSO application date. By-product credits associated with operation of the pollution control facilities should be eliminated from the cost accounts, reclassified to Schedule B.1, Line 10 and included in Line 03 of this Schedule. Attach a schedule as part of Exhibit B classifying pollution control costs by major cost components. Explain the basis used for estimating each of the cost components.

Line 10—Production Overhead Costs. Report the total costs forecast for indirect labor, indirect materials and other production overhead costs associated with the smelter's operations. Attach as part of Exhibit B a schedule showing annual overhead costs projected by major cost components associated with the smelter's operations. For each cost component, where appropriate, identify the forecast quantity and unit price elements of overhead costs and explain the basis for estimating these quantity and price elements. Also identify in the supporting schedule any differences in production overhead cost classifications used in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 11—Other Production Costs. Report other forecast production costs not previously reported on Lines 06 through 10. Attach as part of Exhibit B supporting schedules showing the basis of the forecasts.

Line 12—Total Cost of Sales. Enter for each year the sum of operating costs reported on Lines 06 through 11.

Line 13—Gross Operating Profit. Enter for each year the difference between Lines 05 and 12.

Line 14—Selling, General and Administrative Expenses. Report the total costs forecast for administrative, marketing and general corporate overhead functions that directly or indirectly support the smelter's operations. Refer to the NSO Financial Reporting Overview for a general discussion of indirect cost allocations from overhead cost pools. Attach as part of Exhibit B a schedule classifying selling, general and administrative expenses into major cost components. Indicate whether each component represents costs directly assignable to the smelter or indirect costs allocated from other business segments to the smelter. Explain the basis used for estimating the amount of expected costs included in each component and the basis used for allocating indirect cost elements to the smelter. Identify and explain any differences between the selling, general and administrative cost classification used in this Schedule and that used in Line 15 of Schedule A.3.

Line 15—Taxes, Other than Income Taxes. Report the total costs forecast for property taxes and associated levies paid to governmental units by or for the benefits of the smelter operation. Attach as part of Exhibit B a schedule classifying operating taxes by major component. Indicate whether each component represents taxes directly assignable to the smelter or taxes that have been allocated among more than one facility. Explain the basis used for estimating taxes and the basis for any allocation of taxes to the smelter. Identify and explain any differences between the component classifications used in this Schedule and those used in Line 16 of Schedule A.3.

Line 16—Research Costs. Report the estimates of research costs incurred directly by or for the benefit of the smelter operations. Attach as part of Exhibit B a schedule classifying the costs by major direct and indirect assigned components. Explain the basis for estimating the costs assigned to each component. Identify and explain any differences between classifications used in this Schedule and those used in Line 17 of Schedule A.3.

Line 17—Pollution Control Facility Depreciation and Amortization. Report the estimates of depreciation and amortization charges associated with the smelter's actual and forecast investment in all pollution control equipment and facilities except any SO_2 air pollution controls that have not been installed as of the NSO application date. Reported charges should be computed in accordance with depreciation and amortization methods adopted for certified financial statement reporting purposes by the firm. Attach explanatory supporting schedules as part of Exhibit B.

Line 18—Other Smelter Facility Depreciation and Amortization. Report the pro forma estimates of depreciation and amortization charges associated with the smelter's investment in equipment and facilities other than those classified as pollution control facilities. Attach explanatory supporting schedules as part of Exhibit B.

Line 19—Interests. Report the estimates of interest and other financing charges on the smelter's current and long-term liabilities. Attach as part of Exhibit B a schedule showing the interest-bearing debt contracts identifiable with the smelter's operations, the interest rate projected for these contracts, and the estimated annual interest charges.

Line 20—Miscellaneous Operating Expenses. Report only the total operating expenses associated with or allocated to the smelter that cannot be appropriately classsified in one of the preceding line items. Attach as part of Exhibit B a schedule showing the classification of these residual operating expenses into major cost components. Explain the basis used for forecasting the cost under each component. Identify each cost component in terms of direct or indirect cost and explain the basis used for allocating the indirect costs to smelter operations. Identify and explain any differences between cost classifications included in this Schedule and those used in Line 21 of Schedule A.3.

Line 21—Total Other Operating Expenses. Enter for each year the sum of operating costs reported on Lines 14 through 20.

Line 22—Income From Operations. Enter for each year the difference between Lines 21 and 13.

Schedule B.4—Constant Controls Revenue Forecast

General. Use Schedule B.4 to report annual forecasts of operating revenues anticipated during the years 1984 through 1990 from operation of the smelter subject to this NSO application. These constant controls revenue forecasts should be based on an assumption that the applicant immediately implements a program of additional pollution control facility investments sufficient to achieve full compliance with the smelter's SIP stack emission limitations for sulfur dioxide. Forecast smelter revenues should be expressed on a tolling service equivalent basis as described in Section 2.3.4.

The assumed investment program should be based on whichever adequately demonstrated system, applicable to the smelter, that would be most economically beneficial subsequent to installation of the system. For this purpose, adequately demonstrated systems include those specified in Section 57.102(b)(1).

Copper smelters that will process concentrates containing an average of 1,000 pounds per hour or more of arsenic during the forecast period should assume that they will use best engineering techniques to control fugitive emissions of arsenic. All smelters should also assume that they will be required to meet all other regulatory requirements in effect at the time the application is made.

The line items in Schedule B.4 are explained in the following instructions. Attach as part of Exhibit B schedules to (1) explain the methods used to make the required forecasts, (2) explain differences, if any, between historical trends and the forecasts, and (3) provide data and information to support the forecasts.

Lines 01 and 05—Concentrates Processed. Report for each year the forecast quantity of concentrates processed for unaffiliated parties (Line 01) and affiliated parties (Line 05).

Lines 02 and 06—Smelting Charge. Report for each year the forecast smelting charge for unaffiliated parties (Line 02) and affiliated parties (Line 06). See Section 2.4 for forecast copper smelting charges furnished by EPA.

Lines 03 and 07—Total Smelter Revenues. Report for each year the forecast total operating revenues derived from processing concentrates. The total for unaffiliated parties (Line 03) is equal to the product of Lines 01, 02, and 04, and for affiliated parties (Line 07), the product of Lines 05, 06, and 08.

Lines 04 and 08—Average Product Grade. Report for each year the forecast average quality rating assigned to concentrates processed for unaffiliated parties (Line 04) and affiliated parties (Line 08).

Line 09—Total Co-Product Revenues. Report for each year the forecast net revenues from sales of co-products derived from the smelter's operations. Attach as part of Exhibit B a schedule showing by individual type of co-product, the forecast quantity produced and sold, forecast market price per unit of sales, and forecast total revenues derived from the co-product sales.

Line 10—Total By-product Revenues From Pollution Control Facilities. Report for each year forecast revenues from the sale of by-products derived from operation of the smelter's pollution control facilities. Attach as part of Exhibit B a schedule showing by type of by-product produced (e.g., sulfuric acid) the forecast quantity of output, forecast market price per unit of output sold, and forecast total revenue derived from the by-product sales.

Line 11—Total By-product Revenues From Other Smelter Processing. Report forecast revenues from the sales of gold, silver, and other by-products derived from the smelter's operations. Attach as part of Exhibit B a schedule providing additional documentation as specified in the instructions for Line 10.

Line 12—Total Co-product and By-product Revenues. Enter for each year the total of Lines 09 through 11.

Schedule B.5—Constant Controls Cost Forecast

General. Use Schedule B.5 to report annual forecasts of operating costs anticipated during the years 1984 through 1990 from operation of the smelter subject to this NSO application. These constant controls cost forecasts should be based on an assumption that the applicant immediately implements a program of additional pollution control facility investments sufficient to achieve full compliance with the smelter's SIP stack emission limitations for sulfur dioxide.

The assumed investment program should be based on whichever adequately demonstrated system, applicable to the smelter,

would be most economically beneficial subsequent to installation of the system. For this purpose, adequately demonstrated systems include those specified in § 57.102(b)(1).

Copper smelters that will process concentrates containing an average of 1,000 pounds per hour or more of arsenic during the forecast period should assume that they will use best engineering techniques to control fugitive emissions of arsenic. All smelters should also assume that they will be required to meet all other regulatory requirements in effect at the time the application is made.

The line items in Schedule B.5 are explained in the following instructions. Attach as part of Exhibit B schedules to (1) explain the methods used to make the required forecasts, (2) explain differences, if any, between historical trends and the forecasts, and (3) provide data and information to support the forecasts.

Line 01—Direct Labor Hours. Report for each year the quantity of direct labor hours required to support the processing levels previously reported. Attach as part of Exhibit B an explanation of the labor productivity factors involved.

Line 02—Average Hourly Wage Rate. Report for each year the forecast average wage rate per unit of direct labor input. Attach as part of Exhibit B a description of direct labor cost factors under any existing labor contracts that extend to the forecast period and an explanation of the methodology used to forecast wage rates. EPA-provided forecast wage indices are reported in Section 2.4.

Line 03—Total Wage Payments. Enter for each year the product of Lines 01 and 02.

Line 04—Supplemental Employee Benefits. Report for each year adjustments required to direct labor costs for other employee compensation under supplemental benefit plans. Attach as part of Exhibits B a description of such plans and their costs and an explanation of the methodology used to forecast such costs. EPA-provided forecast wage indices are reported in Section 2.4.

Lines 05—Total Production Labor Cost. Enter for each year the total of Lines 03 and 04.

Lines 06, 09, 12, 15 and 18—Energy Quantities. Report for each year the quantity of energy by type required to support the processing levels reported in the smelter's revenue. Attach as part of Exhibit B an explanation of energy characteristics and use factors considered in forecasting the smelter's future energy requirements.

Lines 07, 10, 13, 16, and 19—Unit Prices. Report for each year the forecast price per unit of energy input by type of energy. Attach as part of Exhibit B a description of the energy price factors under any existing energy contracts that extend to the forecast period and an explanation of the methodology used to forecast unit energy prices. EPA-provided forecast energy indices are reported in Section 2.4.

Lines 08, 11, 14, 17, and 20—Total Payments. Enter for each year the products of quantity and prices paid for electricity (Lines 06×07), natural gas (Lines 09×10), coal (Lines 12×13), fuel oil (Lines 15×16), and other (Lines 18×19).

Lines 21—Total Energy Costs. Enter for each year the total of Lines 08, 11, 14, 17, and 20.

Schedule B.6—Constant Controls Forecast Profit and Loss Summary for the Profit Protection Test

General. Use Schedule B.6 to report annual forecasts of operating revenues and operating costs derived in Schedules B.4 and B.5 for the years 1984 through 1990. These constant controls forecasts should be based on an assumption that the applicant immediately implements a program of additional pollution control facility investments sufficient to achieve full compliance with the smelter's SIP stack emission limitations for sulfur dioxide. The transfer of line items from Schedules B.4 and B.5 to this Schedule is explained in the following instructions.

Line 01—Smelter Revenues-Unaffiliated Parties. Enter the totals reported in Schedule B.4, Line 03.

Line 02—Smelter Revenues-Affiliated Parties. Enter the totals reported in Schedule B.4, Line 07.

Line 03—Co-product and By-product Sales Revenues. Enter the totals reported in Schedule B.4, Line 12.

Line 04—Other Operating Revenues. Report operating revenues anticipated from sources not accounted for under Lines 01 through 03. Refer to instructions for Line 04 of Schedule A.3 for items that should not be included in ''Other Operating Revenues.'' Attach as part of Exhibit B a schedule showing annual amounts forecast by individual revenue component for ''other'' operating revenues associated with the smelter's forecast constant controls operations. Identify in the supporting schedule any differences in the ''other'' revenue components reported in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 05—Total Operating Revenues. Enter for each year the total of Lines 01 through 04.

Line 06—Material Costs. Report total costs forecast for flux, refractories, coke and other materials directly associated with the smelter's processing of concentrates. Attach as part of Exhibit B a schedule showing the annual amounts forecast by major material cost components. For each cost component, identify the forecast quantity and unit price elements of material cost and explain the basis for forecasting these quantity and price elements. Identify in the supporting schedule any differences in the ''other'' material cost components shown in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 07—Production Labor Costs. Enter the totals reported in Schedule B.5, Line 05.

Line 08—Energy Costs. Enter the totals reported in Schedule B.5, Line 21.

Line 09—Pollution Control Costs. Report the total costs forecast for expenses identifiable with operation and maintenance of all pollution control equipment and facilities. By-product credits associated with operation of the pollution control facilities should be eliminated from the cost accounts, reclassified to Schedule B.4, Line 10 and included in Line 03 of this Schedule. Attach a schedule as part of Exhibit B classifying pollution control costs by major cost components. Explain the basis used for estimating each of the cost components.

Line 10—Production Overhead Costs. Report the total costs forecast for indirect labor, indirect materials and other production overhead costs associated with the smelter's constant controls forecasts. Attach as part of Exhibit B a schedule showing annual overhead costs projected by major cost components associated with the smelter's operations. For each cost component, where appropriate, identify the forecast quantity and unit price elements of overhead costs and explain the basis for estimating these quantity and price elements. Also identify in the supporting schedule any differences in production overhead cost classifications used in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 11—Other Production Costs. Report other forecast production costs not previously reported on Lines 06 through 10. Attach as part of Exhibit B supporting schedules showing the basis of the forecasts.

Line 12—Total Cost of Sales. Enter for each year the sum of operating costs reported on Lines 06 through 11.

Line 13—Gross Operating Profit. Enter for each year the difference between Lines 05 and 12.

Line 14—Selling, General and Administrative Expenses. Report the total costs forecast for administrative, marketing and general corporate overhead functions that directly or indirectly support the smelter's operations. Refer to the NSO financial Reporting Overview for a general discussion of indirect cost allocations from overhead cost pools. Attach as part of Exhibit B a schedule classifying selling, general and administrative expenses into major cost components. Indicate whether each component represents costs directly assignable to the smelter or indirect costs allocated from other business segments to the smelter. Explain the basis used for estimating the amount of expected costs included in each component and the basis used for allocating indirect cost elements to the smelter. Identify and explain any differences between the selling, general and administrative cost classification used in this Schedule and that used in Line 15 of Schedule A.3.

Line 15—Taxes, Other than Income Taxes. Report the total costs forecast for property taxes and associated levies paid to governmental units by or for the benefit of the smelter operation. Attach as part of Exhibit B a schedule classifying operating taxes by major component. Indicate whether each component represents taxes directly assignable to the smelter or taxes that have been allocated among more than one facility. Explain the basis used for estimating taxes and the basis for any allocation of taxes to the smelter. Identify and explain any differences between the component classifications used in this Schedule and those used in Line 16 of Schedule A.3.

Line 16—Research Costs. Report the estimates of research costs incurred directly by or for the benefit of the smelter operations. Attach as part of Exhibit B a schedule classifying the costs by major direct and indirect cost components. Explain the basis for estimating the costs assigned to each component. Identify and explain any differences between classifications used in this Schedule and those used in Line 17 of Schedule A.3.

Line 17—Pollution Control Facility Depreciation and Amortization. Report the estimates of depreciation and amortization charges associated with the smelter's actual and forecast investment in all pollution control equipment and facilities. Reported charges should be completed in accordance with depreciation and amortization methods adopted for certified financial statement reporting purposes by the firm. Attach explanatory supporting schedules as part of Exhibit B.

Line 18—Other Smelter Facility Depreciation and Amortization. Report the pro forma estimates of depreciation and amortization charges associated with the smelter's investment in equipment and facilities other than those classified as pollution control facilities. Attach explanatory supporting schedules as part of Exhibit B.

Line 19—Interest. Report the estimates of interest and other financing charges on the smelter's current and long-term liabilities. Attach as part of Exhibit B a schedule showing the interest-bearing debt contracts identifiable with the smelter's operations, the interest rate projected for these contracts, and the estimated annual interest charges.

Line 20—Miscellaneous Operating Expenses. Report only the total operating expenses associated with or allocated to the smelter that cannot be appropriately classified in one of the preceding line items. Attach as part of Exhibit B a schedule showing the classification of these residual operating expenses into major cost components. Explain the basis used for forecasting the cost under each component. Identify each cost component in terms of direct or indirect cost and explain the basis used for allocating the indirect costs to smelter operations. Identify and

explain any differences between cost classifications included in this Schedule and those used in Line 21 of Schedule A.3.

Line 21—Total Other Operating Expenses. Enter for each year the sum of operating costs reported on Lines 14 through 20.

Line 22—Income From Operations. Enter for each year the difference between Lines 21 and 13.

Schedule B.7—Profit Protection Test

General. Applicants must complete this Schedule and/or Schedule C.4 and the accompanying schedules if they seek eligibility for an NSO. The line items in Schedule B.7 are explained in the following instructions.

Line 01—Net Income from Operations. Enter for each year the amounts reported in Schedule B.3, Line 22.

Line 02—Discount Factors. Enter the discount factor for each year, computed as described in the instructions under Section 2.6.

Line 03—Present Value of Future Net Income. Enter for each year the product of Lines 01 and 02.

Line 04—Horizon Value. Enter under the Total column, the estimated horizon value of the smelter. This shall be computed by capitalizing the forecast net income from operations in Line 01 as described in the instructions under Section 2.7.

Line 05—Discount Factor. Enter under the Total column the appropriate discount factor corresponding to the weighted cost of capital, computed as described in the instructions under Section 2.6.

Line 06—Present Value of Horizon Value. Enter under the Total column the product of Lines 04 and 05.

Line 07—Present Value of Future Net Income. Enter under the Total Column the sum of amounts previously reported on Line 03 for 1984 through 1990.

Line 08—Total Present Value. Enter for each year the sum of Lines 06 and 07.

Line 09—Net Income from Operations. Enter for each year the amount reported in Schedule B.6, Line 22.

Line 10—Discount Factors. Follow the instructions for Line 02.

Line 11—Present Value of Future Net Income. Enter for each year the product of Lines 09 and 10.

Line 12—Horizon Value. Enter under the Total column, the estimated horizon value of the smelter. This shall be computed by capitalizing the forecast net income from operations in Line 09 as described in the instructions under Section 2.7.

Line 13—Discount Factor. Follow the instructions for Line 05.

Line 14—Present Value of Horizon Value. Enter under the Total column the product of Lines 12 and 13.

Line 15—Present Value of Future Net Income. Enter under the Total column the sum of amounts previously reported on Line 11 for 1984 through 1990.

Line 16—Total Present Value. Enter the sum of Lines 14 and 15.

Line 17—Ratio for Total Present Value of Constant Controls Case to Total Present Value of Pre-Control Case. Enter the ratio of Lines 16 to 08. If this ratio is less than .50, the smelter passes the Profit Protection Test. An applicant also passes the Profit Protection Test if the reported total present value of pre-tax profits for the pre-control case on Line 08 is a negative value.

Schedule C.1—Constant Controls Forecast Profit and Loss Summary for the Rate of Return Test

General. Use Schedule C.1 to report forecast revenue and cost information derived in Schedules B.4 and B.5 for the years 1984 through 1990. These constant controls forecasts should be based on an assumption that the applicant immediately implements a program of additional pollution control facility investments sufficient to achieve full compliance with the smelter's SIP stack emission limitations for sulfur dioxide. The transfer of line items from Schedules B.4 and B.5 to this Schedule is explained in the following instructions.

Line 01—Smelter Revenues-Unaffiliated Parties. Enter the totals reported in Schedule B.4, Line 03.

Line 02—Smelter Revenues-Affiliated Parties. Enter the totals reported in Schedule B.4, Line 07.

Line 03—Co-product and By-product Sales Revenues. Enter the totals reported in Schedule B.4, Line 12.

Line 04—Other Operating Revenues. Report operating revenues anticipated from sources not accounted for under Lines 01 through 03. Refer to instructions for Line 04 of Schedule A.3 for items that should not be included in ''Other Operating Revenues.'' Attach as part of Exhibit B a schedule showing annual amounts forecast by individual revenue component for ''other'' operating revenues associated with the smelter's forecast constant controls operations. Identify in the supporting schedule any differences in the ''other'' revenue components reported in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 05—Total Operating Revenues. Enter for each year the total of Lines 01 through 04.

Line 06—Material Costs. Report total costs forecast for flux, refractories, coke and other materials directly associated with the smelter's processing of concentrates. Attach as part of Exhibit B a schedule showing the annual amounts forecast by major material cost components. For each cost component, identify the forecast quantity and unit price elements of material cost and explain the basis for forecasting these quantity and price elements. Identify in the supporting schedule

any differences in the ''other'' material cost components shown in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 07—Production Labor Costs. Enter the totals reported in Schedule B.5, Line 05.

Line 08—Energy Costs. Enter the totals reported in Schedule B.5, Line 21.

Line 09—Pollution Control Costs. Report the total costs forecast for expenses identifiable with operation and maintenance of all pollution control equipment and facilities. By-product credits associated with operation of the pollution control facilities should be eliminated from the cost accounts, reclassified to Schedule B.4, Line 10 and included in Line 03 of this Schedule. Attach a schedule as part of Exhibit B classifying pollution control costs by major cost components. Explain the basis used for estimating each of the cost components.

Line 10—Production Overhead Costs. Report the total costs forecast for indirect labor, indirect materials and other production overhead costs associated with the smelter's constant controls forecasts. Attach as part of Exhibit B a schedule showing annual overhead costs projected by major cost components associated with the smelter's operations. For each cost component, where appropriate, identify the forecast quantity and unit price elements of overhead costs and explain the basis for estimating these quantity and price elements. Also identify in the supporting schedule any differences in production overhead cost classifications used in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 11—Other Production Costs. Report other forecast production costs not previously reported on Lines 06 through 10. Attach as part of Exhibit B supporting schedules showing the basis of the forecasts.

Line 12—Total Cost of Sales. Enter for each year the sum of operating costs reported on Lines 06 through 10.

Line 13—Gross Operating Profit. Enter for each year the difference between Lines 05 and 12.

Line 14—Selling, General and Administrative Expenses. Report the total costs forecast for administrative, marketing and general corporate overhead functions that directly or indirectly support the smelter's operations. Refer to the NSO Financial Reporting Overview for a general discussion of indirect cost allocations from overhead cost pools. Attach as part of Exhibit B a schedule classifying selling, general and administrative expenses into major cost components. Indicate whether each component represents costs directly assignable to the smelter or indirect costs allocated from other business segments to the smelter. Explain the basis used for estimating the amount of expected costs included in each component and the basis used for allocating indirect cost elements to the smelter. Identify and explain any differences between the selling, general and administrative cost classification used in this Schedule and that used in Line 15 of Schedule A.3.

Line 15—Taxes, Other than Income Taxes. Report the total costs forecast for property taxes and associated levies paid to governmental units by or for the benefit of the smelter operation. Attach as part of Exhibit B a schedule classifying operating taxes by major component. Indicate whether each component represents taxes directly assignable to the smelter or taxes that have been allocated among more than one facility. Explain the basis used for estimating taxes and the basis for any allocation of taxes to the smelter. Identify and explain any differences between the component classifications used in this Schedule and those used in Line 16 of Schedule A.3.

Line 16—Research Costs. Report the estimates of research costs incurred directly by or for the benefit of the smelter operations. Attach as part of Exhibit B a schedule classifying the costs by major direct and indirect costs components. Explain the basis for estimating the costs assigned to each component. Identify and explain any differences between classifications used in this Schedule and those used in Line 17 of Schedule A.3.

Line 17—Pollution Control Facility Depreciation and Amortization. Report the estimates of depreciation and amortization charges associated with the smelter's actual and forecast investment in all pollution control equipment and facilities. Reported charges should be computed in accordance with depreciation and amortization methods adopted for tax reporting purposes by the firm. Attach explanatory supporting schedules as part of Exhibit B.

Line 18—Other Smelter Facility Depreciation and Amortization. Report the pro forma estimates of depreciation and amortization charge associated with the smelter's investment in equipment and facilities other than those classified as pollution control facilities. Attach explanatory supporting schedules as part of Exhibit B.

Line 19—Interest on Short-Term Debt. Report the estimates of interest and other financing charges on forecast short-term obligations as classified in the smelter's current liabilities on Schedule A.4. Interest and associated financing charges on long-term debt should not be included as an expense identifiable with the smelter's operations. Attach as part of Exhibit B a schedule showing the interest-bearing, short-term debt contracts identifiable with the smelter's operations, the interest rate projected for these contracts, and the estimated annual interest charges. Identify and explain any differences between the classifications used in this Schedule and those used in Line 20 of Schedule A.3.

Line 20—Miscellaneous Operating Expenses. Report only the total operating expenses associated with or allocated to the smelter that cannot be appropriately classified in one of the preceding line items. Attach as part of Exhibit B a schedule showing the classification of these residual operating expenses into major cost components. Explain the basis used for forecasting the cost under each component. Identify each cost component in terms of direct or indirect cost and explain the basis used for allocating the indirect costs to smelter operations. Identify and explain any differences between cost classification included in this Schedule and those used in Line 21 of Schedule A.3.

Line 21—Total Other Operating Expenses. Enter for each year the sum of operating costs reported on Lines 14 through 20.

Line 22—Income From Operations. Enter for each year the difference between Lines 21 and 13.

Line 23—Income Taxes. Enter the product of income from operations (Line 22) and the sum of the Federal, State and local marginal tax rates. Attach as part of Exhibit B a schedule detailing the estimated marginal tax rate by taxing entity.

Line 24—Net Income From Operations. Enter for each year the difference between Lines 23 and 22.

Schedule C.2—Constant Controls Sustaining Capital Investment Forecast

General. The applicant should estimate and report, in Schedule C.2, yearly sustaining capital outlays for maintenance of the smelter's existing productive capability. These estimates should be forecast under the assumption that full compliance with SIP emission limitations for SO_2 will be achieved. Major elements of these outlays should be disclosed, as well as the total of such outlays. Estimates shall be restricted to those items that will be capitalized for tax purposes. These outlays shall primarily be for plant replacement, although outlays for improvements and expansion may be included to the extent that improvements and/or expansion, exclusive of required pollution control outlays, can be justified as economically feasible. Estimates of sustaining capital shall exclude any incremental investment for constant control requirements. Sustaining capital investments in facilities shared with other operating segments shall be allocated in accordance with the instructions given below.

Estimates of sustaining capital shall be compatible with productive capacity and pollution control requirements underlying the operating revenue and cost forecasts incorporated in Schedule C.1.

Lines 01 to 06—Sustaining Capital. Report for each year by individual line item property, plant and equipment sustaining capital investments assignable to smelter operations. Include both (1) property, plant and equipment directly associated with the smelter's operations and (2) facilities shared with other operating segments to the extent that a causal and beneficial relationship can be established for the intersegment allocations of such facility investments.

Attach as part of Exhibit B an explanatory schedule disclosing and supporting by individual line item the major elements of annual capital expenditures for sustaining capital. Further classify these annual capital expenditures into both (1) investments required to maintain the smelter versus investments in smelter expansion and improvements and (2) direct facility versus joint-use facility investments. Explain the method used for allocating capital expenditures on joint-use facilities to the smelter's operations.

Line 07—Total Smelter Sustaining Capital. Enter for each year the total of Lines 01 through 06. Transfer the reported total for each year to Schedule C.4, Line 06.

Schedule C.3—Historical Capital Investment In Constant Dollars

General. Use Schedule C.3 to report the end-of-period asset investments and current liabilities for the most recent fiscal year: (a) expressed in nominal dollars as of the date of the original transaction, and (b) expressed in the current year's dollars, i.e. 1984 dollars. The value of net investment in constant dollars (1984 dollars for smelters applying for an NSO in 1984) is used in Schedule C.4 as the benchmark of the Rate of Return Test.

Applicants should complete Schedule C.3 according to the following instructions. Transfer into the first column of Schedule C.3 the historical cost figures that are reported in the last (1983) column of Table A.4. In the second column of Schedule C.3, report the figures from the first column of Schedule C.3, expressed in constant (1984) dollars.

Convert each nominal dollar figure of the first column into constant (1984) dollars in accordance with the historical cost/constant dollar accounting method defined in Financial Accounting Standards Board (FASB) Statement No. 33 (Docket Item No. IV–A–6d), with the following exception: the applicant must not report the lower recoverable amount as required by FASB No. 33. Attach explanatory supporting schedules as part of Exhibit B.

Schedule C.4—Rate of Return Test

General. Applicants must complete this Schedule and/or Schedule B.7 and the accompanying schedules if they seek eligibility for an NSO. The line items in Schedule C.4 are explained in the following instructions.

Line 01—Net Income from Operations. Enter for each year the amounts reported in Schedule C.1, Line 24.

Lines 02 and 03—Depreciation and Amortization. Enter for each year the amounts reported in Schedule C.1, Lines 17 and 18, respectively.

Line 04—Operating Cash Flow. Enter for each year the total of amounts reported on Lines 01 through 03.

Line 05—Constant Controls Capital Investment. Enter the estimated capital outlays for constant controls for the years during which outlays would be made. These values shall correspond to the constant control investment estimates shown in the supporting schedules for Line 17 of Schedule C.1. Changes in working capital investment due to investment in constant controls facilities may be added to the capital investment estimates shown in the supporting schedules for Schedule C.1.

Line 06—Sustaining Capital. Enter for each year the amounts reported in Schedule C.2, Line 07.

Line 07—Total. Enter for each year the sum of Lines 05 and 06.

Line 08—Net Cash Flow Projections. Enter for each year the difference between Lines 04 and 07.

Line 09—Discount Factors. Enter the discount factor for each year, computed as described in the instructions under Section 2.6.

Line 10—Present Value of Future Cash Flows. Enter for each year the product of Lines 08 and 09.

Line 11—Horizon Value. Enter under the Total column the estimated horizon value of the smelter reported in Schedule C.5, Line 16.

Line 12—Discount Factor. Enter under the Total column the appropriate discount factor, computed as described in the instructions under Section 2.6.

Line 13—Present Value of Horizon Value. Enter under the Total column the product of Lines 11 and 12.

Line 14—Present Value of Future Cash Flows. Enter under the Total column the sum of amounts previously reported on Line 10 for 1984 through 1990.

Line 15—Total Present Value. Enter the sum of Lines 13 and 14.

Line 16—Net Smelter Capital Investment in Constant Dollars. Enter under the Total column the amount reported in the second (Constant Dollar) column of Schedule C.3, Line 26 if the value is greater than zero. If the value is zero or less, enter zero.

Line 17—Net Present Value. Enter the difference between Lines 15 and 16. Applicants reporting a negative net present value will pass the Rate of Return Test.

Schedule C.5—Horizon Value of Cash Flows for the Rate of Return Test

General. The applicant should use Schedule C.5 to calculate the horizon value of net cash flow projections for the Rate of Return Test. This horizon value is used in Schedule C.4. The computation of the horizon value is different for this test than for the Profit Protection Test because this test requires the reporting of depreciation for tax purposes.

In Schedule C.5, the applicant removes the tax savings of constant controls depreciation from the cash flows for the last two forecast years. A depreciation-free horizon value is then calculated from these depreciation-free cash flows. The tax savings of constant controls depreciation during the horizon years are then calculated separately. The final horizon value is equal to the sum of the depreciation-free horizon value and the tax savings from depreciation of constant controls accruing over the horizon years. The line items in Schedule C.5 are explained in the following instructions.

Line 01—Net Cash Flow Projections. Enter for each of the final two forecast years the values in Schedule C.4, Line 08, for the corresponding years.

Line 02—Depreciation and Amortization. Enter for each of the final two forecast years the value in Schedule C.4, Line 02, for the corresponding years.

Line 03—Marginal Tax Rate. Enter for each of the final two forecast years the marginal income tax rate applicable to the smelter. This rate should incorporate both Federal and State tax liability.

Line 04—Tax Savings. Enter for each of the final two forecast years the product of Lines 02 and 03.

Line 05—Nominal Dollar Values. Enter for each of the final two forecast years the difference between Lines 01 and 04.

Line 06—1990 Dollar Values. For each of the final two forecast years the nominal dollar values must be expressed in the last forecast year's dollars (1990 dollars). Transfer the 1990 amount in Line 05 directly to Line 06. Inflate the 1989 amount to 1990 dollars using the forecast GNP price deflator.

Line 07—Average. Enter under the Total column the average of the two values in Line 06.

Line 08—Horizon Factor. Enter under the Total column the horizon factor provided in Section 2.7.

Line 09—Depreciation-free Horizon Value. Enter under the Total column the product of Lines 07 and 08.

Line 10—Depreciation and Amortization. Enter for each year of the horizon period depreciation charges associated with the smelter's investment in equipment and facilities related to pollution controls. These investments should include those actually made and those required to be made by the end of the forecast period. Reported charges should be computed in accordance with depreciation and amortization methods adopted for tax reporting purposes by the firm. Attach as part of Exhibit B supporting schedules consistent with those supporting Line 17 in Schedule C.1.

Line 11—Marginal Tax Rate. Enter for each year of the horizon period the marginal income tax rate applicable to the smelter. This rate should incorporate both Federal and State tax liability.

Line 12—Tax Savings. Enter for each year of the horizon period the product of Lines 10 and 11.

Line 13—Discount Factors. Enter the discount factor for each year of the horizon period. This shall be computed according to the instructions under Section 2.6, except that the variable N found in the discount factor formula represents the number of years in the future, *counting from the last forecast year*. For example, N=1 for the first year of the horizon period.

Line 14—Present Value of Tax Savings. Enter for each year of the horizon period the product of Lines 12 and 13.

Line 15—Total Present Value of Tax Savings. Enter under the Total column the sum of values on Line 14 for the horizon years.

Line 16—Horizon Value. Enter under the Total column the sum of Lines 09 and 15.

Schedule D.1—Interim Controls Revenue Forecast

General. Use Schedule D.1 to report annual forecasts of operating revenues anticipated during the years 1984 through 1990 from operation of the smelter applying for an interim controls waiver. The applicant applying for a permanent waiver should complete Schedule D.1 twice, with revenue and production projections based on two alternative assumptions: (1) Installation of interim constant control equipment, no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of an NSO, and closure after January 1, 1988, and (2) installation of interim constant control equipment and any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, so that the smelter will remain open through the horizon period. The applicant applying for a temporary waiver should use only the first assumption. For a smelter that has no continuous emission controls, the assumed interim control investment program should be based on the installation and operation of a well-designed sulfuric acid plant to treat all strong gas streams. For a smelter that already has some continuous emission controls, the assumed interim constant control investment should be based on the installation and operation of any additional acid plant capacity that would be necessary for treatment of all strong streams with interim constant controls. The interim controls projections should account for other regulatory requirements on the same basis as provided for in the NSO eligibility tests.

Forecast smelter revenues should be expressed on a tolling service equivalent basis as described in Section 2.3.4. The line items in Schedule D.1 are explained in the following instructions. Attach as part of Exhibit B schedules to (1) explain the methods used to make the required forecasts, (2) explain differences, if any, between historical trends and the forecasts, and (3) provide data and information to support the forecasts.

Lines 01 and 05—Concentrates Processed. Report for each year the forecast quantity of concentrates processed for unaffiliated parties (Line 01) and affiliated parties (Line 05).

Lines 02 and 06—Smelting Charge. Report for each year the forecast smelting charge for unaffiliated parties (Line 02) and affiliated parties (Line 06). See Section 2.4 for forecast copper smelting charges furnished by EPA.

Lines 03 and 07—Total Smelter Revenues. Report for each year the forecast total operating revenues derived from processing concentrates. The total for unaffiliated parties (Line 03) is equal to the product of Lines 01, 02, and 04, and for affiliated parties (Line 07), the product of Lines 05, 06, and 08.

Lines 04 and 08—Average Product Grade. Report for each year the forecast average quality rating assigned to concentrates processed for unaffiliated parties (Line 04) and affiliated parties (Line 08).

Line 09—Total Co-Product Revenues. Report for each year the forecast net revenues from sales of co-products derived from the smelter's operations. Attach as part of Exhibit B a schedule showing by individual type of co-product the forecast quantity produced and sold, forecast market price per unit of sales, and forecast total revenues derived from the co-product sales.

Line 10—Total By-product Revenues From Pollution Control Facilities. Report for each year forecast revenues from the sale of by-products derived from operation of the smelter's pollution control facilities. Attach as part of Exhibit B a schedule showing by type of by-product produced (e.g., sulfuric acid) the forecast quantity of output, forecast market price per unit of output sold, and forecast total revenue derived from the by-product sales.

Line 11—Total By-product Revenues From Other Smelter Processing. Report forecast revenues from the sales of gold, silver, and other by-products derived from the smelter's operations. Attach as part of Exhibit B a schedule providing additional documentation as specified in the instructions for Line 10.

Line 12—Total Co-product and By-product Revenues. Enter for each year the total of Lines 09 through 11.

Schedule D.2—Interim Controls Cost Forecast

General. Use Schedule D.2 to report annual forecasts of operating costs anticipated during the years 1984 through 1990 from operation of the smelter applying for an interim controls waiver. The applicant applying for a

permanent waiver should complete Schedule D.2 twice, with cost and production projections based on two alternative assumptions: (1) Installation of interim constant control equipment, no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of an NSO, and closure after January 1, 1988, and (2) installation of interim constant control equipment and any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, so that the smelter will remain open through the horizon period. For a smelter that has no continuous emission controls, the assumed interim control investment program should be based on the installation and operation of a well-designed sulfuric acid plant to treat all strong gas streams. For a smelter that already has some continuous emission controls, the assumed interim constant control investment should be based on the installation and operation of any additional acid plant capacity that would be necessary for treatment of all strong streams with interim constant controls. The interim controls projections should account for other regulatory requirements on the same basis as provided for in the NSO eligibility tests.

The line items in Schedule D.2 are explained in the following instructions. Attach as part of Exhibit B schedules to (1) explain the methods used to make the required forecasts, (2) explain differences, if any, between historical trends and the forecasts, and (3) provide data and information to support the forecasts.

Line 01—Direct Labor Hours. Report for each year the quantity of direct labor hours required to support the processing levels previously reported. Attach as part of Exhibit B an explanation of the labor productivity factors involved.

Line 02—Average Hourly Wage Rate. Report for each year the forecast average wage rate per unit of direct labor input. Attach as part of Exhibit B a description of direct labor cost factors under any existing labor contracts that extend to the forecast period and an explanation of the methodology used to forecast wage rates. EPA-provided forecast wage indices are reported in Section 2.4.

Line 03—Total Wage Payments. Enter for each year the product of Lines 01 and 02.

Line 04—Supplemental Employee Benefits. Report for each year adjustments required to direct labor costs for other employee compensation under supplemental benefit plans. Attach as part of Exhibit B a description of such plans and their costs and an explanation of the methodology used to forecast such costs. EPA-provided forecast wage indices are reported in Section 2.4.

Line 05—Total Production Labor Costs. Enter for each year the total of Lines 03 and 04.

Lines 06, 09, 12, 15, and 18—Energy Quantities. Report for each year the quantity of energy by type required to support the processing levels reported in the smelter's revenue. Attach as part of Exhibit B an explanation of energy characteristics and use factors considered in forecasting the smelter's future energy requirements.

Lines 07, 10, 13, 16, and 19—Unit Prices. Report for each year the forecast price per unit of energy input by type of energy. Attach as part of Exhibit B a description of the energy price factors under any existing energy contracts that extend to the forecast period and an explanation of the methodology used to forecast unit energy prices. EPA-provided forecast energy indices are reported in Section 2.4.

Lines 08, 11, 14, 17, and 20—Total Payments. Enter for each year the products of quantity and prices paid for electricity (Lines 06×07), natural gas (Lines 09×10), coal (Lines 12×13), fuel oil (Lines 15×16), and other (Lines 18×19).

Line 21—Total Energy Costs. Enter for each year the total of Lines 08, 11, 14, 17, and 20.

Schedule D.3—Interim Controls Forecast Profit and Loss Summary

General. Use Schedule D.3 to report forecast revenue and cost information summed in Schedules D.1 and D.2 for the years 1984 through 1990. Applicants applying for a permanent waiver must complete Schedule D.3 twice. Forecast revenues and costs in Schedule D.3 shall be compatible with productive capacity and pollution control assumptions underlying the operating revenue and cost forecasts incorporated into each set of Schedules D.1 and D.2. Applicants applying for a temporary waiver should use only the first assumption: installation of interim constant control equipment and no installation of any additional SO2 controls that the smelter would otherwise be required to install but for the issuance of an NSO. The transfer of line items from Schedules D.1 and D.2 to this Schedule is explained in the following instructions.

Line 01—Smelter Revenues—Unaffiliated Parties. Enter the totals reported in Schedule D.1, Line 03.

Line 02—Smelter Revenues-Affiliated Parties. Enter the totals reported in Schedule D.1, Line 07.

Line 03—Co-product and By-product Sales Revenues. Enter the totals reported in Schedule D.1, Line 12.

Line 04—Other Operating Revenues. Report operating revenues anticipated from sources not accounted for under Lines 01 through 03. Refer to instructions for Line 04 of Schedule A.3 for items that should not be included in ''Other Operating Revenues.'' Attach as part of Exhibit B a schedule showing annual amounts forecast by individual revenue component for ''other'' operating revenues associated with the smelter's forecast interim

controls operations. Identify in the supporting schedule any differences in the ''other'' revenue components reported in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 05—Total Operating Revenues. Enter for each year the total of Lines 01 through 04.

Line 06—Material Costs. Report total costs forecast for flux, refractories, coke and other materials directly associated with the smelter's processing of concentrates. Attach as part of Exhibit B a schedule showing the annual amounts forecast by major material cost components. For each cost component, identify the forecast quantity and unit price elements of material cost and explain the basis for forecasting these quantity and price elements. Identify in the supporting schedule any differences in the ''other'' material cost components shown in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 07—Production Labor Costs. Enter the totals reported in Schedule D.2, Line 05.

Line 08—Energy Costs. Enter the totals reported in Schedule D.2, Line 21.

Line 09—Pollution Control Costs. Report the total costs forecast for operation and maintenance of all pollution control equipment and facilities under the two alternative sets of assumptions made in corresponding Schedules D.1 and D.2. Byproduct credits associated with operation of the pollution control facilities should be eliminated from the cost accounts, reclassified to Schedule D.1, Line 10 and included in Line 03 of this Schedule. Attach a schedule as part of Exhibit B classifying pollution control costs by major cost components. Explain the basis used for estimating each of the cost components.

Line 10—Production Overhead Costs. Report the total costs forecast for indirect labor, indirect materials and other production overhead costs associated with the smelter's constant controls forecasts. Attach as part of Exhibit B a schedule showing annual overhead costs projected by major cost components associated with the smelter's operations. For each cost component, where appropriate, identify the forecast quantity and unit price elements of overhead costs and explain the basis for estimating these quantity and price elements. Also identify in the supporting schedule any differences in production overhead cost classifications used in this Schedule and Schedule A.3 and explain the reasons for such differences.

Line 11—Other Production Costs. Report other forecast production costs not previously reported on lines 06 through 10. Attach as part of Exhibit B supporting schedules showing the basis of the forecasts.

Line 12—Total Cost of Sales. Enter for each year the sum of operating costs reported on Lines 06 through 11.

Line 13—Gross Operating Profit. Enter for each year the difference between Lines 05 and 12.

Line 14—Selling, General and Administrative Expenses. Report the total costs forecast for administrative, marketing and general corporate overhead functions that directly or indirectly support the smelter's operations. Refer to the NSO Financial Reporting Overview for general discussion of indirect cost allocations from overhead cost pools. Attach as part of Exhibit B a schedule classifying selling, general and administrative expenses into major cost components. Indicate whether each component represents costs directly assignable to the smelter or indirect costs allocated from other business segments to the smelter. Explain the basis used for estimating the amount of expected costs included in each component and the basis used for allocating indirect cost elements to the smelter. Identify and explain any differences between the selling, general and administrative cost classification used in this Schedule and that used in Line 15 of Schedule A.3.

Line 15—Taxes, Other than Income Taxes. Report the total costs forecast for property taxes and associated levies paid to governmental units by or for the benefit of the smelter operation. Attach as part of Exhibit B a schedule classifying operating taxes by major component. Indicate whether each component represents taxes directly assignable to the smelter or taxes that have been allocated among more than one facility. Explain the basis used for estimating taxes and the basis for any allocation of taxes to the smelter. Identify and explain any differences between the component classifications used in this Schedule and those used in Line 16 of Schedule A.3.

Line 16—Research Costs. Report the estimates of research costs incurred directly by or for the benefit of the smelter operations. Attach as part of Exhibit B a schedule classifying the costs by major direct and indirect cost components. Explain the basis for estimating the costs assigned to each component. Identify and explain any differences between classifications used in this Schedule and those used in Line 17 of Schedule A.3.

Line 17—Pollution Control Facility Depreciation and Amortization. Report the estimates of depreciation and amortization charges associated with the smelter's actual and forecast investment in all pollution control equipment and facilities under the two alternative sets of assumptions made in corresponding Schedules D.1 and D.2. Reported charges should be computed in accordance with depreciation and amortization methods adopted for tax reporting purposes by the firm. Attach explanatory supporting schedules as part of Exhibit B.

Line 18—Other Smelter Facility Depreciation and Amortization. Report the pro forma estimates of depreciation and amortization

charges associated with the smelter's investment in equipment and facilities other than those classified as pollution control facilities. Attach explanatory supporting schedules as part of Exhibit B.

Line 19—Interest on Short-Term Debt. Report the estimates of interest and other financing charges on forecast short-term obligations as classified in the smelter's current liabilities on Schedule A.4. Interest and associated financing charges on long-term debt should not be included as an expense identifiable with the smelter's operations. Attach as part of Exhibit B a schedule showing the interest-bearing, short-term debt contracts identifiable with the smelter's operations, the interest rate projected for these contracts, and the estimated annual interest charges. Identify and explain any differences between the classifications used in this Schedule and those used in Line 20 of Schedule A.3.

Line 20—Miscellaneous Operating Expenses. Report only the total operating expenses associated with or allocated to the smelter that cannot be appropriately classified in one of the preceding line items. Attach as part of Exhibit B a schedule showing the classification of these residual operating expenses into major cost components. Explain the basis used for forecasting the cost under each component. Identify each cost component in terms of direct or indirect cost and explain the basis used for allocating the indirect costs to smelter operations. Identify and explain any differences between cost classifications included in this Schedule and those used in Line 21 of Schedule A.3.

Line 21—Total Other Operating Expenses. Enter for each year the sum of operating costs reported on Lines 14 through 20.

Line 22—Income From Operations. Enter for each year the difference between Lines 21 and 13.

Line 23—Income Taxes. Enter the product of income from operations (Line 22) and the sum of the Federal, State and local marginal tax rates. Attach as part of Exhibit B a schedule detailing the estimated marginal tax rate by taxing entity.

Line 24—Net Income From Operations. Enter for each year the difference between Lines 23 and 22.

The temporary waiver from interim controls test is on Line 13 of Schedule D.3 that was completed under the assumption of installation of interim constant control equipment and no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of an NSO. Applicants will be eligible for a temporary waiver from the interim development of constant control technology for sulfur dioxide emissions if the reported gross operating profit on Line 13 is a negative value for one or more years during which the NSO is in effect.

Schedule D.4—Interim Controls Sustaining Capital Investment Forecast

General. Use Schedule D.4 to report yearly sustaining capital outlays for maintenance of the smelter's existing productive capability. The applicant should complete Schedule D.4 twice, under two alternative assumptions: (1) Installation of interim constant control equipment, no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of an NSO, and closure after January 1, 1988, and (2) installation of interim constant equipment and any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, so that the smelter will remain open through the horizon period.

Major elements of these outlays should be disclosed, as well as the total of such outlays. Estimates shall be restricted to those items that will be capitalized for tax purposes. These outlays shall primarily be for plant replacement, although outlays for improvements and expansion may be included to the extent that improvements and/or expansion, exclusive of required pollution control outlays, can be justified as economically feasible. Estimates of sustaining capital investments shall exclude any incremental investment for sulfur dioxide emission controls reported in Line 06 of Schedule D.6. Sustaining capital investments in facilities shared with other operating segments shall be allocated in accordance with the instructions given below.

Estimates of sustaining capital shall be compatible with productive capacity and pollution control requirements underlying the operating revenue and cost forecasts incorporated in Schedule D.3.

Line 01 to 06—Sustaining Capital. Report for each year by individual line item property, plant and equipment sustaining capital investments assignable to smelter operations. Include both (1) property, plant and equipment directly associated with the smelter's operations and (2) facilities shared with other operating segments to the extent that a causal and beneficial relationship can be established for the intersegment allocations of such facility investments.

Attach as part of Exhibit B an explanatory schedule disclosing and supporting by individual line item the major elements of annual capital expenditures for sustaining capital. Further classify these annual capital expenditures into both (1) investments required to maintain the smelter versus investments in smelter expansion and improvements and (2) direct facility versus joint-use facility investments. Explain the method used for allocating capital expenditures on joint-use facilities to the smelter's operations.

Line 07—Total Smelter Sustaining Capital. Enter for each year the total of Lines 01 through 06. Transfer the reported total for each year to Schedule D.6, Line 06.

Schedule D.5—Cash Proceeds From Liquidation

General. Use Schedule D.5 to calculate cash proceeds from liquidation. Applicants should determine the current salvage value of their existing investment in the smelter as the net proceeds that could be derived through an orderly liquidation of the smelter's assets. The net cash proceeds should be reported after an appropriate allowance for disposal costs, contractual claims against the smelter (e.g., labor termination penalties), and income tax effects on the corporation of such liquidation costs.

The applicant must stipulate the most advantageous alternative market (use) for the smelter's facilities. Generally, this market will be:

Secondary market for used plant and equipment.

Sale for scrap.

Abandonment where the disposal cost exceeds scrap value.

The current net salvage value should be disaggregated into the same property, plant and equipment asset groups reported under the historical capital investment summary, Schedule A.4. The line items in Schedule D.5 are explained in the following instructions.

Line 01—Current Assets. Enter in Columns 1 and 2, the value of total current assets shown in Line 08 of Schedule A.4 (Historical Capital Investment Summary) for 1983. No gain or loss should be reported in Columns 3 through 5 for the liquidation of current asset investments.

Lines 02–07—Property Plant and Equipment. Enter in Column 1 the appraised liquidation value (in terms of pretax cash proceeds) of the smelter by asset group. This estimate should be certified by a qualified third party professional appraiser and shall represent the best use and highest alternative value of these assets. The liquidation value of any assets which are jointly used by the smelter and other operating segments shall be excluded if, upon closure of the smelter, such assets would continue in service for the non-smelter activity.

In Column 2, report the net book value of these assets for which liquidation values have been reported in Column 1. The reported values should correspond with amounts reported for 1982 in lines 09 through 15 in Schedule A.4 as adjusted for appropriate eliminations of joint-use facilities and reconciliation to a net book value as reported for income taxes. Attach as part of Exhibit B supporting schedules showing all adjustments and conversion of the net book value as reported on the financial statements, to net book value that would be used for income tax purposes.

Compute Column 3 as Column 1 less Column 2. The gain (or loss) shown in Column 3 shall be segregated into ordinary income and capital gains components subject to taxation pursuant to applicable income tax rules. Enter ordinary income in Column 4 and capital gains in Column 5.

Line 08—Total Smelter Investment. Enter the sum of Lines 02 through 07 for each of the columns.

Line 09—Other Non-current Assets. In Column 1, report the appraised value of other non-current assets in accordance with the instructions for Line 18, Schedule A.4, except that any joint asset(s) that would continue in the event of smelter liquidation shall be excluded. This estimate shall be certified by a qualified third-party professional appraiser.

In Column 2, report the net book value of the non-current assets directly corresponding to those assets included in the liquidation value estimated under Column 1.

The remaining columns shall be completed in accordance with the instructions given above for Lines 02 and 06.

Line 10—Total Smelter Value. Enter the sum of Lines 01, 08 and 09.

Line 11—Total Current Liabilities. Report in both Columns 1 and 2, the value of total current liabilities shown in Line 25 of Schedule A.4 for 1983.

Line 12—Gross Liquidation Value. Enter the difference between Lines 10 and 11.

Line 13—Liquidation Costs. In Columns 1, 3 and 4, report the value of any liquidation costs such as labor contract termination penalties, severance pay and related costs, associated with closure of the smelter.

Line 14—Taxable Gain (or Loss). Enter in Columns 4 and 5, the differences between Lines 12 and 13.

Line 15—Income Tax Rate. Enter the sum of the Federal, State and local marginal tax rates of the firm for ordinary income and capital gains in Columns 4 and 5, respectively. Attach as part of Exhibit B a schedule detailing the estimated marginal tax rate by taxing entity.

Line 16—Income Tax on Gain (or Loss). In Columns 4 and 5, enter the product of Line 14 and the marginal income tax rates reported in Line 15. In Column 1, enter the sum of Columns 4 and 5.

Line 17—After Tax Cash Proceeds. Enter in Column 1 the difference between Line 12 and the sum of Lines 13 and 16.

Schedule D.6—Permanent Waiver from Interim Controls Test

General. Applicants must complete this Schedule and its supporting schedules if they seek a permanent waiver from interim control requirements. The applicant should complete Schedule D.6 twice, with revenue

and production projections based on two alternative assumptions: (1) Installation of interim constant control equipment, no installation of any additional SO_2 controls that the smelter would otherwise be required to install but for the issuance of an NSO, and closure after January 1, 1988, and (2) installation of interim constant control equipment and any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, so that the smelter will remain open through the horizon period. Forecasts in Schedule D.6 shall be compatible with assumptions and forecasts in each set of Schedules D.1 through D.4. The line items in Schedule D.6 are explained in the following instructions.

Line 01—Net Income from Operations. Enter for each year the amounts reported in Schedule D.3, Line 24.

Line 02—Net Income Adjustments. Enter any adjustments to net income not included in Schedule D.3. When assuming closure after January 1, 1988, the applicant must include the proceeds from liquidation in 1988. The applicant must estimate liquidation value as of 1988 using one of two methods: (1) the applicant may complete Schedule D.5 assuming liquidation in 1988 and report the value of after-tax cash proceeds in Line 17; or (2) the applicant may use the value of after-tax cash proceeds in Line 17 of Schedule D.5, as already completed, assuming liquidation in the current (application) year, and expressing values in 1988 dollars. The current liquidation value must be inflated to 1988 dollars by applying the appropriate forecast percentage rate changes in the GNP price deflator. Attach explanatory supporting schedules in Exhibit B.

Lines 03 and 04—Depreciation and Amortization. Enter for each year the amounts reported in Schedule D.3, Lines 17 and 18, respectively.

Line 05—Operating Cash Flow. Enter for each year the total of amounts reported on Lines 01 through 04.

Line 06—Pollution Controls Capital Investment. Enter the estimated pollution control capital outlays projected to be made under the two alternative sets of assumptions described in the *General* section of this schedule. These controls shall include only interim control equipment for the first set of assumptions and both interim control equipment and any additional SO_2 controls required to comply with the smelter's SIP emission limitation by January 2, 1988, for the second set of assumptions. The values assumed in this schedule shall correspond to the investment estimates shown in each set of supporting schedules for Line 17 of Schedule D.3. For purposes of allocating costs of the additional SO_2 controls under the second set of assumptions, applicants must provide information establishing the period over which capital outlays for such controls would be made if installation of the controls begins the latest date that would still allow compliance to be achieved by January 2, 1988. Changes in working capital investment due to investment in control facilities may be added to the capital investment estimates shown in the corresponding supporting schedules for Schedule D.3.

Line 07—Sustaining Capital. Enter for each year the amounts reported in Schedule D.4, Line 07.

Line 08—Total. Enter for each year the sum of Lines 05 and 06.

Line 09—Net Cash Flow Projections. Enter for each year the difference between Lines 04 and 07.

Line 10—Discount Factors. Enter the discount factor for each year, computed as described in the instructions under Section 2.6.

Line 11—Present Value of Future Cash Flows. Enter for each year the product of Lines 08 and 09.

Line 12—Horizon Value. Enter under the Total column the estimated horizon value of the smelter reported in Schedule D.7, Line 16.

Line 13—Discount Factor. Enter under the Total column the appropriate discount factor, computed as described in the instructions under Section 2.6.

Line 14—Present Value of Horizon Value. Enter under the Total column the product of Lines 11 and 12.

Line 15—Present Value of Future Cash Flows. Enter under the Total column the sum of amounts previously reported on Line 10 for 1984 through 1990.

Line 16—Total Present Value. Enter the sum of Lines 13 and 14.

Line 17—Current Salvage Value. Enter the amount reported in Schedule D.5, Line 17, if the value is greater than zero. If the value is zero or less, enter zero.

Line 18—Net Present Value. Enter the difference between Lines 16 and 17. In determining eligibility for a permanent waiver from interim control requirements, an applicant must use the higher of the two net present value figures computed under the two alternative assumptions. Applicants reporting a negative value for the higher net present value figure will be eligible for a permanent waiver from interim use of a constant control system for sulfur dioxide emissions.

Schedule D.7—Horizon Value of Cash Flows for the Interim Controls Test

General. Use Schedule D.7 to calculate the horizon value of net cash flow projections for the Interim Controls Test. This horizon value is used in Schedule D.6. The computation of the horizon value is different for this test than for the Profit Protection Test because this test requires the reporting of depreciation for tax purposes.

In Schedule D.7, the applicant removes the tax savings of control equipment depreciation from the cash flows for the last two forecast years. A depreciation-free horizon value is then calculated from these depreciation-free cash flows. The tax savings of constant controls depreciation during the horizon years are then calculated separately. The final horizon value is equal to the sum of the depreciation-free horizon value and the tax savings from depreciation of constant controls accruing over the horizon years. The line items in Schedule D.7 are explained in the following instruction.

Line 01—Net Cash Flow Projections. Enter for each of the final two forecast years the values in Schedule D.6, Line 09, for the corresponding years.

Line 02—Depreciation and Amortization. Enter for each of the final two forecast years the value in Schedule D.6, Line 03, for the corresponding years.

Line 03—Marginal Tax Rate. Enter for each of the final two forecast years the marginal income tax rate applicable to the smelter. This rate should incorporate both Federal and State tax liability.

Line 04—Tax Savings. Enter for each of the final two forecast years the product of Lines 02 and 03.

Line 05—Nominal Dollar Values. Enter for each of the final two forecast years the difference between Lines 01 and 04.

Line 06—1990 Dollar Values. For each of the final two forecast years the nominal dollar values must be expressed in the last forecast year's dollars (1990 dollars). Transfer the 1990 amount in Line 05 directly to Line 06. Inflate the 1989 amount to 1990 dollars using the forecast GNP price deflator.

Line 07—Average. Enter under the Total column the average of the two values in Line 06.

Line 08—Horizon Factor. Enter under the Total column the horizon factor provided in Section 2.7.

Line 09—Depreciation-free Horizon Value. Enter under the Total column the product of Lines 07 and 08.

Line 10—Depreciation and Amortization. Enter for each year of the horizon period depreciation charges associated with the smelter's investment in equipment and facilities related to pollution controls. These investments should include those actually made and those forecast to be made by the end of the forecast period. Reported charges should be computed in accordance with depreciation and amortization methods adopted for tax reporting purposes by the firm. Attach as part of exhibit B supporting schedules consistent with those supporting Line 17 in Schedule D.3.

Line 11—Marginal Tax Rate. Enter for each year of the horizon period the marginal income tax rate applicable to the smelter. This rate should incorporate both Federal and State tax liability.

Line 12—Tax Savings. Enter for each year of the horizon period the product of Lines 10 and 11.

Line 13—Discount Factors. Enter the discount factor for each year of the horizon period. This shall be computed according to the instructions under Section 2.6, except that the variable N found in the discount factor formula represents the number of years in the future, *counting from the last forecast year*. For example, N=1 for the first year of the horizon period.

Line 14—Present Value of Tax Savings. Enter for each year of the horizon period the product of Lines 12 and 13.

Line 15—Total Present Value of Tax Savings. Enter under the Total column the sum of values on Line 14 for the horizon years.

Line 16—Horizon Value. Enter under the Total column the sum of Lines 09 and 15.

ENVIRONMENTAL PROTECTION AGENCY

Primary Nonferrous Smelter Order Application

Part I—Identification Information

1. Firm name _____
2. Street/Box/RFD _____
3. City _____
4. State _____
5. Zip Code _____
6. IRS Employer Identification No. _____
7. SEC 1934 Act Registration No. _____
8. Smelter Name _____
9. Street/Box/RFD _____
10. City _____
11. State _____
12. Zip Code _____
13. Contact Person _____
14. Title _____
15. Street/Box/RFD _____
16. City _____
17. State _____
18. Zip Code _____
19. Telephone _____

Part II—Certification

I certify that the information provided herein and appended hereto is true and accurate to the best of my knowledge. I understand that this information is being required, in part, under the authority of Section 114 of the Clean Air Act, 42 U.S.C. 7414.

Name _____
Title _____
Signature _____
Date _____

SCHEDULE A.1—HISTORICAL REVENUE DATA

[Smelter identification]

	Line	1979	1980	1981	1982	1983
A. Copper product sales:						
1. Total quantity sold	01					
2. Unaffiliated customer sales:						
a. Quantity sold	2					
b. Operating revenue	03					
c. Average unit price	04					
d. Average product grade	05					
3. Affiliated customers sales:						
a. Quantity sold	06					
b. Operating revenue	07					
c. Average unit price	08					
d. Average product grade	09					
4. Adjusted copper revenues:						
a. Total copper revenues	10					
b. Transfer price adjustment	11					
c. Other revenue adjustments	12					
d. Adjusted copper revenues	13					
B. Lead product sales:						
1. Total quantity sold	14					
2. Unaffiliated customer sales:						
a. Quantity sold	15					
b. Operating revenue	16					
c. Average unit price	17					
d. Average product grade	18					
3. Affiliated customer sales:						
a. Quantity sold	19					
b. Operating revenue	20					
c. Average unit price	21					
d. Average product grade	22					
4. Adjusted lead revenues:						
a. Total lead revenues	23					
b. Transfer price adjustment	24					
c. Other revenue adjustments	25					
d. Adjusted lead revenues	26					
C. Zinc product sales:						
1. Total quantity sold	27					
2. Unaffiliated customer sales:						
a. Quantity sold	28					
b. Operating revenue	29					
c. Average unit price	30					
d. Average product grade	31					
3. Affiliated customer sales:						
a. Quantity sold	32					
b. Operating revenue	33					
c. Average unit price	34					
d. Average product grade	35					
4. Adjusted zinc revenues:						
a. Total zinc revenues	36					
b. Transfer price adjustment	37					
c. Other revenue adjustments	38					
d. Adjusted zinc revenues	39					
D. Molybdenum or other nonferrous metal sales:						
1. Total quantity sold	40					
2. Unaffiliated customer sales:						
a. Quantity sold	41					
b. Operating revenue	42					
c. Average unit price	43					
d. Average product grade	44					
3. Affiliated customer sales:						
a. Quantity sold	45					
b. Operating revenue	46					
c. Average unit price	47					
d. Average product grade	48					
4. Adjusted molybdenum or other nonferrous metal revenues:						
a. Total molybdenum or other nonferrous metal revenues	49					
b. Transfer price adjustment	50					
c. Other revenue adjustments	51					
d. Adjusted molybdenum or other nonferrous metal revenues	52					
E. Primary metal revenues	53					
F. Tolling service revenues:						
1. Total toll concentrates processed	54					

SCHEDULE A.1—HISTORICAL REVENUE DATA—Continued

[Smelter identification]

	Line	1979	1980	1981	1982	1983
2. Unaffiliated customer revenues:						
a. Concentrates processed	55					
b. Operating revenue	56					
c. Average unit price	57					
d. Average product grade	58					
3. Affiliated customer revenues:						
a. Concentrates processed	59					
b. Operating revenue	60					
c. Average unit price	61					
d. Average product grade	62					
4. Adjusted tolling service revenues:						
a. Total tolling service revenue	63					
b. Transfer price adjustment	64					
c. Other revenue adjustments	65					
d. Adjusted tolling service revenues	66					
G. Coproduct and byproduct sales:						
1. Total coproduct revenues	67					
2. Total byproduct revenues:						
a. Pollution control facilities	68					
b. Other smelter processing	69					
3. Total coproduct and byproduct revenues	70					

SCHEDULE A.2—HISTORICAL COST DATA

[Smelter identification]

	Line	1979	1980	1981	1982	1983
A. Concentrate costs:						
1. Total quantity purchased	01					
2. Unaffiliated purchases:						
a. Quantity purchased	02					
b. Concentrate cost	03					
c. Average unit price	04					
d. Average concentrate grade	05					
3. Affiliated purchases:						
a. Quantity purchased	06					
b. Concentrate cost	07					
c. Average unit price	08					
d. Average concentrate grade	09					
4. Adjusted concentrate costs:						
a. Total concentrate costs	10					
b. Transfer price adjustment	11					
c. Other cost adjustments	12					
d. Adjusted concentrate cost	13					
B. Production labor cost:						
1. Direct labor hours	14					
2. Average hourly wage rate	15					
3. Total wage payments	16					
4. Supplemental employee benefits	17					
5. Total production labor cost	18					
C. Energy costs:						
1. Electricity:						
a. Quantity in kilowatt hours	19					
b. Price per kwh	20					
c. Total electricity payments	21					
2. Natural gas:						
a. Quantity in mcf	22					
b. Price per mcf	23					
c. Total natural gas payments	24					
3. Coal:						
a. Quantity in tons	25					
b. Price per ton	26					
c. Total coal payments	27					
4. Fuel oil:						
a. Quantity in gallons	28					
b. Price per gallon	29					
c. Total fuel oil payments	30					
5. Other (specify):						
a. Quantity (specific units)	31					
b. Price per unit	32					

SCHEDULE A.2—HISTORICAL COST DATA—Continued

[Smelter identification]

	Line	1979	1980	1981	1982	1983
c. Total payments	33					
6. Total energy costs	34					

SCHEDULE A.3—HISTORICAL PROFIT AND LOSS SUMMARY

[Smelter identification]

	Line	1979	1980	1981	1982	1983
A. Operating revenues:						
1. Primary metal sales	01					
2. Coproduct and byproduct sales	02					
3. Tolling service revenues	03					
4. Other operating revenues	04					
5. Total operating revenues	05					
B. Cost of sales:						
1. Concentrates processed	06					
2. Other materials	07					
3. Production labor	08					
4. Energy costs	09					
5. Pollution control cost	10					
6. Production overhead	11					
7. Other production costs	12					
8. Total cost of sales	13					
C. Gross operating profit	14					
D. Other operating expenses:						
1. Selling general and administrative	15					
2. Taxes, other than income tax	16					
3. Research costs	17					
4. Depreciation and amortization:						
a. Pollution control facilities	18					
b. Other smelter facilities	19					
5. Interest on short term debt	20					
6. Miscellaneous operating expenses	21					
7. Total other operating expenses	22					
E. Income from operations	23					
F. Other income and (expense):						
1. Gain/(loss) on disposition of property	24					
2. Miscellaneous other income and (expense)	25					
3. Total other income and (expense)	26					
G. Net taxable income	27					

SCHEDULE A.4—HISTORICAL CAPITAL INVESTMENT SUMMARY

[Smelter identification]

	Line	1979	1980	1981	1982	1983
A. Current assets:						
1. Cash on hand and deposit	01					
2. Temporary cash investments	02					
3. Trade receivables, net:						
a. Unaffiliated customers	03					
b. Affiliated customers	04					
4. Inventories:						
a. Raw materials and products	05					
b. Other materials and supplies	06					
5. Other current assets	07					
6. Total current assets	08					
B. Property, plant and equipment:						
1. Land	09					
2. Buildings and improvements	10					
3. Machinery and equipment	11					
4. Transportation equipment	12					
5. Pollution control facilities	13					
6. Other fixed assets	14					
7. Total smelter investment	15					
8. Less: Accumulated depreciation and amortization	16					
9. Net smelter investment	17					
C. Other noncurrent assets	18					
D. Total smelter capital investment	19					

SCHEDULE A.4—HISTORICAL CAPITAL INVESTMENT SUMMARY—Continued

[Smelter identification]

	Line	1979	1980	1981	1982	1983
E. Current liabilities:						
1. Trade accounts and notes payable:						
a. Unaffiliated suppliers	20					
b. Affiliated suppliers	21					
2. Other expense accruals	22					
3. Notes payable, current	23					
4. Other current liabilities	24					
5. Total current liabilities	25					
F. Net smelter capital investment	26					

SCHEDULE B—PRE-CONTROL REVENUE FORECAST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast smelter revenues—unaffiliated parties:								
1. Concentrates processed	01							
2. Smelting charge	02							
3. Total smelter revenues	03							
4. Average product grade	04							
B. Forecast smelter revenues—affiliated parties:								
1. Concentrates processed	05							
2. Smelting charge	06							
3. Total smelter revenues	07							
4. Average product grade	08							
C. Forecast co-product and by-product sales:								
1. Total co-product revenues	09							
2. Total by-product revenues from:								
a. Pollution control facilities	10							
b. Other smelter processing	11							
3. Total co-product and by-product revenues	12							

SCHEDULE B.2—PRE-CONTROL COST FORECAST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast production labor cost:								
1. Direct labor hours	01							
2. Average hourly wage rate	02							
3. Total wage payments	03							
4. Supplemental employee benefits	04							
5. Total production labor cost	05							
B. Forecast energy costs:								
1. Electricity:								
a. Quantity in kilowatt hours	06							
b. Price per kwh	07							
c. Total electricity payments	08							
2. Natural gas:								
a. Quantity in mcf	09							
b. Price per mcf	10							
c. Total natural gas payments	11							
3. Coal:								
a. Quantity in tons	12							
b. Price per ton	13							
c. Total coal payments	14							
4. Fuel oil:								
a. Quantity in gallons	15							
b. Price per gallon	16							
c. Total fuel oil payments	17							
5. Other (specify):								
a. Quantity (specific units)	18							
b. Price per unit	19							
c. Total payments	20							
6. Total energy costs	21							

SCHEDULE B.3—PRE-CONTROL FORECAST PROFIT AND LOSS SUMMARY

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast operating revenues:								
1. Smelter revenues—unaffiliated parties	01							
2. Smelter revenues—affiliated parties	02							
3. Co-product and by-product sales	03							
4. Other operating revenues	04							
5. Total operating revenues	05							
B. Forecast cost of sales:								
1. Material costs	06							
2. Production labor costs	07							
3. Energy costs	08							
4. Pollution control costs	09							
5. Production overhead	10							
6. Other production costs	11							
7. Total cost of sales	12							
C. Forecast gross operating profit	13							
D. Forecast other operating expenses:								
1. Selling, general and administrative expenses	14							
2. Taxes, other than income tax	15							
3. Research costs	16							
4. Depreciation and amortization:								
a. Pollution control facilities	17							
b. Other smelter facilities	18							
5. Interest	19							
6. Miscellaneous operating expenses	20							
7. Total other operating expenses	21							
E. Forecast income from operations	22							

SCHEDULE B.4—CONSTANT CONTROLS REVENUE FORECAST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast smelter revenues—unaffiliated parties:								
1. Concentrates processed	01							
2. Smelting charge	02							
3. Total smelter revenues	03							
4. Average product grade	04							
B. Forecast smelter revenues—affiliated parties:								
1. Concentrates processed	05							
2. Smelting charge	06							
3. Total smelter revenues	07							
4. Average product grade	08							
C. Forecast co-product and by-product sales:								
1. Total co-product revenues	09							
2. Total by-product revenues from:								
a. Pollution control faciltites	10							
b. Other smelter processing	11							
3. Total co-product and by-product revenues	12							

SCHEDULE B.5—CONSTANT CONTROLS COST FORECAST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast production labor cost:								
1. Direct labor hours	01							
2. Average hourly wage rate	02							
3. Total wage payments	03							
4. Supplemental employee benefits	04							
5. Total production labor cost	05							
B. Forecast energy costs:								
1. Electricity:								
a. Quantity in kilowatt hours	06							
b. Price per kwh	07							
c. Total electricity payments	08							
2. Natural gas:								
a. Quantity in mcf	09							

SCHEDULE B.5—CONSTANT CONTROLS COST FORECAST—Continued

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
b. Price per mcf	10							
c. Total natural gas payments	11							
3. Coal:								
a. Quantity in tons	12							
b. Price per ton	13							
c. Total coal payments	14							
4. Fuel oil:								
a. Quantity in gallons	15							
b. Price per gallon	16							
c. Total fuel oil payments	17							
5. Other (specify):								
a. Quantity (specific units)	18							
b. Price per unit	19							
c. Total payments	20							
6. Total energy costs	21							

SCHEDULE B.6—CONSTANT CONTROLS PROFIT AND LOSS SUMMARY FOR THE PROFIT PROTECTION TEST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast operating revenues:								
1. Smelter revenues—unaffiliated parties	01							
2. Smelter revenues—affiliated parties	02							
3. Co-product and by-product sales	03							
4. Other operating revenues	04							
5. Total operating revenues	05							
B. Forecast cost of sales:								
1. Material costs	06							
2. Production labor costs	07							
3. Energy costs	08							
4. Pollution control costs	09							
5. Production overhead	10							
6. Other production costs	11							
7. Total cost of sales	12							
C. Forecast gross operating profit	13							
D. Forecast other operating expenses:								
1. Selling, general and administrative expenses	14							
2. Taxes, other than income tax	15							
3. Research costs	16							
4. Depreciation and amortization:								
a. Pollution control facilities	17							
b. Other smelter facilities	18							
5. Interest	19							
6. Miscellaneous operating expenses	20							
7. Total other operating expenses	21							
E. Forecast income from operations	22							

SCHEDULE B.7—PROFIT PROTECTION TEST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990	Total
A. Pre-control case:									
1. Net income from operations	01								XXXX
2. Discount factors	02								XXXX
3. Present value of future net income	03								XXXX
4. Horizon value	04	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
5. Discount factor	05	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
6. Present value of horizon value	06	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
7. Present value of future net income	07	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
8. Total present value	08	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
B. Constant controls case:									
1. Net income from operations	09								XXXX

SCHEDULE B.7—PROFIT PROTECTION TEST—Continued

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990	Total
2. Discount factors	10	.....	.....	.....	.....	.....	.....	.....	XXXX
3. Present value of future net income	11	.....	.....	.....	.....	.....	.....	.....	XXXX
4. Horizon value	12	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
5. Discount factor	13	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
6. Present value of horizon value	14	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
7. Present value of future net income	15	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
8. Total present value	16	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
C. Ratio of total present value of constant controls case to total, present value of base case	17	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....

SCHEDULE C.1—CONSTANT CONTROLS PROFIT AND LOSS SUMMARY FOR THE RATE OF RETURN TEST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast operating revenues:								
1. Smelter revenues—unaffilated parties	01	.....	.....	.....	.....	.....	.....	.....
2. Smelter revenues—affiliated parties	02	.....	.....	.....	.....	.....	.....	.....
3. Co-product and by-product sales	03	.....	.....	.....	.....	.....	.....	.....
4. Other operating revenues	04	.....	.....	.....	.....	.....	.....	.....
5. Total operating revenues	05	.....	.....	.....	.....	.....	.....	.....
B. Forecast cost of sales:								
1. Material costs	06	.....	.....	.....	.....	.....	.....	.....
2. Production labor costs	07	.....	.....	.....	.....	.....	.....	.....
3. Energy costs	08	.....	.....	.....	.....	.....	.....	.....
4. Pollution control costs	09	.....	.....	.....	.....	.....	.....	.....
5. Production overhead	10	.....	.....	.....	.....	.....	.....	.....
6. Other production costs	11	.....	.....	.....	.....	.....	.....	.....
7. Total cost of sales	12	.....	.....	.....	.....	.....	.....	.....
C. Forecast gross operating profit	13	.....	.....	.....	.....	.....	.....	.....
D. Forecast other operating expenses:								
1. Selling, general and administrative expenses	14	.....	.....	.....	.....	.....	.....	.....
2. Taxes, other than income tax	15	.....	.....	.....	.....	.....	.....	.....
3. Research costs	16	.....	.....	.....	.....	.....	.....	.....
4. Depreciation and amortization								
a. Pollution control facilities	17	.....	.....	.....	.....	.....	.....	.....
b. Other smelter facilities	18	.....	.....	.....	.....	.....	.....	.....
5. Interest on short-term debt	19	.....	.....	.....	.....	.....	.....	.....
6. Miscellaneous operating expenses	20	.....	.....	.....	.....	.....	.....	.....
7. Total other operating expenses	21	.....	.....	.....	.....	.....	.....	.....
E. Forecast income from operations	22	.....	.....	.....	.....	.....	.....	.....
F. Forecast income taxes	23	.....	.....	.....	.....	.....	.....	.....
G. Forecast net income from operations	24	.....	.....	.....	.....	.....	.....	.....

SCHEDULE C.2—CONSTANT CONTROLS SUSTAINING CAPITAL INVESTMENT FORECAST

[Smelter identification]

Sustaining capital	Line	1984	1985	1986	1987	1988	1989	1990
1. Land	01	.....	.....	.....	.....	.....	.....	.....
2. Buildings and improvements	02	.....	.....	.....	.....	.....	.....	.....
2. Machinery and equipment	03	.....	.....	.....	.....	.....	.....	.....
4. Transportation equipment	04	.....	.....	.....	.....	.....	.....	.....
5. Pollution control facilities	05	.....	.....	.....	.....	.....	.....	.....
6. Other fixed assets	06	.....	.....	.....	.....	.....	.....	.....
7. Total smelter sustaining capital	07	.....	.....	.....	.....	.....	.....	.....

SCHEDULE C.3—HISTORICAL CAPITAL INVESTMENT IN CONSTANT DOLLARS

[Smelter identification]

Items from 1983 balance sheet	Line	Nominal dollars	Constant dollars
A. Current assets:			
1. Cash on hand and deposit	01	.....	.....
2. Temporary cash investments	02	.....	.....
3. Trade receivables, net:			
a. Unaffiliated customers	03	.....	.....
b. Affiliated customers	04	.....	.....
4. Inventories:			
a. Raw materials and products	05	.....	.....
b. Other materials and supplies	06	.....	.....
5. Other current assets	07	.....	.....
6. Total current assets	08	.....	.....
B. Property, plant and equipment:			
1. Land	09	.....	.....
2. Buildings and improvements	10	.....	.....
3. Machinery and equipment	11	.....	.....
4. Transportation equipment	12	.....	.....
5. Pollution control facilities	13	.....	.....
6. Other fixed assets	14	.....	.....
7. Total smelter investments	15	.....	.....
8. Less: Accumulated depreciation and amortization	16	.....	.....
9. Net smelter investment	17	.....	.....
C. Other noncurrent assets	18	.....	.....
D. Total smelter capital investment	19	.....	.....
E. Current liabilities:			
1. Trade accounts and notes payable:			
a. Unaffiliated suppliers	20	.....	.....
b. Affiliated suppliers	21	.....	.....
2. Other expense accruals	22	.....	.....
3. Notes payable, current	23	.....	.....
4. Other current liabilities	24	.....	.....
5. Total current liabilities	25	.....	.....
F. Net smelter capital investment	26	.....	.....

SCHEDULE C.4—RATE OF RETURN TEST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990	Total
A. Operating cash flow projection:									
1. Net income from operations	01	.....	.....	.....	.....	.....	.....	.....	XXXX
2. Depreciation and amortization:									
a. Pollution control facilities	02	.....	.....	.....	.....	.....	.....	.....	XXXX
b. Other smelter facilities	03	.....	.....	.....	.....	.....	.....	.....	XXXX
3. Operating cash flow	04	.....	.....	.....	.....	.....	.....	.....	XXXX
4. Capital expenditure projections:									
a. Constant controls	05	.....	.....	.....	.....	.....	.....	.....	XXXX
b. Sustaining capital	06	.....	.....	.....	.....	.....	.....	.....	XXXX
c. Total	07	.....	.....	.....	.....	.....	.....	.....	XXXX
5. Net cash flow projections	08	.....	.....	.....	.....	.....	.....	.....	XXXX
6. Discount factors	09	.....	.....	.....	.....	.....	.....	.....	XXXX
7. Present value of future cash flows	10	.....	.....	.....	.....	.....	.....	.....	XXXX
B. Net present value:									
1. Horizon value	11	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
2. Discount factor	12	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
3. Present value of horizon value	13	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
4. Present value of future cash flows	14	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
5. Total present value	15	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
6. Net smelter capital investment in constant dollars	16	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
7. Net present value	17	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....

SCHEDULE C.5—HORIZON VALUE OF CASH FLOWS

[Smelter identification]

	Line	Final forecast years		Horizon years					
		1989	1990	1991	1992	1993	1994	1995	Total
A. Depreciation-free horizon value:									
1. Net cash flow projections	01	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
2. Depreciation tax savings:									
a. Depreciation and amortization	02	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
b. Marginal tax rate	03	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
c. Tax savings	04	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
3. Depreciation-free net cash flows:									
a. Nominal dollar values	05	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
b. 1990 dollar values	06	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
c. Average	07	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
4. Horizon factor	08	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
5. Depreciation-free horizon value	09	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
B. Depreciation tax savings over the horizon period:									
1. Depreciation and amortization	10	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
2. Marginal tax rate	11	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
3. Tax savings	12	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
4. Discount factors	13	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
5. Present value of tax savings	14	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
6. Total present value of tax savings	15	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
C. Horizon Value	16	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....

SCHEDULE D.1—INTERIM CONTROLS REVENUE FORECAST

[Smelter Identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast smelter revenues—unaffiliated parties:								
1. Concentrates processed	01	.....	.....	.....	.....	.....	.....	.....
2. Smelting charge	02	.....	.....	.....	.....	.....	.....	.....
3. Total smelter revenues	03	.....	.....	.....	.....	.....	.....	.....
4. Average product grade	04	.....	.....	.....	.....	.....	.....	.....
B. Forecast smelter revenues—affiliated parties:								
1. Concentrates processed	05	.....	.....	.....	.....	.....	.....	.....
2. Smelting charge	06	.....	.....	.....	.....	.....	.....	.....
3. Total smelter revenues	07	.....	.....	.....	.....	.....	.....	.....
4. Average product grade	08	.....	.....	.....	.....	.....	.....	.....
C. Forecast co-product and by-product sales:								
1. Total co-product revenues	09	.....	.....	.....	.....	.....	.....	.....
2. Total by-product revenues from:								
a. Pollution control facilities	10	.....	.....	.....	.....	.....	.....	.....
b. Other smelter processing	11	.....	.....	.....	.....	.....	.....	.....
3. Total co-product and by-product revenues:	12	.....	.....	.....	.....	.....	.....	.....

SCHEDULE D.2—INTERIM CONTROLS COST FORECAST

[Smelter Identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast production labor cost:								
1. Direct labor hours	01	.....	.....	.....	.....	.....	.....	.....
2. Average hourly wage rate	02	.....	.....	.....	.....	.....	.....	.....
3. Total wage payments	03	.....	.....	.....	.....	.....	.....	.....
4. Supplemental employee benefits	04	.....	.....	.....	.....	.....	.....	.....
5. Total production labor cost	05	.....	.....	.....	.....	.....	.....	.....
B. Forecast energy costs:								
1. Electricity:								
a. Quantity in kilowatt hours	06	.....	.....	.....	.....	.....	.....	.....
b. Price per kwh	07	.....	.....	.....	.....	.....	.....	.....
c. Total electricity payments	08	.....	.....	.....	.....	.....	.....	.....
2. Natural gas:								
a. Quantity in mcf	09	.....	.....	.....	.....	.....	.....	.....

SCHEDULE D.2—INTERIM CONTROLS COST FORECAST—Continued

[Smelter Identification]

	Line	1984	1985	1986	1987	1988	1989	1990
b. Price per mcf	10							
c. Total natural gas payments	11							
3. Coal:								
a. Quantity in tons	12							
b. Price per ton	13							
c. Total coal payments	14							
4. Fuel oil:								
a. Quantity in gallons	15							
b. Price per gallon	16							
c. Total fuel oil payments	17							
5. Other (specify):								
a. Quantity (specific units)	18							
b. Price per unit	18							
c. Total payments	20							
6. Total energy costs	21							

SCHEDULE D.3—INTERIM CONTROLS FORECAST PROFIT AND LOSS SUMMARY

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990
A. Forecast operating revenues:								
1. Smelter revenues—unaffiliated parties	01							
2. Smelter revenues—affiliated parties	02							
3. Co-product and by-product sales	03							
4. Other operating revenues	04							
5. Total operating revenues	05							
B. Forecast cost of sales:								
1. Material costs	06							
2. Production labor costs	07							
3. Energy costs	08							
4. Pollution control costs	09							
5. Production overhead	10							
6. Other production costs	11							
7. Total cost of sales	12							
C. Forecast gross operating profit	13							
D. Forecast other operating expenses:								
1. Selling, general and administrative expenses	14							
2. Taxes, other than income tax	15							
3. Research costs	16							
4. Depreciation and amortization:								
a. Pollution control facilities	17							
b. Other smelter facilities	18							
5. Interest on short-term debt	19							
6. Miscellaneous operating expenses	20							
7. Total other operating expenses	21							
E. Forecast income from operations	22							
F. Forecast income taxes	23							
G. Forecast net income from operations	24							

SCHEDULE D.4—INTERIM CONTROL SUSTAINING CAPITAL INVESTMENT FORECAST

[Smelter identification]

Sustaining capital	Line	1984	1985	1986	1987	1988	1989	1990
1. Land	01							
2. Buildings and improvements	02							
3. Machinery and equipment	03							
4. Transportation equipment	04							
5. Pollution control facilities	05							
6. Other fixed assets	06							
7. Total smelter sustaining capital	07							

SCHEDULE D.5—CASH PROCEEDS FROM LIQUIDATION

[Smelter identification]

	Line	(1) Estimated Liquidation value	(2) Reported net book value	(3) Total gain (loss)	Gain (loss) subject to taxation as—	
					(4) Ordinary income	(5) Capital gain
A. Total current assets	01	.....	.....	XXXXX	XXXXX	XXXXX
B. Property, plant and equipment:						
1. Land	02	.....	.....	.....	.....	.....
2. Buildings and improvements	03	.....	.....	.....	.....	.....
3. Machinery and equipment	04	.....	.....	.....	.....	.....
4. Transportation equipment	05	.....	.....	.....	.....	.....
5. Pollution control facilities	06	.....	.....	.....	.....	.....
6. Other fixed assets	07	.....	.....	.....	.....	.....
7. Total	08	.....	.....	.....	.....	.....
C. Other noncurrent assets.	09	.....	.....	.....	.....	.....
D. Total smelter value	10	.....	.....	.....	.....	.....
E. Total current liabilities	11	.....	.....	XXXXX	XXXXX	XXXXX
F. Gross liquidation value	12	.....	.....	.....	.....	.....
G. Liquidation costs	13	.....	XXXXX	.....	.....	XXXXX
H. Net Taxable Gain (or loss)	14	XXXXX	XXXXX	XXXXX	.....	.....
I. Income tax rate	15	XXXXX	XXXXX	XXXXX	.....	.....
J. Income tax on gain (loss)	16	XXXXX	XXXXX	XXXXX	.....	.....
K. After tax cash proceeds from liquidation	17	.....	XXXXX	XXXXX	XXXXX	XXXXX

SCHEDULE D.6—PERMANENT WAIVER FROM INTERIM CONTROLS TEST

[Smelter identification]

	Line	1984	1985	1986	1987	1988	1989	1990	Total
A. Operating Cash flow projection:									
1. Net income from operations	01	.....	.....	.....	.....	.....	.....	.....	XXXX
2. Net income adjustments	02	.....	.....	.....	.....	.....	.....	.....	XXXX
3. Depreciation and amortization:									
a. Pollution control facilities	03	.....	.....	.....	.....	.....	.....	.....	XXXX
b. Other smelter facilities	04	.....	.....	.....	.....	.....	.....	.....	XXXX
4. Operating cash flow	05	.....	.....	.....	.....	.....	.....	.....	XXXX
5. Capital expenditure projections:									
a. Interim controls	06	.....	.....	.....	.....	.....	.....	.....	XXXX
b. Sustaining capital	07	.....	.....	.....	.....	.....	.....	.....	XXXX
c. Total	08	.....	.....	.....	.....	.....	.....	.....	XXXX
6. Net cash flow projections	09	.....	.....	.....	.....	.....	.....	.....	XXXX
7. Discount factors	10	.....	.....	.....	.....	.....	.....	.....	XXXX
8. Present value of future cash flows	11	.....	.....	.....	.....	.....	.....	.....	XXXX
B. Net present value:									
1. Horizon value	12	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
2. Discount factor	13	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
3. Present value of horizon value	14	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
4. Present value of future cash flows	15	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
5. Total present value	16	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
6. Current salvage value	17	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
7. Net present value	18	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....

SCHEDULE D.7—HORIZON VALUE OF CASH FLOWS

[Smelter identification]

	Line	Final forecast years		Horizon years					Total
		1989	1990	1991	1992	1993	1994	1995	
A. Depreciation-free horizon value:									
1. Net cash flow projections	01	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
2. Depreciation tax savings:									
a. Depreciation and amortization	02	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
b. Marginal tax rate	03	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
c. Tax savings	04	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

SCHEDULE D.7—HORIZON VALUE OF CASH FLOWS—Continued

[Smelter identification]

	Line	Final forecast years		Horizon years					Total
		1989	1990	1991	1992	1993	1994	1995	
3. Depreciation-free net cash flows:									
a. Nominal dollar values	05	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
b. 1990 dollar values	06	.....	.....	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
c. Average	07	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
4. Horizon factor	08	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
5. Depreciation-free horizon value	09	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
B. Depreciation tax savings over the horizon period:									
1. Depreciation and amortization	10	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
2. Marginal tax rate	11	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
3. Tax savings	12	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
4. Discount factors	13	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
5. Present value of tax savings	14	XXXX	XXXX	.....	.....	.....	.....	.....	XXXX
6. Total present value of tax savings	15	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....
C. Horizon Value	16	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	.....

PART 58—AMBIENT AIR QUALITY SURVEILLANCE

Subpart A—General Provisions

Sec.
58.1 Definitions.
58.2 Purpose.
58.3 Applicability.

Subpart B—Monitoring Criteria

58.10 Quality assurance.
58.11 Monitoring methods.
58.12 Siting of instruments or instrument probes.
58.13 Operating schedule.
58.14 Special purpose monitors.

Subpart C—State and Local Air Monitoring Stations (SLAMS)

58.20 Air quality surveillance: plan content.
58.21 SLAMS network design.
58.22 SLAMS methodology.
58.23 Monitoring network completion.
58.24 [Reserved]
58.25 System modification.
58.26 Annual State air monitoring report.
58.27 Compliance date for air quality data reporting.
58.28 SLAMS data submittal.

Subpart D—National Air Monitoring Stations (NAMS)

58.30 NAMS network establishment.
58.31 NAMS network description.
58.32 NAMS approval.
58.33 NAMS methodology.
58.34 NAMS network completion.
58.35 NAMS data submittal.
58.36 System modification.

Subpart E—Photochemical Assessment Monitoring Stations (PAMS)

58.40 PAMS network establishment.
58.41 PAMS network description.
58.42 PAMS approval.
58.43 PAMS methodology.
58.44 PAMS network completion.
58.45 PAMS data submittal.
58.46 System modification.

Subpart F—Air Quality Index Reporting

58.50 Index reporting.

Subpart G—Federal Monitoring

58.60 Federal monitoring.
58.61 Monitoring other pollutants.

APPENDIX A TO PART 58—QUALITY ASSURANCE REQUIREMENTS FOR STATE AND LOCAL AIR MONITORING STATIONS (SLAMS)
APPENDIX B TO PART 58—QUALITY ASSURANCE REQUIREMENTS FOR PREVENTION OF SIGNIFICANT DETERIORATION (PSD) AIR MONITORING
APPENDIX C TO PART 58—AMBIENT AIR QUALITY MONITORING METHODOLOGY
APPENDIX D TO PART 58—NETWORK DESIGN FOR STATE AND LOCAL AIR MONITORING STATIONS (SLAMS), NATIONAL AIR MONITORING STATIONS (NAMS), AND PHOTOCHEMICAL ASSESSMENT MONITORING STATIONS (PAMS)
APPENDIX E TO PART 58—PROBE AND MONITORING PATH SITING CRITERIA FOR AMBIENT AIR QUALITY MONITORING
APPENDIX F TO PART 58—ANNUAL SLAMS AIR QUALITY INFORMATION

APPENDIX G TO PART 58—UNIFORM AIR QUALITY INDEX (AQI) AND DAILY REPORTING

AUTHORITY: 42 U.S.C. 7410, 7601(a), 7613, and 7619.

SOURCE: 44 FR 27571, May 10, 1979, as amended at 59 FR 41628, Aug. 12, 1994.

Subpart A—General Provisions

§ 58.1 Definitions.

As used in this part, all terms not defined herein have the meaning given them in the Act:

Act means the Clean Air Act as amended (42 U.S.C. 7401, *et seq.*).

Administrator means the Administrator of the Environmental Protection Agency (EPA) or his or her authorized representative.

Aerometric Information Retrieval System (AIRS)-Air Quality Subsystem (AQS) is EPA's computerized system for storing and reporting of information relating to ambient air quality data.

Annual State air monitoring report is an annual report, prepared by control agencies and submitted to EPA for approval, that consists of an annual data summary report for all pollutants and a detailed report describing any proposed changes to their air quality surveillance network.

CO means carbon monoxide.

Community Monitoring Zone (CMZ) means an optional averaging area with established, well defined boundaries, such as county or census block, within a MPA that has relatively uniform concentrations of annual $PM_{2.5}$ as defined by appendix D of this part. Two or more core SLAMS and other monitors within a CMZ that meet certain requirements as set forth in Appendix D of this part may be averaged for making comparisons to the annual $PM_{2.5}$ NAAQS.

Consolidated Metropolitan Statistical Area (CMSA) means the most recent area as designated by the U.S. Office of Management and Budget and population figures from the Bureau of the Census. The Department of Commerce provides that within metropolitan complexes of 1 million or more population, separate component areas are defined if specific criteria are met. Such areas are designated primary metropolitan statistical areas (PMSAs; and any area containing PMSAs is designated CMSA.

Core $PM_{2.5}$ SLAMS means community-oriented monitoring sites representative of community-wide exposures that are the basic component sites of the $PM_{2.5}$ SLAMS regulatory network. Core $PM_{2.5}$ SLAMS include community-oriented SLAMS monitors, and sites collocated at PAMS.

Corrected concentration pertains to the result of an accuracy or precision assessment test of an open path analyzer in which a high-concentration test or audit standard gas contained in a short test cell is inserted into the optical measurement beam of the instrument. When the pollutant concentration measured by the analyzer in such a test includes both the pollutant concentration in the test cell and the concentration in the atmosphere, the atmospheric pollutant concentration must be subtracted from the test measurement to obtain the corrected concentration test result. The corrected concentration is equal to the measured concentration minus the average of the atmospheric pollutant concentrations measured (without the test cell) immediately before and immediately after the test.

Correlated acceptable continuous (CAC) PM analyzer means an optional fine particulate matter analyzer that can be used to supplement a $PM_{2.5}$ reference or equivalent sampler, in accordance with the provisions of § 58.13(f).

Effective concentration pertains to testing an open path analyzer with a high-concentration calibration or audit standard gas contained in a short test cell inserted into the optical measurement beam of the instrument. Effective concentration is the equivalent ambient-level concentration that would produce the same spectral absorbance over the actual atmospheric monitoring path length as produced by the high-concentration gas in the short test cell. Quantitatively, effective concentration is equal to the actual concentration of the gas standard in the test cell multiplied by the ratio of the path length of the test cell to the actual atmospheric monitoring path length.

Equivalent method means a method of sampling and analyzing the ambient

air for an air pollutant that has been designated as an equivalent method in accordance with part 53 of this chapter; it does not include a method for which an equivalent method designation has been canceled in accordance with §53.11 or §53.16 of this chapter.

Indian Governing Body means the governing body of any tribe, band, or group of Indians subject to the jurisdiction of the United States and recognized by the United States as possessing power of self-government.

Indian Reservation means any Federally recognized reservation established by treaty, agreement, executive order, or act of Congress.

Local agency means any local government agency, other than the State agency, which is charged with the responsibility for carrying out a portion of the plan.

Meteorological measurements means measurements of wind speed, wind direction, barometric pressure, temperature, relative humidity, and solar radiation.

Metropolitan Statistical Area (MSA) as designated by the most recent decennial U.S. Census of Population Report.

Monitor is a generic term for an instrument, sampler, analyzer, or other device that measures or assists in the measurement of atmospheric air pollutants and which is acceptable for use in ambient air surveillance under the provisions of appendix C to this part, including both point and open path analyzers that have been designated as either reference or equivalent methods under part 53 of this chapter and air samplers that are specified as part of a manual method that has been designated as a reference or equivalent method under part 53 of this chapter.

Monitoring path for an open path analyzer is the actual path in space between two geographical locations over which the pollutant concentration is measured and averaged.

Monitoring path length of an open path analyzer is the length of the monitoring path in the atmosphere over which the average pollutant concentration measurement (path-averaged concentration) is determined. See also, optical measurement path length.

Monitoring Planning Area (MPA) means a contiguous geographic area with established, well defined boundaries, such as a metropolitan statistical area, county or State, having a common area that is used for planning monitoring locations for $PM_{2.5}$. MPAs may cross State boundaries, such as the Philadelphia PA-NJ MSA, and be further subdivided into community monitoring zones. MPAs are generally oriented toward areas with populations greater than 200,000, but for convenience, those portions of a State that are not associated with MSAs can be considered as a single MPA. MPAs must be defined, where applicable, in a State PM monitoring network description.

NAMS means National Air Monitoring Station(s). Collectively the NAMS are a subset of the SLAMS ambient air quality monitoring network.

NO_2 means nitrogen dioxide. *NO* means nitrogen oxide. NO_X means oxides of nitrogen and is defined as the sum of the concentrations of NO_2 and NO.

O_3 means ozone.

Open path analyzer is an automated analytical method that measures the average atmospheric pollutant concentration in situ along one or more monitoring paths having a monitoring path length of 5 meters or more and that has been designated as a reference or equivalent method under the provisions of part 53 of this chapter.

Optical measurement path length is the actual length of the optical beam over which measurement of the pollutant is determined. The path-integrated pollutant concentration measured by the analyzer is divided by the optical measurement path length to determine the path-averaged concentration. Generally, the optical measurement path length is:

(1) Equal to the monitoring path length for a (bistatic) system having a transmitter and a receiver at opposite ends of the monitoring path;

(2) Equal to twice the monitoring path length for a (monostatic) system having a transmitter and receiver at one end of the monitoring path and a mirror or retroreflector at the other end; or

(3) Equal to some multiple of the monitoring path length for more complex systems having multiple passes of

the measurement beam through the monitoring path.

PAMS means Photochemical Assessment Monitoring Stations.

Particulate matter monitoring network description, required by § 58.20(f), means a detailed plan, prepared by control agencies and submitted to EPA for approval, that describes their $PM_{2.5}$ and PM_{10} air quality surveillance network.

Pb means lead.

Plan means an implementation plan, approved or promulgated pursuant to section 110 of the Clean Air Act.

$PM_{2.5}$ means particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers as measured by a reference method based on 40 CFR part 50, Appendix L, and designated in accordance with part 53 of this chapter or by an equivalent method designated in accordance with part 53 of this chapter.

PM_{10} means particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers as measured by a reference method based on appendix J of part 50 of this chapter and designated in accordance with part 53 of this chapter or by an equivalent method designated in accordance with part 53 of this chapter.

Point analyzer is an automated analytical method that measures pollutant concentration in an ambient air sample extracted from the atmosphere at a specific inlet probe point and that has been designated as a reference or equivalent method in accordance with part 53 of this chapter.

Population-oriented monitoring (or sites) applies to residential areas, commercial areas, recreational areas, industrial areas, and other areas where a substantial number of people may spend a significant fraction of their day.

Primary Metropolitan Statistical Area (PMSA) is a separate component of a consolidated metropolitan statistical area. For the purposes of this part, PMSA is used interchangeably with MSA.

Probe is the actual inlet where an air sample is extracted from the atmosphere for delivery to a sampler or point analyzer for pollutant analysis.

PSD station means any station operated for the purpose of establishing the effect on air quality of the emissions from a proposed source for purposes of prevention of significant deterioration as required by § 51.24(n) of part 51 of this chapter.

Reference method means a method of sampling and analyzing the ambient air for an air pollutant that will be specified as a reference method in an appendix to part 50 of this chapter, or a method that has been designated as a reference method in accordance with this part; it does not include a method for which a reference method designation has been canceled in accordance with § 53.11 or § 53.16 of this chapter.

Regional Administrator means the Administrator of one of the ten EPA Regional Offices or his or her authorized representative.

SAROAD site identification form is one of the several forms in the SAROAD system. It is the form which provides a complete description of the site (and its surroundings) of an ambient air quality monitoring station.

SLAMS means State or Local Air Monitoring Station(s). The SLAMS make up the ambient air quality monitoring network which is required by § 58.20 to be provided for in the State's implementation plan. This definition places no restrictions on the use of the physical structure or facility housing the SLAMS. Any combination of SLAMS and any other monitors (Special Purpose, NAMS, PSD) may occupy the same facility or structure without affecting the respective definitions of those monitoring station.

SO_2 means sulfur dioxide.

Special Purpose Monitor (SPM) is a generic term used for all monitors other than SLAMS, NAMS, PAMS, and PSD monitors included in an agency's monitoring network for monitors used in a special study whose data are officially reported to EPA.

State agency means the air pollution control agency primarily responsible for development and implementation of a plan under the Act.

Storage and Retrieval of Aerometric Data (SAROAD) system is a computerized system which stores and reports information relating to ambient air quality. The SAROAD system has been replaced with the AIRS-AQS system; however, the SAROAD data reporting

format continues to be used by some States and local air pollution agencies as an interface to AIRS on an interim basis.

Traceable means that a local standard has been compared and certified, either directly or via not more than one intermediate standard, to a National Institute of Standards and Technology (NIST)-certified primary standard such as a NIST-Traceable Reference Material (NTRM) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS).

TSP (total suspended particulates) means particulate matter as measured by the method described in appendix B of part 50 of this chapter,

Urban area population means the population defined in the most recent decennial U.S. Census of Population Report.

VOC means volatile organic compounds.

[44 FR 27571, May 10, 1979, as amended at 48 FR 2529, Jan. 20, 1983; 51 FR 9586, Mar. 19, 1986; 52 FR 24739, July 1, 1987; 58 FR 8467, Feb. 12, 1993; 59 FR 41628, 41629, Aug. 12, 1994; 60 FR 52319, Oct. 6, 1995; 62 FR 38830, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§58.2 Purpose.

(a) This part contains criteria and requirements for ambient air quality monitoring and requirements for reporting ambient air quality data and information. The monitoring criteria pertain to the following areas:

(1) Quality assurance procedures for monitor operation and data handling.

(2) Methodology used in monitoring stations.

(3) Operating schedule.

(4) Siting parameters for instruments or instrument probes.

(b) The requirements pertaining to provisions for an air quality surveillance system in the State Implementation Plan are contained in this part.

(c) This part also acts to establish a national ambient air quality monitoring network for the purpose of providing timely air quality data upon which to base national assessments and policy decisions. This network will be operated by the States and will consist of certain selected stations from the States' SLAMS networks. These selected stations will remain as SLAMS and will continue to meet any applicable requirements on SLAMS. The stations, however, will also be designated as National Air Monitoring Stations (NAMS) and will be subject to additional data reporting and monitoring methodology requirements as contained in subpart D of this part.

(d) This section also acts to establish a Photochemical Assessment Monitoring Stations (PAMS) network as a subset of the State's SLAMS network for the purpose of enhanced monitoring in O_3 nonattainment areas listed as serious, severe, or extreme. The PAMS network will be subject to the data reporting and monitoring methodology requirements as contained in subpart E of this part.

(e) Requirements for the daily reporting of an index of ambient air quality, to insure that the population of major urban areas are informed daily of local air quality conditions, are also included in this part.

[44 FR 27571, May 10, 1979, as amended at 58 FR 8467, Feb. 12, 1993]

§58.3 Applicability.

This part applies to:

(a) State air pollution control agencies.

(b) Any local air pollution control agency or Indian governing body to which the State has delegated authority to operate a portion of the State's SLAMS network.

(c) Owners or operators of proposed sources.

Subpart B—Monitoring Criteria

§58.10 Quality assurance.

(a) Appendix A to this part contains quality assurance criteria to be followed when operating the SLAMS network.

(b) Appendix B to this part contains the quality assurance criteria to be followed by the owner or operator of a proposed source when operating a PSD station.

§58.11 Monitoring methods.

Appendix C to this part contains the criteria to be followed in determining acceptable monitoring methods or instruments for use in SLAMS.

§ 58.12 Siting of instruments or instrument probes.

Appendix E to this part contains criteria for siting instruments or instrument probes for SLAMS.

§ 58.13 Operating schedule.

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, $PM_{2.5}$ samplers, and PAMS VOC samplers), at least one 24-hour sample must be obtained every sixth day except during periods or seasons exempted by the Regional Administrator.

(c) For PAMS VOC samplers, samples must be obtained as specified in sections 4.3 and 4.4 of appendix D to this part. Area-specific PAMS operating schedules must be included as part of the network description required by § 58.40 and must be approved by the Administrator.

(d) For PM_{10} samplers—a 24-hour sample must be taken a minimum of every third day, except during periods or seasons exempted by the Regional Administrator.

(e) For $PM_{2.5}$ samplers, a 24-hour sample is required everyday for certain core SLAMS, including certain PAMS, as described in section 2.8.1.3 of appendix D of this part, except during seasons or periods of low $PM_{2.5}$ as otherwise exempted by the Regional Administrator. A waiver of the everyday sampling schedule for SLAMS may be granted by the Regional Administrator or designee, and for NAMS by the Administrator or designee, for 1 calendar year from the time a $PM_{2.5}$ sequential sampler (FRM or Class I equivalent) has been approved by EPA. A 24-hour sample must be taken a minimum of every third day for all other SLAMS, including NAMS, as described in section 2.8.1.3 of appendix D of this part, except when exempted by the Regional Administrator in accordance with forthcoming EPA guidance. During periods for which exemptions to every third day or every day sampling are allowed for core $PM_{2.5}$ SLAMS, a minimum frequency of one in 6-day sampling is still required. However, alternative sampling frequencies are allowed for SLAMS sites that are principally intended for comparisons to the 24-hour NAAQS. Such modifications must be approved by the Regional Administrator.

(f) *Alternatives to everyday sampling at sites with correlated acceptable continuous analyzers.* (1) Certain $PM_{2.5}$ core SLAMS sites located in monitoring planning areas (as described in section 2.8 of appendix D of this part) are required to sample every day with a reference or equivalent method operating in accordance with part 53 of this chapter and section 2 of appendix C of this part. However, in accordance with the monitoring priority as defined in paragraph (f)(2) of this section, established by the control agency and approved by EPA, a core SLAMS monitor may operate with a reference or equivalent method on a 1 in 3-day schedule and produce data that may be compared to the NAAQS, provided that it is collocated with an acceptable continuous fine particulate PM analyzer that is correlated with the reference or equivalent method. If the alternative sampling schedule is selected by the control agency and approved by EPA, the alternative schedule shall be implemented on January 1 of the year in which everyday sampling is required. The selection of correlated acceptable continuous PM analyzers and procedures for correlation with the intermittent reference or equivalent method shall be in accordance with procedures approved by the Regional Administrator. Unless the continuous fine particulate analyzer satisfies the requirements of section 2 of appendix C of this part, however, the data derived from the correlated acceptable continuous monitor are not eligible for direct comparisons to the NAAQS in accordance with part 50 of this chapter.

(2) A Metropolitan Statistical Area (MSA) (or primary metropolitan statistical area) with greater than 1 million population and high concentrations of $PM_{2.5}$ (greater than or equal to 80 percent of the NAAQS) shall be a Priority

1 PM monitoring area. Other monitoring planning areas may be designated as Priority 2 PM monitoring areas.

(3) Core SLAMS having a correlated acceptable continuous analyzer collocated with a reference or equivalent method in a Priority 1 PM monitoring area may operate on the 1 in 3 sampling frequency only after reference or equivalent data are collected for at least 2 complete years.

(4) In all monitoring situations, with a correlated acceptable continuous alternative, FRM samplers or filter-based equivalent analyzers should preferably accompany the correlated acceptable continuous monitor.

[44 FR 27571, May 10, 1979, as amended at 52 FR 24739, July 1, 1987; 58 FR 8467, Feb. 12, 1993; 62 FR 38831, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§58.14 Special purpose monitors.

(a) Except as specified in paragraph (b) of this section, 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 as described in §58.22 and, after January 1, 1983, must also meet the requirements for SLAMS described in §58.13 and Appendices A and E of this part.

(b) Based on the need, in transitioning to a $PM_{2.5}$ standard that newly addresses the ambient impacts of fine particles, to encourage a sufficiently extensive geographical deployment of $PM_{2.5}$ monitors and thus hasten the development of an adequate $PM_{2.5}$ ambient air quality monitoring infrastructure, $PM_{2.5}$ NAAQS violation determinations shall not be exclusively made based on data produced at a population-oriented SPM site during the first 2 complete calendar years of its operation. However, a notice of NAAQS violations resulting from population-oriented SPMs shall be reported to EPA in the State's annual monitoring report and be considered by the State in the design of its overall SLAMS network; these population-oriented SPMs should be considered to become a permanent SLAMS during the annual network review in accordance with §58.25.

(c) Any ambient air quality monitoring station other than a SLAMS or PSD station from which the State intends to use the data for SIP-related functions other than as described in paragraph (a) of this section is not necessarily required to comply with the requirements for a SLAMS station under paragraph (a) of this section 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.

[62 FR 38832, July 18, 1997]

Subpart C—State and Local Air Monitoring Stations (SLAMS)

§58.20 Air quality surveillance: plan content.

By January 1, 1980, the State shall adopt and submit to the Administrator a revision to the plan which will:

(a) Provide for the establishment of an air quality surveillance system that consists of a network of monitoring stations designated as State and Local Air Monitoring Stations (SLAMS) which measure ambient concentrations of those pollutants for which standards have been established in part 50 of this chapter. SLAMS (including NAMS) designated as PAMS will also obtain ambient concentrations of speciated VOC and NO_X, and meteorological measurements. PAMS may therefore be located at existing SLAMS or NAMS sites when appropriate.

(b) Provide for meeting the requirements of appendices A, C, D, and E to this part.

(c) Provide for the operation of at least one SLAMS per criteria pollutant except Pb during any stage of an air pollution episode as defined in the plan.

(d) Provide for the review of the air quality surveillance system on an annual basis to determine if the system meets the monitoring objectives defined in appendix D of this part. Such

review must identify needed modifications to the network such as termination or relocation of unnecessary stations or establishment of new stations that are necessary. For $PM_{2.5}$, the review must identify needed changes to core SLAMS, monitoring planning areas, the chosen community monitoring approach including optional community monitoring zones, SLAMS, or SPMs.

(e) Provide for having a SLAMS network description available for public inspection and submission to the Administrator upon request. The network description must be available at the time of plan revision submittal and must contain the following information for each SLAMS:

(1) The AIRS site identification form for existing stations.

(2) The proposed location for scheduled stations.

(3) The sampling and analysis method.

(4) The operating schedule.

(5) The monitoring objective and spatial scale of representativeness as defined in appendix D to this part.

(6) A schedule for: (i) Locating, placing into operation, and making available the AIRS site identification form for each SLAMS which is not located and operating at the time of plan revision submittal, (ii) implementing quality assurance procedures of appendix A to this part for each SLAMS for which such procedures are not implemented at the time of plan revision submittal, and (iii) resiting each SLAMS which does not meet the requirements of appendix E to this part at the time of plan revision submittal.

(f) Provide for having a PM monitoring network description available for public inspection which must provide for monitoring planning areas, and the community monitoring approach involving core monitors and optional community monitoring zones for $PM_{2.5}$. The PM monitoring network description for PM_{10} and $PM_{2.5}$ must be submitted to the Regional Administrator for approval by July 1, 1998, and must contain the following information for each PM SLAMS and $PM_{2.5}$ SPM:

(1) The AIRS site identification form for existing stations.

(2) The proposed location for scheduled stations.

(3) The sampling and analysis method.

(4) The operating schedule.

(5) The monitoring objective, spatial scale of representativeness, and additionally for $PM_{2.5}$, the monitoring planning area, optional community monitoring zone, and the site code designation to identify which site will be identified as core SLAMS; and SLAMS or population-oriented SPMs, if any, that are microscale or middle scale in their representativeness as defined in appendix D of this part.

(6) A schedule for:

(i) Locating, placing into operation, and making available the AIRS site identification form for each SLAMS which is not located and operating at the time of plan revision submittal.

(ii) Implementing quality assurance procedures of appendix A of this part for each SLAMS for which such procedures are not implemented at the time of plan revision submittal.

(iii) Resiting each SLAMS which does not meet the requirements of appendix E of this part at the time of plan revision submittal.

(g) Provide for having a list of all $PM_{2.5}$ monitoring locations including SLAMS, NAMS, PAMS and population-oriented SPMs, that are included in the State's PM monitoring network description and are intended for comparison to the NAAQS, available for public inspection.

(h) Within 9 months after;

(1) February 12, 1993; or

(2) Date of redesignation or reclassification of any existing O_3 nonattainment area to serious, severe, or extreme; or

(3) The designation of a new area and classification to serious, severe, or extreme, affected States shall adopt and submit a plan revision to the Administrator.

(i) The plan revision will provide for the establishment and maintenance of PAMS. Each PAMS site will provide for the monitoring of ambient concentrations of criteria pollutants (O_3, NO_2), and non-criteria pollutants (NO_X, NO, and speciated VOC) as stipulated in section 4.2 of appendix D, and meteorological measurements. The PAMS

network is part of the SLAMS network, and the plan provisions in paragraphs (a) through (h) of this section will apply to the revision. Since NAMS sites are also part of the SLAMS network, some PAMS sites may be coincident with NAMS sites and may be designated as both PAMS and NAMS.

[44 FR 27571, May 10, 1979, as amended at 46 FR 44164, Sept. 3, 1981; 52 FR 24740, July 1, 1987; 58 FR 8467, Feb. 12, 1993; 59 FR 41628, Aug. 12, 1994; 62 FR 38832, July 18, 1997]

§ 58.21 SLAMS network design.

The design criteria for SLAMS contained in appendix D to this part must be used in designing the SLAMS network. The State shall consult with the Regional Administrator during the network design process. The final network design will be subject to the approval of the Regional Administrator.

§ 58.22 SLAMS methodology.

Each SLAMS must meet the monitoring methodology requirements of appendix C to this part at the time the station is put into operation as a SLAMS.

§ 58.23 Monitoring network completion.

With the exception of the PM_{10} monitoring networks that shall be in place by March 16, 1998 and with the exception of the $PM_{2.5}$ monitoring networks as described in paragraph (c) of this section:

(a) Each station in the SLAMS network must be in operation, be sited in accordance with the criteria in appendix E to this part, and be located as described on the station's AIRS site identification form, and

(b) The quality assurance requirements of appendix A to this part must be fully implemented.

(c) Each $PM_{2.5}$ station in the SLAMS network must be in operation in accordance with the minimum requirements of appendix D of this part, be sited in accordance with the criteria in appendix E of this part, and be located as described on the station's AIRS site identification form, according to the following schedule:

(1) Within 1 year after September 16, 1997, at least one required core $PM_{2.5}$ SLAMS site in each MSA with population greater than 500,000, plus one site in each PAMS area, (plus at least two additional SLAMS sites per State) must be in operation.

(2) Within 2 years after September 16, 1997, all other required SLAMS, including all required core SLAMS, required regional background and regional transport SLAMS, continuous PM monitors in areas with greater than 1 million population, and all additional required $PM_{2.5}$ SLAMS must be in operation.

(3) Within 3 years after September 16, 1997, all additional sites (e.g., sites classified as SLAMS/SPM to complete the mature network) must be in operation.

[44 FR 27571, May 10, 1979, as amended at 52 FR 24740, July 1, 1987; 59 FR 41628, Aug. 12, 1994; 62 FR 38832, July 18, 1997]

§ 58.24 [Reserved]

§ 58.25 System modification.

The State shall annually develop and implement a schedule to modify the ambient air quality monitoring network to eliminate any unnecessary stations or to correct any inadequacies indicated by the result of the annual review required by § 58.20(d). The State shall consult with the Regional Administrator during the development of the schedule to modify the monitoring program. The final schedule and modifications will be subject to the approval of the Regional Administrator. Nothing in this section will preclude the State, with the approval of the Regional Administrator, from making modifications to the SLAMS network for reasons other than those resulting from the annual review.

§ 58.26 Annual State air monitoring report.

(a) The State shall submit to the Administrator (through the appropriate Regional Office) an annual summary report of all the ambient air quality monitoring data from all monitoring stations designated State and Local Air Monitoring Stations (SLAMS). The annual report must be submitted by July 1 of each year for data collected from January 1 to December 31 of the previous year.

(b) The SLAMS annual data 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) 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.

(d) For PM monitoring and data—

(1) The State shall submit a summary to the appropriate Regional Office (for SLAMS) or Administrator (through the Regional Office) (for NAMS) that details proposed changes to the PM Monitoring Network Description and to be in accordance with the annual network review requirements in § 58.25. This shall discuss the existing PM networks, including modifications to the number, size or boundaries of monitoring planning areas and optional community monitoring zones; number and location of PM_{10} and $PM_{2.5}$ SLAMS; number and location of core $PM_{2.5}$ SLAMS; alternative sampling frequencies proposed for $PM_{2.5}$ SLAMS (including core $PM_{2.5}$ SLAMS and $PM_{2.5}$ NAMS), core $PM_{2.5}$ SLAMS to be designated $PM_{2.5}$ NAMS; and PM_{10} and $PM_{2.5}$ SLAMS to be designated PM_{10} and $PM_{2.5}$ NAMS respectively.

(2) The State shall submit an annual summary to the appropriate Regional Office of all the ambient air quality monitoring PM data from all special purpose monitors that are described in the State's PM monitoring network description and are intended for SIP purposes. These include those population-oriented SPMs that are eligible for comparison to the $PM_{2.5}$ NAAQS. The State shall certify the data in accordance with paragraph (c) of this section.

(e) The Annual State Air Monitoring Report shall be submitted to the Regional Administrator by July 1 or by an alternative annual date to be negotiated between the State and Regional Administrator. The Region shall provide review and approval/disapproval within 60 days. After 3 years following September 16, 1997, the schedule for submitting the required annual revised $PM_{2.5}$ monitoring network description may be altered based on a new schedule determined by the Regional Administrator. States may submit an alternative PM monitoring network description in which it requests exemptions from specific required elements of the network design (e.g., required number of core sites, other SLAMS, sampling frequency, etc.). After 3 years following September 16, 1997 or once a monitoring area has been determined to violate the NAAQS, then changes to an MPA monitoring network affecting the violating locations shall require public review and notification.

[44 FR 27571, May 10, 1979, as amended at 51 FR 9586, Mar. 19, 1986; 62 FR 38833, July 18, 1997; 63 FR 7714, Feb. 17, 1998]

§ 58.27 Compliance date for air quality data reporting.

The annual air quality data reporting requirements of § 58.26 apply to data collected after December 31, 1980. Data collected before January 1, 1981, must be reported under the reporting procedures in effect before the effective date of subpart C of this part.

§ 58.28 SLAMS data submittal.

The State shall submit all of the SLAMS data according to the same data submittal requirements as defined for NAMS in section 58.35. The State shall also submit any portion or all of the SLAMS data to the appropriate Regional Administrator upon request.

[59 FR 41628, Aug. 12, 1994]

Subpart D—National Air Monitoring Stations (NAMS)

§ 58.30 NAMS network establishment.

(a) By January 1, 1980, with the exception of PM_{10} and $PM_{2.5}$ samplers, which shall be by July 1, 1998, the State shall:

(1) Establish, through the operation of stations or through a schedule for locating and placing stations into operation, that portion of a National Ambient Air Quality Monitoring Network which is in that State, and

(2) Submit to the Administrator (through the appropriate Regional Office) a description of that State's portion of the network.

(b) Hereinafter, the portion of the national network in any State will be referred to as the NAMS network.

(c) The stations in the NAMS network must be stations from the SLAMS network required by § 58.20.

(d) The requirements of appendix D to this part must be met when designing the NAMS network. The process of designing the NAMS network must be part of the process of designing the SLAMS network as explained in appendix D to this part.

[44 FR 27571, May 10, 1979, as amended at 46 FR 44164, Sept. 3, 1981; 52 FR 24740, July 1, 1987; 62 FR 38833, July 18, 1997]

§ 58.31 NAMS network description.

The NAMS network description required by § 58.30 must contain the following for all stations, existing or scheduled:

(a) The AIRS site identification number for existing stations.

(b) The proposed location for scheduled stations.

(c) Identity of the urban area represented.

(d) The sampling and analysis method.

(e) The operating schedule.

(f) The monitoring objective, spatial scale of representativeness, and for $PM_{2.5}$, the monitoring planning area and community monitoring zones, as defined in appendix D of this part.

(g) A schedule for:

(1) Locating, placing into operation, and submitting the AIRS site identification form for each NAMS which is not located and operating at the time of network description submittal,

(2) Implementing quality assurance procedures of appendix A to this part for each NAMS for which such procedures are not implemented at the time of network description submittal, and

(3) Resiting each NAMS which does not meet the requirements of appendix E to this part at the time of network description submittal.

[44 FR 27571, May 10, 1979, as amended at 59 FR 41628, Aug. 12, 1994; 62 FR 38833, July 18, 1997; 63 FR 7714, Feb. 17, 1998; 64 FR 3034, Jan. 20, 1999]]

§ 58.32 NAMS approval.

The NAMS network required by § 58.30 is subject to the approval of the Administrator. Such approval will be contingent upon completion of the network description as outlined in § 58.31 and upon conformance to the NAMS design criteria contained in appendix D to this part.

§ 58.33 NAMS methodology.

Each NAMS must meet the monitoring methodology requirements of appendix C to this part applicable to NAMS at the time the station is put into operation as a NAMS.

§ 58.34 NAMS network completion.

With the exception of PM_{10} samplers, which shall be by 1 year after September 16, 1997, and $PM_{2.5}$, which shall be by 3 years after September 16, 1997:

(a) Each NAMS must be in operation, be sited in accordance with the criteria in Appendix E to this part, and be located as described in the AIRS database; and

(b) The quality assurance requirements of appendix A to this part must be fully implemented for all NAMS.

[44 FR 27571, May 10, 1979, as amended at 46 FR 44164, Sept. 3, 1981; 52 FR 24740, July 1, 1987; 59 FR 41628, Aug. 12, 1994; 62 FR 38833, July 18, 1997; 64 FR 3034, Jan. 20, 1999]

§ 58.35 NAMS data submittal.

(a) The requirements of this section apply to those stations designated as both SLAMS and NAMS by the network description required by §§ 58.20 and 58.30.

(b) The State shall report to the Administrator all ambient air quality data for SO_2, CO, O_3, NO_2, Pb, PM_{10}, and $PM_{2.5}$, and information specified by the AIRS Users Guide (Volume II, Air Quality Data Coding, and Volume III, Air Quality Data Storage) to be coded into the AIRS-AQS format. Such air quality data and information must be submitted directly to the AIRS–AQS via either electronic transmission or magnetic tape, in the format of the AIRS–AQS, and in accordance with the quarterly schedule described in paragraph (c) of this section.

(c) The specific quarterly reporting periods are January 1-March 31, April

1-June 30, July 1-September 30, and October 1-December 31. The data and information reported for each reporting period must:

(1) Contain all data and information gathered during the reporting period.

(2) Be received in the AIRS–AQS within 90 days after the end of the quarterly reporting period. For example, the data for the reporting period January 1-March 31, 1994 are due on or before June 30, 1994.

(d) Air quality data submitted for each reporting period must be edited, validated, and entered into the AIRS–AQS for updating (within the time limits specified in paragraph (c) of this section) pursuant to appropriate AIRS–AQS procedures. The procedures for editing and validating data are described in the AIRS Users Guide, Volume II Air Quality Data Coding.

(e) This section does not permit a State to exempt those SLAMS which are also designated as NAMS from all or any of the reporting requirements applicable to SLAMS in § 58.26.

[44 FR 27571, May 10, 1979, as amended at 46 FR 44164, Sept. 3, 1981; 51 FR 9586, Mar. 19, 1986; 52 FR 24740, July 1, 1987; 59 FR 41628, Aug. 12, 1994; 62 FR 38833, July 18, 1997]

§ 58.36 System modification.

During the annual SLAMS Network Review specified in § 58.20, any changes to the NAMS network identified by the EPA and/or proposed by the State and agreed to by the EPA will be evaluated. These modifications should address changes invoked by a new census and changes to the network due to changing air quality levels, emission patterns, etc. The State shall be given one year (until the next annual evaluation) to implement the appropriate changes to the NAMS network.

[51 FR 9586, Mar. 19, 1986]

Subpart E—Photochemical Assessment Monitoring Stations (PAMS)

SOURCE: 58 FR 8468, Feb. 12, 1993, unless otherwise noted.

§ 58.40 PAMS network establishment.

(a) In addition to the plan revision, the State shall submit a photochemical assessment monitoring network description including a schedule for implementation to the Administrator within 6 months after;

(1) February 12, 1993; or

(2) Date of redesignation or reclassification of any existing O_3 nonattainment area to serious, severe, or extreme; or

(3) The designation of a new area and classification to serious, severe, or extreme O_3 nonattainment.

The network description will apply to all serious, severe, and extreme O_3 nonattainment areas within the State. Some O_3 nonattainment areas may extend beyond State or Regional boundaries. In instances where PAMS network design criteria as defined in appendix D to this part require monitoring stations located in different States and/or Regions, the network description and implementation schedule should be submitted jointly by the States involved. When appropriate, such cooperation and joint network design submittals are preferred. Network descriptions shall be submitted through the appropriate Regional Office(s). Alternative networks, including different monitoring schedules, periods, or methods, may be submitted, but they must include a demonstration that they satisfy the monitoring data uses and fulfill the PAMS monitoring objectives described in sections 4.1 and 4.2 of appendix D to this part.

(b) For purposes of plan development and approval, the stations established or designated as PAMS must be stations from the SLAMS network or become part of the SLAMS network required by § 58.20.

(c) The requirements of appendix D to this part applicable to PAMS must be met when designing the PAMS network.

§ 58.41 PAMS network description.

The PAMS network description required by § 58.40 must contain the following:

(a) Identification of the monitoring area represented.

(b) The AIRS site identification number for existing stations.

(c) The proposed location for scheduled stations.

(d) Identification of the site type and location within the PAMS network design for each station as defined in appendix D to this part except that during any year, a State may choose to submit detailed information for the site scheduled to begin operation during that year's PAMS monitoring season, and defer submittal of detailed information on the remaining sites until succeeding years. Such deferred network design phases should be submitted to EPA for approval no later than January 1 of the first year of scheduled operation. As a minimum, general information on each deferred site should be submitted each year until final approval of the complete network is obtained from the Administrator.

(e) The sampling and analysis method for each of the measurements.

(f) The operating schedule for each of the measurements.

(g) An O_3 event forecasting scheme, if appropriate.

(h) A schedule for implementation. This schedule should include the following:

(1) A timetable for locating and submitting the AIRS site identification form for each scheduled PAMS that is not located at the time of submittal of the network description;

(2) A timetable for phasing-in operation of the required number and type of sites as defined in appendix D to this part; and

(3) A schedule for implementing the quality assurance procedures of appendix A to this part for each PAMS.

[58 FR 8468, Feb. 12, 1993, as amended at 64 FR 3035, Jan. 20, 1999]

§58.42 PAMS approval.

The PAMS network required by §58.40 is subject to the approval of the Administrator. Such approval will be contingent upon completion of each phase of the network description as outlined in §58.41 and upon conformance to the PAMS network design criteria contained in appendix D to this part.

§58.43 PAMS methodology.

PAMS monitors must meet the monitoring methodology requirements of appendix C to this part applicable to PAMS.

§58.44 PAMS network completion.

(a) The complete, operational PAMS network will be phased in as described in appendix D to this part over a period of 5 years after;

(1) February 12, 1993; or

(2) Date of redesignation or reclassification of any existing O_3 nonattainment area to serious, severe, or extreme; or

(3) The designation of a new area and classification to serious, severe, or extreme O_3 nonattainment.

(b) The quality assurance criteria of appendix A to this part must be implemented for all PAMS.

§58.45 PAMS data submittal.

(a) The requirements of this section apply only to those stations designated as PAMS by the network description required by §58.40.

(b) All data shall be submitted to the Administrator in accordance with the format, reporting periods, reporting deadlines, and other requirements as specified for NAMS in §58.35.

(c) The State shall report NO and NO_X data consistent with the requirements of §58.35 for criteria pollutants.

(d) The State shall report VOC data and meteorological data within 6 months following the end of each quarterly reporting period.

§58.46 System modification.

(a) Any proposed changes to the PAMS network description will be evaluated during the annual SLAMS Network Review specified in §58.20. Changes proposed by the State must be approved by the Administrator. The State will be allowed 1 year (until the next annual evaluation) to implement the appropriate changes to the PAMS network.

(b) PAMS network requirements are mandatory only for serious, severe, and extreme O_3 nonattainment areas. When any such area is redesignated to attainment, the State may revise its PAMS monitoring program subject to approval by the Administrator.

Subpart F—Air Quality Index Reporting

§ 58.50 Index reporting.

(a) The State shall report to the general public through prominent notice an air quality index in accordance with the requirements of appendix G to this part.

(b) Reporting is required by all Metropolitan Statistical Areas with a population exceeding 350,000.

(c) The population of a Metropolitan Statistical Area for purposes of index reporting is the most recent decennial U.S. census population.

[64 FR 42547, Aug. 4, 1999]

Subpart G—Federal Monitoring

SOURCE: 44 FR 27571, May 10, 1979. Redesignated at 58 FR 8467, Feb. 12, 1993.

§ 58.60 Federal monitoring.

The Administrator may locate and operate an ambient air monitoring station if the State fails to locate, or schedule to be located, during the initial network design process or as a result of the annual review required by § 58.20(d):

(a) A SLAMS at a site which is necessary in the judgment of the Regional Administrator to meet the objectives defined in appendix D to this part, or

(b) A NAMS at a site which is necessary in the judgment of the Administrator for meeting EPA national data needs.

§ 58.61 Monitoring other pollutants.

The Administrator may promulgate criteria similar to that referenced in subpart B of this part for monitoring a pollutant for which a National Ambient Air Quality Standard does not exist. Such an action would be taken whenever the Administrator determines that a nationwide monitoring program is necessary to monitor such a pollutant.

APPENDIX A TO PART 58—QUALITY ASSURANCE REQUIREMENTS FOR STATE AND LOCAL AIR MONITORING STATIONS (SLAMS)

1. *General Information.*

1.1 This appendix specifies the minimum quality assurance/quality control (QA/QC) requirements applicable to SLAMS air monitoring data submitted to EPA. State and local agencies are encouraged to develop and maintain quality assurance programs more extensive than the required minimum.

1.2 To assure the quality of data from air monitoring measurements, two distinct and important interrelated functions must be performed. One function is the control of the measurement process through broad quality assurance activities, such as establishing policies and procedures, developing data quality objectives, assigning roles and responsibilities, conducting oversight and reviews, and implementing corrective actions. The other function is the control of the measurement process through the implementation of specific quality control procedures, such as audits, calibrations, checks, replicates, routine self-assessments, etc. In general, the greater the control of a given monitoring system, the better will be the resulting quality of the monitoring data. The results of quality assurance reviews and assessments indicate whether the control efforts are adequate or need to be improved.

1.3 Documentation of all quality assurance and quality control efforts implemented during the data collection, analysis, and reporting phases is important to data users, who can then consider the impact of these control efforts on the data quality (see reference 1 of this appendix). Both qualitative and quantitative assessments of the effectiveness of these control efforts should identify those areas most likely to impact the data quality and to what extent.

1.4 Periodic assessments of SLAMS data quality are required to be reported to EPA. To provide national uniformity in this assessment and reporting of data quality for all SLAMS networks, specific assessment and reporting procedures are prescribed in detail in sections 3, 4, and 5 of this appendix. On the other hand, the selection and extent of the QA and QC activities used by a monitoring agency depend on a number of local factors such as the field and laboratory conditions, the objectives for 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 system requirements, in section 2 of this appendix, are specified in general terms to allow each State to develop a quality assurance program that is most efficient and effective for its own circumstances while achieving the Ambient Air Quality Programs data quality objectives.

2. *Quality System Requirements.*

2.1 Each State and local agency must develop a quality system (reference 2 of this appendix) to ensure that the monitoring results:

(a) Meet a well-defined need, use, or purpose.

(b) Satisfy customers' expectations.

(c) Comply with applicable standards specifications.

(d) Comply with statutory (and other) requirements of society.

(e) Reflect consideration of cost and economics.

(f) Implement a quality assurance program consisting of policies, procedures, specifications, standards, and documentation necessary to:

(1) Provide data of adequate quality to meet monitoring objectives, and

(2) Minimize loss of air quality data due to malfunctions or out-of-control conditions. This quality assurance program must be described in detail, suitably documented in accordance with Agency requirements (reference 4 of this appendix), and approved by the appropriate Regional Administrator, or the Regional Administrator's designee. The Quality Assurance Program will be reviewed during the systems audits described in section 2.5 of this appendix.

2.2 Primary requirements and guidance documents for developing the quality assurance program are contained in references 2 through 7 of this appendix, which also contain many suggested and required procedures, checks, and control specifications. Reference 7 of this appendix describes specific guidance for the development of a QA Program for SLAMS. Many specific quality control checks and specifications for methods are included in the respective reference methods described in part 50 of this chapter or in the respective equivalent method descriptions available from EPA (reference 8 of this appendix). Similarly, quality control procedures related to specifically designated reference and equivalent method analyzers are contained in the respective operation or instruction manuals associated with those analyzers. Quality assurance guidance for meteorological systems at PAMS is contained in reference 9 of this appendix. Quality assurance procedures for VOC, NO_x (including NO and NO_2), O_3, and carbonyl measurements at PAMS must be consistent with reference 15 of this appendix. Reference 4 of this appendix includes requirements for the development of quality assurance project plans, and quality assurance and control programs, and systems audits demonstrating attainment of the requirements.

2.3 Pollutant Concentration and Flow Rate Standards.

2.3.1 Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for CO, SO_2, NO, and NO_2 must be traceable to either a National Institute of Standards and Technology (NIST) NIST-Traceable Reference Material (NTRM) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS), certified in accordance with one of the procedures given in reference 10 of this appendix.

2.3.2 Test concentrations for O_3 must be obtained in accordance with the UV photometric calibration procedure specified in 40 CFR part 50, appendix D, or by means of a certified ozone transfer standard. Consult references 11 and 12 of this appendix for guidance on primary and transfer standards for O_3.

2.3.3 Flow rate measurements must be made by a flow measuring instrument that is traceable to an authoritative volume or other applicable standard. Guidance for certifying some types of flowmeters is provided in reference 7 of this appendix.

2.4 National Performance Audit Program (NPAP). Agencies operating SLAMS are required to participate in EPA's NPAP. These audits are described in reference 7 of this appendix. For further instructions, agencies should contact either the appropriate EPA Regional QA Coordinator at the appropriate EPA Regional Office location, or the NPAP Coordinator, Emissions Monitoring and Analysis Division (MD–14), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

2.5 Systems Audit Programs. Systems audits of the ambient air monitoring programs of agencies operating SLAMS shall be conducted at least every 3 years by the appropriate EPA Regional Office. Systems audit programs are described in reference 7 of this appendix. For further instructions, agencies should contact either the appropriate EPA Regional QA Coordinator or the Systems Audit QA Coordinator, Office of Air Quality Planning and Standards, Emissions Monitoring and Analysis Division (MD-14), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

3. *Data Quality Assessment Requirements.*

3.0.1 All ambient monitoring methods or analyzers used in SLAMS shall be tested periodically, as described in this section, to quantitatively assess the quality of the SLAMS data. Measurement uncertainty is estimated for both automated and manual methods. Terminology associated with measurement uncertainty are found within this appendix and includes:

(a) Precision. A measurement of mutual agreement among individual measurements of the same property usually under prescribed similar conditions, expressed generally in terms of the standard deviation;

(b) Accuracy. The degree of agreement between an observed value and an accepted reference value, accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations;

(c) Bias. The systematic or persistent distortion of a measurement process which causes errors in one direction. The individual

results of these tests for each method or analyzer shall be reported to EPA as specified in section 4 of this appendix. EPA will then calculate quarterly assessments of measurement uncertainty applicable to the SLAMS data as described in section 5 of this appendix. Data assessment results should be reported to EPA only for methods and analyzers approved for use in SLAMS monitoring under appendix C of this part.

3.0.2 Estimates of the data quality will be calculated on the basis of single monitors and reporting organizations and may also be calculated for each region and for the entire Nation. A reporting organization is defined as a State, subordinate organization within a State, or other organization that is responsible for a set of stations that monitors the same pollutant and for which data quality assessments can be pooled. States must define one or more reporting organizations for each pollutant such that each monitoring station in the State SLAMS network is included in one, and only one, reporting organization.

3.0.3 Each reporting organization shall be defined such that measurement uncertainty among all stations in the organization can be expected to be reasonably homogeneous, as a result of common factors.

(a) Common factors that should be considered by States in defining reporting organizations include:

(1) Operation by a common team of field operators.

(2) Common calibration facilities.

(3) Oversight by a common quality assurance organization.

(4) Support by a common laboratory or headquarters.

(b) Where there is uncertainty in defining the reporting organizations or in assigning specific sites to reporting organizations, States shall consult with the appropriate EPA Regional Office. All definitions of reporting organizations shall be subject to final approval by the appropriate EPA Regional Office.

3.0.4 Assessment results shall be reported as specified in section 4 of this appendix. Table A–1 of this appendix provides a summary of the minimum data quality assessment requirements, which are described in more detail in the following sections.

3.1 Precision of Automated Methods Excluding $PM_{2.5}$.

3.1.1 Methods for SO_2, NO_2, O_3 and CO. A one- point precision check must be performed at least once every 2 weeks on each automated analyzer used to measure SO_2, NO_2, O_3 and CO. The precision check is made by challenging the analyzer with a precision check gas of known concentration (effective concentration for open path analyzers) between 0.08 and 0.10 ppm for SO_2, NO_2, and O_3 analyzers, and between 8 and 10 ppm for CO analyzers. To check the precision of SLAMS analyzers operating on ranges higher than 0 to 1.0 ppm SO_2, NO_2, and O_3, or 0 to 100 ppm for CO, use precision check gases of appropriately higher concentration as approved by the appropriate Regional Administrator or their designee. However, the results of precision checks at concentration levels other than those specified above need not be reported to EPA. The standards from which precision check test concentrations are obtained must meet the specifications of section 2.3 of this appendix.

3.1.1.1 Except for certain CO analyzers described below, point analyzers must operate in their normal sampling mode during the precision check, and the test atmosphere must pass through all filters, scrubbers, conditioners and other components used during normal ambient sampling and as much of the ambient air inlet system as is practicable. If permitted by the associated operation or instruction manual, a CO point analyzer may be temporarily modified during the precision check to reduce vent or purge flows, or the test atmosphere may enter the analyzer at a point other than the normal sample inlet, provided that the analyzer's response is not likely to be altered by these deviations from the normal operational mode. If a precision check is made in conjunction with a zero or span adjustment, it must be made prior to such zero or span adjustments. Randomization of the precision check with respect to time of day, day of week, and routine service and adjustments is encouraged where possible.

3.1.1.2 Open path analyzers are tested by inserting a test cell containing a precision check gas concentration into the optical measurement beam of the instrument. If possible, the normally used transmitter, receiver, and as appropriate, reflecting devices should be used during the test, and the normal monitoring configuration of the instrument should be altered as little as possible to accommodate the test cell for the test. However, if permitted by the associated operation or instruction manual, an alternate local light source or an alternate optical path that does not include the normal atmospheric monitoring path may be used. The actual concentration of the precision check gas in the test cell must be selected to produce an effective concentration in the range specified in section 3.1.1. Generally, the precision test concentration measurement will be the sum of the atmospheric pollutant concentration and the precision test concentration. If so, the result must be corrected to remove the atmospheric concentration contribution. The corrected concentration is obtained by subtracting the average of the atmospheric concentrations measured by the open path instrument under test immediately before and immediately after the precision check test from the precision test

concentration measurement. If the difference between these before and after measurements is greater than 20 percent of the effective concentration of the test gas, discard the test result and repeat the test. If possible, open path analyzers should be tested during periods when the atmospheric pollutant concentrations are relatively low and steady.

3.1.1.3 Report the actual concentration (effective concentration for open path analyzers) of the precision check gas and the corresponding concentration measurement (corrected concentration, if applicable, for open path analyzers) indicated by the analyzer. The percent differences between these concentrations are used to assess the precision of the monitoring data as described in section 5.1. of this appendix.

3.1.2 Methods for Particulate Matter Excluding $PM_{2.5}$. A one-point precision check must be performed at least once every 2 weeks on each automated analyzer used to measure PM_{10}. The precision check is made by checking the operational flow rate of the analyzer. If a precision flow rate check is made in conjunction with a flow rate adjustment, it must be made prior to such flow rate adjustment. Randomization of the precision check with respect to time of day, day of week, and routine service and adjustments is encouraged where possible.

3.1.2.1 Standard procedure: Use a flow rate transfer standard certified in accordance with section 2.3.3 of this appendix to check the analyzer's normal flow rate. Care should be used in selecting and using the flow rate measurement device such that it does not alter the normal operating flow rate of the analyzer. Report the actual analyzer flow rate measured by the transfer standard and the corresponding flow rate measured, indicated, or assumed by the analyzer.

3.1.2.2 Alternative procedure:

3.1.2.2.1 It is permissible to obtain the precision check flow rate data from the analyzer's internal flow meter without the use of an external flow rate transfer standard, provided that:

3.1.2.2.1.1 The flow meter is audited with an external flow rate transfer standard at least every 6 months.

3.1.2.2.1.2 Records of at least the three most recent flow audits of the instrument's internal flow meter over at least several weeks confirm that the flow meter is stable, verifiable and accurate to ±4%.

3.1.2.2.1.3 The instrument and flow meter give no indication of improper operation.

3.1.2.2.2 With suitable communication capability, the precision check may thus be carried out remotely. For this procedure, report the set-point flow rate as the actual flow rate along with the flow rate measured or indicated by the analyzer flow meter.

3.1.2.2.3 For either procedure, the percent differences between the actual and indicated flow rates are used to assess the precision of the monitoring data as described in section 5.1 of this appendix (using flow rates in lieu of concentrations). The percent differences between these concentrations are used to assess the precision of the monitoring data as described in section 5.1. of this appendix.

3.2 Accuracy of Automated Methods Excluding $PM_{2.5}$.

3.2.1 Methods for SO_2, NO_2, O_3, or CO.

3.2.1.1 Each calendar quarter (during which analyzers are operated), audit at least 25 percent of the SLAMS analyzers that monitor for SO_2, NO_2, O_3, or CO such that each analyzer is audited at least once per year. If there are fewer than four analyzers for a pollutant within a reporting organization, randomly reaudit one or more analyzers so that at least one analyzer for that pollutant is audited each calendar quarter. Where possible, EPA strongly encourages more frequent auditing, up to an audit frequency of once per quarter for each SLAMS analyzer.

3.2.1.2 (a) The audit is made by challenging the analyzer with at least one audit gas of known concentration (effective concentration for open path analyzers) from each of the following ranges applicable to the analyzer being audited:

Audit Level	Concentration Range, PPM		
	SO_2, O_3	NO_2	CO
1	0.03–0.08	0.03–0.08	3–8
2	0.15–0.20	0.15–0.20	15–20
3	0.35–0.45	0.35–0.45	35–45
4	0.80–0.90	.....	80–90

(b) NO_2 audit gas for chemiluminescence-type NO_2 analyzers must also contain at least 0.08 ppm NO.

3.2.1.3 NO concentrations substantially higher than 0.08 ppm, as may occur when using some gas phase titration (GPT) techniques, may lead to audit errors in chemiluminescence analyzers due to inevitable minor NO-NO_x channel imbalance. Such errors may be atypical of routine monitoring errors to the extent that such NO concentrations exceed typical ambient NO concentrations at the site. These errors may be minimized by modifying the GPT technique to lower the NO concentrations remaining in the NO_2 audit gas to levels closer to typical ambient NO concentrations at the site.

3.2.1.4 To audit SLAMS analyzers operating on ranges higher than 0 to 1.0 ppm for SO_2, NO_2, and O_3 or 0 to 100 ppm for CO, use audit gases of appropriately higher concentration as approved by the appropriate Regional Administrator or the Administrators's designee. The results of audits at concentration levels other than those shown in the above table need not be reported to EPA.

3.2.1.5 The standards from which audit gas test concentrations are obtained must meet

the specifications of section 2.3 of this appendix. The gas standards and equipment used for auditing must not be the same as the standards and equipment used for calibration or calibration span adjustments. The auditor should not be the operator or analyst who conducts the routine monitoring, calibration, and analysis.

3.2.1.6 For point analyzers, the audit shall be carried out by allowing the analyzer to analyze the audit test atmosphere in its normal sampling mode such that the test atmosphere passes through all filters, scrubbers, conditioners, and other sample inlet components used during normal ambient sampling and as much of the ambient air inlet system as is practicable. The exception provided in section 3.1 of this appendix for certain CO analyzers does not apply for audits.

3.2.1.7 Open path analyzers are audited by inserting a test cell containing the various audit gas concentrations into the optical measurement beam of the instrument. If possible, the normally used transmitter, receiver, and, as appropriate, reflecting devices should be used during the audit, and the normal monitoring configuration of the instrument should be modified as little as possible to accommodate the test cell for the audit. However, if permitted by the associated operation or instruction manual, an alternate local light source or an alternate optical path that does not include the normal atmospheric monitoring path may be used. The actual concentrations of the audit gas in the test cell must be selected to produce effective concentrations in the ranges specified in this section 3.2 of this appendix. Generally, each audit concentration measurement result will be the sum of the atmospheric pollutant concentration and the audit test concentration. If so, the result must be corrected to remove the atmospheric concentration contribution. The corrected concentration is obtained by subtracting the average of the atmospheric concentrations measured by the open path instrument under test immediately before and immediately after the audit test (or preferably before and after each audit concentration level) from the audit concentration measurement. If the difference between the before and after measurements is greater than 20 percent of the effective concentration of the test gas standard, discard the test result for that concentration level and repeat the test for that level. If possible, open path analyzers should be audited during periods when the atmospheric pollutant concentrations are relatively low and steady. Also, the monitoring path length must be reverified to within ±3 percent to validate the audit, since the monitoring path length is critical to the determination of the effective concentration.

3.2.1.8 Report both the actual concentrations (effective concentrations for open path analyzers) of the audit gases and the corresponding concentration measurements (corrected concentrations, if applicable, for open path analyzers) indicated or produced by the analyzer being tested. The percent differences between these concentrations are used to assess the accuracy of the monitoring data as described in section 5.2 of this appendix.

3.2.2 Methods for Particulate Matter Excluding $PM_{2.5}$.

3.2.2.1 Each calendar quarter, audit the flow rate of at least 25 percent of the SLAMS PM_{10} analyzers such that each PM_{10} analyzer is audited at least once per year. If there are fewer than four PM_{10} analyzers within a reporting organization, randomly re-audit one or more analyzers so that at least one analyzer is audited each calendar quarter. Where possible, EPA strongly encourages more frequent auditing, up to an audit frequency of once per quarter for each SLAMS analyzer.

3.2.2.2 The audit is made by measuring the analyzer's normal operating flow rate, using a flow rate transfer standard certified in accordance with section 2.3.3 of this appendix. The flow rate standard used for auditing must not be the same flow rate standard used to calibrate the analyzer. However, both the calibration standard and the audit standard may be referenced to the same primary flow rate or volume standard. Great care must be used in auditing the flow rate to be certain that the flow measurement device does not alter the normal operating flow rate of the analyzer. Report the audit (actual) flow rate and the corresponding flow rate indicated or assumed by the sampler. The percent differences between these flow rates are used to calculate accuracy (PM_{10}) as described in section 5.2 of this appendix.

3.3 Precision of Manual Methods Excluding $PM_{2.5}$.

3.3.1 For each network of manual methods other than for $PM_{2.5}$, select one or more monitoring sites within the reporting organization for duplicate, collocated sampling as follows: for 1 to 5 sites, select 1 site; for 6 to 20 sites, select 2 sites; and for over 20 sites, select 3 sites. Where possible, additional collocated sampling is encouraged. For purposes of precision assessment, networks for measuring TSP and PM_{10} shall be considered separately from one another. PM_{10} and TSP sites having annual mean particulate matter concentrations among the highest 25 percent of the annual mean concentrations for all the sites in the network must be selected or, if such sites are impractical, alternative sites approved by the Regional Administrator may be selected.

3.3.2 In determining the number of collocated sites required for PM_{10}, monitoring networks for lead should be treated independently from networks for particulate matter, even though the separate networks may share one or more common samplers.

However, a single pair of samplers collocated at a common-sampler monitoring site that meets the requirements for both a collocated lead site and a collocated particulate matter site may serve as a collocated site for both networks.

3.3.3 The two collocated samplers must be within 4 meters of each other, and particulate matter samplers must be at least 2 meters apart to preclude airflow interference. Calibration, sampling, and analysis must be the same for both collocated samplers and the same as for all other samplers in the network.

3.3.4 For each pair of collocated samplers, designate one sampler as the primary sampler whose samples will be used to report air quality for the site, and designate the other as the duplicate sampler. Each duplicate sampler must be operated concurrently with its associated routine sampler at least once per week. The operation schedule should be selected so that the sampling days are distributed evenly over the year and over the seven days of the week. A six-day sampling schedule is required. Report the measurements from both samplers at each collocated sampling site. The calculations for evaluating precision between the two collocated samplers are described in section 5.3 of this appendix.

3.4 Accuracy of Manual Methods Excluding $PM_{2.5}$. The accuracy of manual sampling methods is assessed by auditing a portion of the measurement process.

3.4.1 Procedures for PM_{10} and TSP.

3.4.1.1 Procedures for flow rate audits for PM_{10}. Each calendar quarter, audit the flow rate of at least 25 percent of the PM_{10} samplers such that each PM_{10} sampler is audited at least once per year. If there are fewer than four PM_{10} samplers within a reporting organization, randomly reaudit one or more samplers so that one sampler is audited each calendar quarter. Audit each sampler at its normal operating flow rate, using a flow rate transfer standard certified in accordance with section 2.3.3 of this appendix. The flow rate standard used for auditing must not be the same flow rate standard used to calibrate the sampler. However, both the calibration standard and the audit standard may be referenced to the same primary flow rate standard. The flow audit should be scheduled so as to avoid interference with a scheduled sampling period. Report the audit (actual) flow rate and the corresponding flow rate indicated by the sampler's normally used flow indicator. The percent differences between these flow rates are used to calculate accuracy and bias as described in section 5.4.1 of this appendix.

3.4.1.2 Great care must be used in auditing high-volume particulate matter samplers having flow regulators because the introduction of resistance plates in the audit flow standard device can cause abnormal flow patterns at the point of flow sensing. For this reason, the flow audit standard should be used with a normal filter in place and without resistance plates in auditing flow-regulated high-volume samplers, or other steps should be taken to assure that flow patterns are not perturbed at the point of flow sensing.

3.4.2 SO_2 Methods.

3.4.2.1 Prepare audit solutions from a working sulfite-tetrachloromercurate (TCM) solution as described in section 10.2 of the SO_2 Reference Method (40 CFR part 50, appendix A). These audit samples must be prepared independently from the standardized sulfite solutions used in the routine calibration procedure. Sulfite-TCM audit samples must be stored between 0 and 5 °C and expire 30 days after preparation.

3.4.2.2 Prepare audit samples in each of the concentration ranges of 0.2-0.3, 0.5-0.6, and 0.8-0.9 μg SO_2/ml. Analyze an audit sample in each of the three ranges at least once each day that samples are analyzed and at least twice per calendar quarter. Report the audit concentrations (in μg SO_2/ml) and the corresponding indicated concentrations (in μg SO_2/ml). The percent differences between these concentrations are used to calculate accuracy as described in section 5.4.2 of this appendix.

3.4.3 NO_2 Methods. Prepare audit solutions from a working sodium nitrite solution as described in the appropriate equivalent method (see reference 8 of this appendix). These audit samples must be prepared independently from the standardized nitrite solutions used in the routine calibration procedure. Sodium nitrite audit samples expire in 3 months after preparation. Prepare audit samples in each of the concentration ranges of 0.2-0.3, 0.5-0.6, and 0.8-0.9 μg NO_2/ml. Analyze an audit sample in each of the three ranges at least once each day that samples are analyzed and at least twice per calendar quarter. Report the audit concentrations (in μg NO_2/ml) and the corresponding indicated concentrations (in μg NO_2/ml). The percent differences between these concentrations are used to calculate accuracy as described in section 5.4.2 of this appendix.

3.4.4 Pb Methods.

3.4.4.1 For the Pb Reference Method (40 CFR part 50, appendix G), the flow rates of the high-volume Pb samplers shall be audited as part of the TSP network using the same procedures described in section 3.4.1 of this appendix. For agencies operating both TSP and Pb networks, 25 percent of the total number of high-volume samplers are to be audited each quarter.

3.4.4.2 Each calendar quarter, audit the Pb Reference Method analytical procedure using glass fiber filter strips containing a known quantity of Pb. These audit sample strips are prepared by depositing a Pb solution on unexposed glass fiber filter strips of dimensions

1.9 cm by 20.3 cm (3/4 inch by 8 inch) and allowing them to dry thoroughly. The audit samples must be prepared using batches of reagents different from those used to calibrate the Pb analytical equipment being audited. Prepare audit samples in the following concentration ranges:

Range	Pb Concentration, µg/Strip	Equivalent Ambient Pb Concentration, µg/m³ [1]
1	100–300	0.5–1.5
2	600–1000	3.0–5.0

[1] Equivalent ambient Pb concentration in µg/m³ is based on sampling at 1.7 m³/min for 24 hours on a 20.3 cm×25.4 cm (8 inch×10 inch) glass fiber filter.

3.4.4.3 Audit samples must be extracted using the same extraction procedure used for exposed filters.

3.4.4.4 Analyze three audit samples in each of the two ranges each quarter samples are analyzed. The audit sample analyses shall be distributed as much as possible over the entire calendar quarter. Report the audit concentrations (in µg Pb/strip) and the corresponding measured concentrations (in µg Pb/strip) using unit code 77. The percent differences between the concentrations are used to calculate analytical accuracy as described in section 5.4.2 of this appendix.

3.4.4.5 The accuracy of an equivalent Pb method is assessed in the same manner as for the reference method. The flow auditing device and Pb analysis audit samples must be compatible with the specific requirements of the equivalent method.

3.5 Measurement Uncertainty for Automated and Manual $PM_{2.5}$ Methods. The goal for acceptable measurement uncertainty has been defined as 10 percent coefficient of variation (CV) for total precision and ± 10 percent for total bias (reference 14 of this appendix).

3.5.1 Flow Rate Audits.

3.5.1.1 Automated methods for $PM_{2.5}$. A one-point precision check must be performed at least once every 2 weeks on each automated analyzer used to measure $PM_{2.5}$. The precision check is made by checking the operational flow rate of the analyzer. If a precision flow rate check is made in conjunction with a flow rate adjustment, it must be made prior to such flow rate adjustment. Randomization of the precision check with respect to time of day, day of week, and routine service and adjustments is encouraged where possible.

3.5.1.1.1 Standard procedure: Use a flow rate transfer standard certified in accordance with section 2.3.3 of this appendix to check the analyzer's normal flow rate. Care should be used in selecting and using the flow rate measurement device such that it does not alter the normal operating flow rate of the analyzer. Report the actual analyzer flow rate measured by the transfer standard and the corresponding flow rate measured, indicated, or assumed by the analyzer.

3.5.1.1.2 Alternative procedure: It is permissible to obtain the precision check flow rate data from the analyzer's internal flow meter without the use of an external flow rate transfer standard, provided that the flow meter is audited with an external flow rate transfer standard at least every 6 months; records of at least the three most recent flow audits of the instrument's internal flow meter over at least several weeks confirm that the flow meter is stable, verifiable and accurate to ±4%; and the instrument and flow meter give no indication of improper operation. With suitable communication capability, the precision check may thus be carried out remotely. For this procedure, report the set-point flow rate as the actual flow rate along with the flow rate measured or indicated by the analyzer flow meter.

3.5.1.1.3 For either procedure, the differences between the actual and indicated flow rates are used to assess the precision of the monitoring data as described in section 5.5 of this appendix.

3.5.1.2 Manual methods for $PM_{2.5}$. Each calendar quarter, audit the flow rate of each SLAMS $PM_{2.5}$ analyzer. The audit is made by measuring the analyzer's normal operating flow rate, using a flow rate transfer standard certified in accordance with section 2.3.3 of this appendix. The flow rate standard used for auditing must not be the same flow rate standard used to calibrate the analyzer. However, both the calibration standard and the audit standard may be referenced to the same primary flow rate or volume standard. Great care must be used in auditing the flow rate to be certain that the flow measurement device does not alter the normal operating flow rate of the analyzer. Report the audit (actual) flow rate and the corresponding flow rate indicated or assumed by the sampler. The procedures used to calculate measurement uncertainty $PM_{2.5}$ are described in section 5.5 of this appendix.

3.5.2 Measurement of Precision using Collocated Procedures for Automated and Manual Methods of $PM_{2.5}$.

(a) For $PM_{2.5}$ sites within a reporting organization each EPA designated Federal reference method (FRM) or Federal equivalent method (FEM) must:

(1) Have 25 percent of the monitors collocated (values of .5 and greater round up).

(2) Have at least 1 collocated monitor (if the total number of monitors is less than 4). The first collocated monitor must be a designated FRM monitor.

(b) In addition, monitors selected must also meet the following requirements:

(1) A monitor designated as an EPA FRM shall be collocated with a monitor having the same EPA FRM designation.

(2) For each monitor designated as an EPA FEM, 50 percent of the designated monitors

shall be collocated with a monitor having the same method designation and 50 percent of the monitors shall be collocated with an FRM monitor. If there are an odd number of collocated monitors required, the additional monitor shall be an FRM. An example of this procedure is found in table A–2 of this appendix.

(c) For $PM_{2.5}$ sites during the initial deployment of the SLAMS network, special emphasis should be placed on those sites in areas likely to be in violation of the NAAQS. Once areas are initially determined to be in violation, the collocated monitors should be deployed according to the following protocol:

(1) Eighty percent of the collocated monitors should be deployed at sites with concentrations ≥ ninety percent of the annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area); one hundred percent if all sites have concentrations above either NAAQS, and each area determined to be in violation should be represented by at least one collocated monitor.

(2) The remaining 20 percent of the collocated monitors should be deployed at sites with concentrations < ninety percent of the annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area)

(3) If an organization has no sites at concentration ranges ≥ ninety percent of the annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area), 60 percent of the collocated monitors should be deployed at those sites with the annual mean $PM_{2.5}$ concentrations (or 24-hour NAAQS if that is affecting the area) among the highest 25 percent for all $PM_{2.5}$ sites in the network.

3.5.2.1 In determining the number of collocated sites required for $PM_{2.5}$, monitoring networks for visibility should not be treated independently from networks for particulate matter, as the separate networks may share one or more common samplers. However, for class I visibility areas, EPA will accept visibility aerosol mass measurement instead of a $PM_{2.5}$ measurement if the latter measurement is unavailable. Any $PM_{2.5}$ monitoring site which does not have a monitor which is an EPA federal reference or equivalent method is not required to be included in the number of sites which are used to determine the number of collocated monitors.

3.5.2.2 The two collocated samples must be within 4 meters of each other, and particulate matter samplers must be at least 2 meters apart (1 meter apart for samplers having flow rates less than 200 liters/min.) to preclude airflow interference. Calibration, sampling, and analysis must be the same for both collocated samplers and the same as for all other samplers in the network.

3.5.2.3 For each pair of collocated samplers, designate one sampler as the primary sampler whose samples will be used to report air quality for the site, and designate the other as the duplicate sampler. Each duplicate sampler must be operated concurrently with its associated primary sampler. The operation schedule should be selected so that the sampling days are distributed evenly over the year and over the 7 days of the week and therefore, a 6-day sampling schedule is required. Report the measurements from both samplers at each collocated sampling site. The calculations for evaluating precision between the two collocated samplers are described in section 5.5 of this appendix.

3.5.3 Measurement of Bias using the FRM Audit Procedures for Automated and Manual Methods of $PM_{2.5}$.

3.5.3.1 The FRM audit is an independent assessment of the total measurement system bias. These audits will be performed under the National Performance Audit Program (section 2.4 of this appendix) or a comparable program. Twenty-five percent of the SLAMS monitors within each reporting organization will be assessed with an FRM audit each year. Additionally, every designated FRM or FEM within a reporting organization must:

(a) Have at least 25 percent of each method designation audited, including collocated sites (even those collocated with FRM instruments), (values of .5 and greater round up).

(b) Have at least one monitor audited.

(c) Be audited at a frequency of four audits per year.

(d) Have all FRM or FEM samplers subject to an FRM audit at least once every 4 years. Table A–2 illustrates the procedure mentioned above.

3.5.3.2 For $PM_{2.5}$ sites during the initial deployment of the SLAMS network, special emphasis should be placed on those sites in areas likely to be in violation of the NAAQS. Once areas are initially determined to be in violation, the FRM audit program should be implemented according to the following protocol:

(a) Eighty percent of the FRM audits should be deployed at sites with concentrations ≥ ninety percent of the annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area); one hundred percent if all sites have concentrations above either NAAQS, and each area determined to be in violation should implement an FRM audit at a minimum of one monitor within that area.

(b) The remaining 20 percent of the FRM audits should be implemented at sites with concentrations < ninety percent of the annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area).

(c) If an organization has no sites at concentration ranges ≥ ninety percent of the annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area), 60 percent of the FRM audits should be implemented at those sites with the annual mean $PM_{2.5}$ concentrations (or 24-hour NAAQS if that is affecting the area) among the highest 25 percent for all

$PM_{2.5}$ sites in the network. Additional information concerning the FRM audit program is contained in reference 7 of this appendix. The calculations for evaluating bias between the primary monitor and the FRM audit are described in section 5.5.

4. *Reporting Requirements.*

(a) For each pollutant, prepare a list of all monitoring sites and their AIRS site identification codes in each reporting organization and submit the list to the appropriate EPA Regional Office, with a copy to AIRS-AQS. Whenever there is a change in this list of monitoring sites in a reporting organization, report this change to the Regional Office and to AIRS-AQS.

4.1 Quarterly Reports. For each quarter, each reporting organization shall report to AIRS-AQS directly (or via the appropriate EPA Regional Office for organizations not direct users of AIRS) the results of all valid precision, bias and accuracy tests it has carried out during the quarter. The quarterly reports of precision, bias and accuracy data must be submitted consistent with the data reporting requirements specified for air quality data as set forth in §58.35(c). EPA strongly encourages early submittal of the QA data in order to assist the State and Local agencies in controlling and evaluating the quality of the ambient air SLAMS data. Each organization shall report all QA/QC measurements. Report results from invalid tests, from tests carried out during a time period 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 use in SLAMS monitoring networks under appendix C of this part. Such data should be flagged so that it will not be utilized for quantitative assessment of precision, bias and accuracy.

4.2 Annual Reports.

4.2.1 When precision, bias and accuracy estimates for a reporting organization have been calculated for all four quarters of the calendar year, EPA will calculate and report the measurement uncertainty for the entire calendar year. These limits will then be associated with the data submitted in the annual SLAMS report required by §58.26.

4.2.2 Each reporting organization shall submit, along with its annual SLAMS report, a listing by pollutant of all monitoring sites in the reporting organization.

5. *Calculations for Data Quality Assessment.*

(a) Calculations of measurement uncertainty are carried out by EPA according to the following procedures. Reporting organizations should report the data for individual precision, bias and accuracy tests as specified in sections 3 and 4 of this appendix even though they may elect to perform some or all of the calculations in this section on their own.

5.1 Precision of Automated Methods Excluding $PM_{2.5}$. Estimates of the precision of automated methods are calculated from the results of biweekly precision checks as specified in section 3.1 of this appendix. At the end of each calendar quarter, an integrated precision probability interval for all SLAMS analyzers in the organization is calculated for each pollutant.

5.1.1 Single Analyzer Precision.

5.1.1.1 The percent difference (d_i) for each precision check is calculated using equation 1, where Y_i is the concentration indicated by the analyzer for the I-th precision check and X_i is the known concentration for the I-th precision check, as follows:

Equation 1

$$d_i = \frac{Y_i - X_i}{X_i} \times 100$$

5.1.1.2 For each analyzer, the quarterly average (d_j) is calculated with equation 2, and the standard deviation (S_j) with equation 3, where n is the number of precision checks on the instrument made during the calendar quarter. For example, n should be 6 or 7 if precision checks are made biweekly during a quarter. Equation 2 and 3 follow:

Equation 2

$$d_j = \frac{1}{n} \sum_{i=1}^{n} d_i$$

Equation 3

$$S_j = \sqrt{\frac{1}{n-1}\left[\sum_{i=1}^{n} d_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} d_i\right)^2\right]}$$

5.1.2 Precision for Reporting Organization.

5.1.2.1 For each pollutant, the average of averages (D) and the pooled standard deviation (S_a) are calculated for all analyzers audited for the pollutant during the quarter, using either equations 4 and 5 or 4a and 5a, where k is the number of analyzers audited within the reporting organization for a single pollutant, as follows:

Equation 4

$$D = \frac{1}{k} \sum_{j=1}^{k} d_j$$

Equation 4a

$$D = \frac{n_1 d_1 + n_2 d_2 + \ldots + n_j d_j + \ldots + n_k d_k}{n_1 + n_2 + \ldots + n_j + \ldots + n_k}$$

Equation 5

$$S_a = \sqrt{\frac{1}{k}\sum_{j=1}^{k} S_j^2}$$

Equation 5a

$$S_a = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2 + \ldots + (n_j-1)S_j^2 + \ldots + (n_k-1)S_k^2}{n_1+n_2+\ldots+n_j+\ldots+n_k-k}}$$

5.1.2.2 Equations 4 and 5 are used when the same number of precision checks are made for each analyzer. Equations 4a and 5a are used to obtain a weighted average and a weighted standard deviation when different numbers of precision checks are made for the analyzers.

5.1.2.3 For each pollutant, the 95 Percent Probability Limits for the precision of a reporting organization are calculated using equations 6 and 7, as follows:

Equation 6

$$\text{Upper 95 Percent Probability Limit} = D + 1.96\ S_a$$

Equation 7

$$\text{Lower 95 Percent Probability Limit} = D - 1.96\ S_a$$

5.2 Accuracy of Automated Methods Excluding $PM_{2.5}$. Estimates of the accuracy of automated methods are calculated from the results of independent audits as described in section 3.2 of this appendix. At the end of each calendar quarter, an integrated accuracy probability interval for all SLAMS analyzers audited in the reporting organization is calculated for each pollutant. Separate probability limits are calculated for each audit concentration level in section 3.2 of this appendix.

5.2.1 Single Analyzer Accuracy. The percentage difference (d_i) for each audit concentration is calculated using equation 1, where Y_i is the analyzer's indicated concentration measurement from the I-th audit check and X_i is the actual concentration of the audit gas used for the I-th audit check.

5.2.2 Accuracy for Reporting Organization.

5.2.2.1 For each audit concentration level of a particular pollutant, the average (D) of the individual percentage differences (d_i) for all n analyzers audited during the quarter is calculated using equation 8, as follows:

Equation 8

$$D = \frac{1}{n}\sum_{i=1}^{n} d_i$$

5.2.2.2 For each concentration level of a particular pollutant, the standard deviation (S_a) of all the individual percentage differences for all n analyzers audited during the quarter is calculated, using equation 9, as follows:

Equation 9

$$S_a = \sqrt{\frac{1}{n-1}\left[\sum_{i=1}^{n} d_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} d_i\right)^2\right]}$$

5.2.2.3 For reporting organizations having four or fewer analyzers for a particular pollutant, only one audit is required each quarter. For such reporting organizations, the audit results of two consecutive quarters are required to calculate an average and a standard deviation, using equations 8 and 9. Therefore, the reporting of probability limits shall be on a semiannual (instead of a quarterly) basis.

5.2.2.4 For each pollutant, the 95 Percent Probability Limits for the accuracy of a reporting organization are calculated at each audit concentration level using equations 6 and 7.

5.3 Precision of Manual Methods Excluding $PM_{2.5}$. Estimates of precision of manual methods are calculated from the results obtained from collocated samplers as described in section 3.3 of this appendix. At the end of each calendar quarter, an integrated precision probability interval for all collocated samplers operating in the reporting organization is calculated for each manual method network.

5.3.1 Single Sampler Precision.

5.3.1.1 At low concentrations, agreement between the measurements of collocated samplers, expressed as percent differences,

may be relatively poor. For this reason, collocated measurement pairs are selected for use in the precision calculations only when both measurements are above the following limits:

(a) TSP: 20 μg/m³.
(b) SO_2: 45 μg/m³.
(c) NO_2: 30 μg/m³.
(d) Pb: 0.15 μg/m³.
(e) PM_{10}: 20 μg/m³.

5.3.1.2 For each selected measurement pair, the percent difference (d_i) is calculated, using equation 10, as follows:

Equation 10

$$d_i = \frac{Y_i - X_i}{(Y_i + X_i)/2} \times 100$$

where:

Y_i is the pollutant concentration measurement obtained from the duplicate sampler; and

X_i is the concentration measurement obtained from the primary sampler designated for reporting air quality for the site.

(a) For each site, the quarterly average percent difference (d_j) is calculated from equation 2 and the standard deviation (S_j) is calculated from equation 3, where n= the number of selected measurement pairs at the site.

5.3.2 Precision for Reporting Organization.

5.3.2.1 For each pollutant, the average percentage difference (D) and the pooled standard deviation (S_a) are calculated, using equations 4 and 5, or using equations 4a and 5a if different numbers of paired measurements are obtained at the collocated sites. For these calculations, the k of equations 4, 4a, 5 and 5a is the number of collocated sites.

5.3.2.2 The 95 Percent Probability Limits for the integrated precision for a reporting organization are calculated using equations 11 and 12, as follows:

Equation 11

$$\text{Upper 95 Percent Probability Limit} = D + 1.96\, S_a$$

Equation 12

$$\text{Lower 95 Percent Probability Limit} = D - 1.96\, S_a$$

5.4 Accuracy of Manual Methods Excluding $PM_{2.5}$. Estimates of the accuracy of manual methods are calculated from the results of independent audits as described in section 3.4 of this appendix. At the end of each calendar quarter, an integrated accuracy probability interval is calculated for each manual method network operated by the reporting organization.

5.4.1 Particulate Matter Samplers other than $PM_{2.5}$ (including reference method Pb samplers).

5.4.1.1 Single Sampler Accuracy. For the flow rate audit described in section 3.4.1 of this appendix, the percentage difference (d_i) for each audit is calculated using equation 1, where X_i represents the known flow rate and Y_i represents the flow rate indicated by the sampler.

5.4.1.2 Accuracy for Reporting Organization. For each type of particulate matter measured (e.g., TSP/Pb), the average (D) of the individual percent differences for all similar particulate matter samplers audited during the calendar quarter is calculated using equation 8. The standard deviation (S_a) of the percentage differences for all of the similar particulate matter samplers audited during the calendar quarter is calculated using equation 9. The 95 Percent Probability Limits for the integrated accuracy for the reporting organization are calculated using equations 6 and 7. For reporting organizations having four or fewer particulate matter samplers of one type, only one audit is required each quarter, and the audit results of two consecutive quarters are required to calculate an average and a standard deviation. In that case, probability limits shall be reported semi-annually rather than quarterly.

5.4.2 Analytical Methods for SO_2, NO_2, and Pb.

5.4.2.1 Single Analysis-Day Accuracy. For each of the audits of the analytical methods for SO_2, NO_2, and Pb described in sections 3.4.2, 3.4.3, and 3.4.4 of this appendix, the percentage difference (d_j) at each concentration level is calculated using equation 1, where X_j represents the known value of the audit sample and Y_j represents the value of SO_2, NO_2, or Pb indicated by the analytical method.

5.4.2.2 Accuracy for Reporting Organization. For each analytical method, the average (D) of the individual percent differences at each concentration level for all audits during the calendar quarter is calculated using equation 8. The standard deviation (S_a) of the percentage differences at each concentration level for all audits during the calendar quarter is calculated using equation 9. The 95 Percent Probability Limits for the accuracy for the reporting organization are calculated using equations 6 and 7.

5.5 Precision, Accuracy and Bias for Automated and Manual $PM_{2.5}$ Methods.

(a) Reporting organizations are required to report the data that will allow assessments of the following individual quality control checks and audits:

(1) Flow rate audit.

(2) Collocated samplers, where the duplicate sampler is not an FRM device.

(3) Collocated samplers, where the duplicate sampler is an FRM device.

(4) FRM audits.

(b) EPA uses the reported results to derive precision, accuracy and bias estimates according to the following procedures.

5.5.1 Flow Rate Audits. The reporting organization shall report both the audit standard flow rate and the flow rate indicated by the sampling instrument. These results are used by EPA to calculate flow rate accuracy and bias estimates.

5.5.1.1 Accuracy of a Single Sampler - Single Check (Quarterly) Basis (d_i). The percentage difference (d_i) for a single flow rate audit d_i is calculated using equation 13, where X_i represents the audit standard flow rate (known) and Y_i represents the indicated flow rate, as follows:

Equation 13

$$d_i = \frac{Y_i - X_i}{X_i} \times 100$$

5.5.1.2 Bias of a Single Sampler - Annual Basis (D_j). For an individual particulate sampler j, the average (D_j) of the individual percentage differences (d_i) during the calendar year is calculated using equation 14, where n_j is the number of individual percentage differences produced for sampler j during the calendar year, as follows:

Equation 14

$$D_j = \frac{1}{n_j} \times \sum_{i=1}^{n_j} d_i$$

5.5.1.3 Bias for Each EPA Federal Reference and Equivalent Method Designation Employed by Each Reporting Organization - Quarterly Basis ($D_{k,q}$). For method designation k used by the reporting organization, quarter q's single sampler percentage differences (d_i) are averaged using equation 16, where $n_{k,q}$ is the number of individual percentage differences produced for method designation k in quarter q, as follows:

Equation 15

$$D_{k,q} = \frac{1}{n_{k,q}} \times \sum_{i=1}^{n_{k,q}} d_i$$

5.5.1.4 Bias for Each Reporting Organization - Quarterly Basis (D_q). For each reporting organization, quarter q's single sampler percentage differences (d_i) are averaged using equation 16, to produce a single average for each reporting organization, where n_q is the total number of single sampler percentage differences for all federal reference or equivalent methods of samplers in quarter q, as follows:

Equation 16

$$D_q = \frac{1}{n_q} \times \sum_{i=1}^{n_q} d_i$$

5.5.1.5 Bias for Each EPA Federal Reference and Equivalent Method Designation Employed by Each Reporting Organization - Annual Basis (D_k). For method designation k used by the reporting organization, the annual average percentage difference, D_k, is derived using equation 17, where $D_{k,q}$ is the average reported for method designation k during the qth quarter, and $n_{k,q}$ is the number of the method designation k's monitors that were deployed during the qth quarter, as follows:

Equation 17

$$D_k = \frac{\sum_{q=1}^{4} \left(n_{k,q} D_{k,q}\right)}{\sum_{q=1}^{4} n_{k,q}}$$

5.5.1.6 Bias for Each Reporting Organization - Annual Basis (D). For each reporting organization, the annual average percentage difference, D, is derived using equation 18, where D_q is the average reported for the reporting organization during the qth quarter, and n_q is the total number monitors that were deployed during the qth quarter. A single annual average is produced for each reporting organization. Equation 18 follows:

Equation 18

$$D = \frac{\sum_{q=1}^{4} \left(n_q D_q\right)}{\sum_{q=1}^{4} n_q}$$

5.5.2 Collocated Samplers, Where the Duplicate Sampler is not an FRM Device. (a) At low concentrations, agreement between the measurements of collocated samplers may be relatively poor. For this reason, collocated measurement pairs are selected for use in the precision calculations only when both measurements are above the following limits:

$PM_{2.5}$: 6 μg/m³

(b) Collocated sampler results are used to assess measurement system precision. A collocated sampler pair consists of a primary sampler (used for routine monitoring) and a duplicate sampler (used as a quality control check). Quarterly precision estimates are

calculated by EPA for each pair of collocated samplers and for each method designation employed by each reporting organization. Annual precision estimates are calculated by EPA for each primary sampler, for each EPA Federal reference method and equivalent method designation employed by each reporting organization, and nationally for each EPA Federal reference method and equivalent method designation.

5.5.2.1 Percent Difference for a Single Check (d_i). The percentage difference, d_i, for each check is calculated by EPA using equation 19, where X_i represents the concentration produced from the primary sampler and Y_i represents concentration reported for the duplicate sampler, as follows:

Equation 19

$$d_i = \frac{Y_i - X_i}{(Y_i + X_i)/2} \times 100$$

5.5.2.2 Coefficient of Variation (CV) for a Single Check (CV_i). The coefficient of variation, CV_i, for each check is calculated by EPA by dividing the absolute value of the percentage difference, d_i, by the square root of two as shown in equation 20, as follows:

Equation 20

$$CV_i = \frac{|d_i|}{\sqrt{2}}$$

5.5.2.3 Precision of a Single Sampler - Quarterly Basis ($CV_{j,q}$).

(a) For particulate sampler j, the individual coefficients of variation ($CV_{j,q}$) during the quarter are pooled using equation 21, where $n_{j,q}$ is the number of pairs of measurements from collocated samplers during the quarter, as follows:

Equation 21

$$CV_{j,q} = \sqrt{\frac{\sum_{i=1}^{n_j} CV_i^2}{n_{j,q}}}$$

(b) The 90 percent confidence limits for the single sampler's CV are calculated by EPA using equations 22 and 23, where $X^2_{0.05,df}$ and $X^2_{0.95,df}$ are the 0.05 and 0.95 quantiles of the chi-square (X^2) distribution with $n_{j,q}$ degrees of freedom, as follows:

Equation 22

$$\text{Lower Confidence Limit} = CV_{j,q}\sqrt{\frac{n_{j,q}}{\chi^2_{0.95,\ n_{j,q}}}}$$

Equation 23

$$\text{Upper Confidence Limit} = CV_{j,q}\sqrt{\frac{n_{j,q}}{\chi^2_{0.05,\ n_{j,q}}}}$$

5.5.2.4 Precision of a Single Sampler - Annual Basis. For particulate sampler j, the individual coefficients of variation, CV_i, produced during the calendar year are pooled using equation 21, where n_j is the number of checks made during the calendar year. The 90 percent confidence limits for the single sampler's CV are calculated by EPA using equations 22 and 23, where $X^2_{0.05,df}$ and $X^2_{0.95,df}$ are the 0.05 and 0.95 quantiles of the chi-square (X^2) distribution with n_j degrees of freedom.

5.5.2.5 Precision for Each EPA Federal Reference Method and Equivalent Method Designation Employed by Each Reporting Organization - Quarterly Basis ($CV_{k,q}$).

(a) For each method designation k used by the reporting organization, the quarter's single sampler coefficients of variation, $CV_{j,q}$s, obtained from equation 21, are pooled using equation 24, where $n_{k,q}$ is the number of collocated primary monitors for the designated method (but not collocated with FRM samplers) and $n_{j,q}$ is the number of degrees of freedom associated with $CV_{j,q}$, as follows:

Equation 24

$$CV_{k,q} = \sqrt{\frac{\sum_{j=1}^{n_{k,q}} \left(CV_{j,q}^2 n_{j,q}\right)}{\sum_{j=1}^{n_{k,q}} n_{j,q}}}$$

(b) The number of method CVs produced for a reporting organization will equal the number of different method designations having more than one primary monitor employed by the organization during the quarter. (When exactly one monitor of a specified designation is used by a reporting organization, it will be collocated with an FRM sampler.)

5.5.2.6 Precision for Each Method Designation Employed by Each Reporting Organization - Annual Basis (CV_k). For each method

designation k used by the reporting organization, the quarterly estimated coefficients of variation, $CV_{k,q}$, are pooled using equation 25, where $n_{k,q}$ is the number of collocated primary monitors for the designated method during the qth quarter and also the number of degrees of freedom associated with the quarter's precision estimate for the method designation, $CV_{k,q}$, as follows:

Equation 25

$$CV_k = \sqrt{\frac{\sum_{q=1}^{4} \left(CV_{k,q}^2 n_{k,q}\right)}{\sum_{q=1}^{4} n_{k,q}}}$$

5.5.3 Collocated Samplers, Where the Duplicate Sampler is an FRM Device. At low concentrations, agreement between the measurements of collocated samplers may be relatively poor. For this reason, collocated measurement pairs are selected for use in the precision calculations only when both measurements are above the following limits: $PM_{2.5}$: 6 μg/m³. These duplicate sampler results are used to assess measurement system bias. Quarterly bias estimates are calculated by EPA for each primary sampler and for each method designation employed by each reporting organization. Annual precision estimates are calculated by EPA for each primary monitor, for each method designation employed by each reporting organization, and nationally for each method designation.

5.5.3.1 Accuracy for a Single Check (d'_i). The percentage difference, d'_i, for each check is calculated by EPA using equation 26, where X_i represents the concentration produced from the FRM sampler taken as the true value and Y_i represents concentration reported for the primary sampler, as follows:

Equation 26

$$d'_i = \frac{Y_i - X_i}{X_i} \times 100\%$$

5.5.3.2 Bias of a Single Sampler - Quarterly Basis ($D'_{j,q}$).

(a) For particulate sampler j, the average of the individual percentage differences during the quarter q is calculated by EPA using equation 27, where $n_{j,q}$ is the number of checks made for sampler j during the calendar quarter, as follows:

Equation 27

$$D'_{j,q} = \frac{1}{n_{j,q}} \times \sum_{i=1}^{n_{j,q}} d'_i$$

(b) The standard error, $s'_{j,q}$, of sampler j's percentage differences for quarter q is calculated using equation 28, as follows:

Equation 28

$$s'_{j,q} = \sqrt{\frac{1}{n_{j,q}-1} \times \left[\left(\sum_{i=1}^{n_{j,q}} d_i'^2\right) - \left(n_{j,q} D'^2_{j,q}\right)\right] \times \frac{1}{n_{j,q}}}$$

(c) The 95 Percent Confidence Limits for the single sampler's bias are calculated using equations 29 and 30 where $t_{0.975,df}$ is the 0.975 quantile of Student's t distribution with df = $n_{j,q}$-1 degrees of freedom, as follows:

Equation 29

$$\text{Lower Confidence Limit} = D'_{j,q} - t_{0.975,df} \times s'_{j,q}$$

Equation 30

$$\text{Upper Confidence Limit} = D'_{j,q} - t_{0.975,df} \times s'_{j,q}$$

5.5.3.3 Bias of a Single Sampler - Annual Basis (D'_j).

(a) For particulate sampler j, the mean bias for the year is derived from the quarterly bias estimates, $D'_{j,q}$, using equation 31, where the variables are as defined for equations 27 and 28, as follows:

Equation 31

$$D'_j = \frac{\sum_{q=1}^{4} \left(n_{j,q} D'_{j,q}\right)}{\sum_{q=1}^{4} n_{j,q}}$$

(b) The standard error of the above estimate, se_j' is calculated using equation 32, as follows:

Equation 32

$$se_j^{'} = \sqrt{\frac{\sum_{q=1}^{4}\left[s_{j,q}^{'}\ 2\times\left(n_{j,q}-1\right)\right]}{\sum_{q=1}^{4}\left(n_{j,q}-1\right)\sum_{q=1}^{4}\left(n_{j,q}\right)}}$$

(c) The 95 Percent Confidence Limits for the single sampler's bias are calculated using equations 33 and 34, where $t_{0.975,df}$ is the 0.975 quantile of Student's t distribution with df = $(n_{j,1} + n_{j,2} + n_{j,3} + n_{j,4} - 4)$ degrees of freedom, as follows:

Equation 33

$$\text{Lower Confidence Limit} = D_j^{'} - t_{0.975,df} \times se_j^{'}$$

Equation 34

$$\text{Upper Confidence Limit} = D_j^{'} - t_{0.975,df} \times se_j^{'}$$

5.5.3.4 Bias for a Single Reporting Organization (D′) - Annual Basis. The reporting organizations mean bias is calculated using equation 35, where variables are as defined in equations 31 and 32, as follows:

Equation 35

$$D^{'} = \frac{1}{n_j} \times \sum_{i=1}^{n_j} D_j^{'}$$

5.5.4 FRM Audits. FRM Audits are performed once per quarter for selected samplers. The reporting organization reports concentration data from the primary sampler. Calculations for FRM Audits are similar to those for collocated samplers having FRM samplers as duplicates. The calculations differ because only one check is performed per quarter.

5.5.4.1 Accuracy for a Single Sampler, Quarterly Basis (d_i). The percentage difference, d_i, for each check is calculated using equation 26, where X_i represents the concentration produced from the FRM sampler and Y_i represents the concentration reported for the primary sampler. For quarter q, the bias estimate for sampler j is denoted $D_{j,q}$.

5.5.4.2 Bias of a Single Sampler - Annual Basis (D'_j). For particulate sampler j, the mean bias for the year is derived from the quarterly bias estimates, $D_{j,q}$, using equation 31, where $n_{j,q}$ equals 1 because one FRM audit is performed per quarter.

5.5.4.3. Bias for a Single Reporting Organization - Annual Basis (D′). The reporting organizations mean bias is calculated using equation 35, where variables are as defined in equations 31 and 32.

References in Appendix A of Part 58

(1) Rhodes, R.C. Guideline on the Meaning and Use of Precision and Accuracy Data Required by 40 CFR part 58, Appendices A and B. EPA-600/4-83/023. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, June, 1983.

(2) American National Standard—Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs. ANSI/ASQC E4-1994. January 1995. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

(3) EPA Requirements for Quality Management Plans. EPA QA/R-2. August 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(4) EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. EPA QA/R-5. August 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(5) Guidance for the Data Quality Objectives Process. EPA QA/G-4. September 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(6) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 1—A Field Guide to Environmental Quality Assurance. EPA-600/R-94/038a. April 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(7) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II—Ambient Air Specific Methods EPA-600/R-94/038b. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(7a) Copies of section 2.12 of the Quality Assurance Handbook for Air Pollution Measurement Systems, are available from Department E (MD-77B), U.S. EPA, Research Triangle Park, NC 27711.

(8) List of Designated Reference and Equivalent Methods. Available from U.S. Environmental Protection Agency, National Exposure Research Laboratory, Quality Assurance Branch, MD-77B, Research Triangle Park, NC 27711.

(9) Technical Assistance Document for Sampling and Analysis of Ozone Precursors.

Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. EPA 600/8-91-215. October 1991.

(10) EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards. EPA-600/R-93/224. September 1993. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(11) Paur, R.J. and F.F. McElroy. Technical Assistance Document for the Calibration of Ambient Ozone Monitors. EPA-600/4-79-057. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, September, 1979.

(12) McElroy, F.F. Transfer Standards for the Calibration of Ambient Air Monitoring Analyzers for Ozone. EPA-600/4-79-056. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, September, 1979.

(13) Musick, D.R. The Ambient Air Precision and Accuracy Program: 1995 Annual Report. EPA-454/R97001. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, February 1997.

(14) Papp, M.L., J,B., Elkins, D.R., Musick and M.J., Messner, Data Quality Objectives for the $PM_{2.5}$. Monitoring Data, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. In preparation.

(15) Photochemical Assessment Monitoring Stations Implementation Manual. EPA-454/B-93-051, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, March 1994.

TABLE A–1 TO APPENDIX A—MINIMUM DATA ASSESSMENT REQUIREMENTS

Method	Assessment Method	Coverage	Minimum Frequency	Parameters Reported
Precision:				
Automated Methods for SO_2, NO_2, O_3, and CO	Response check at concentration between .08 and .10 ppm (8 & 10 ppm for CO)[2]	Each analyzer	Once per 2 weeks	Actual concentration[2] and measured concentration[3]
Manual Methods: All methods except $PM_{2.5}$	Collocated samplers	1 site for 1–5 sites 2 sites for 6–20 sites 3 sites >20 sites (sites with highest conc.)	Once every six days	Particle mass concentration indicated by sampler and by collocated sampler
Accuracy:				
Automated Methods for SO_2, NO_2, O_3, and CO	Response check at .03–.08 ppm[1,2] .15–.20 ppm[1,2] .35–.45 ppm[1,2] 80–.90 ppm[1,2] (if applicable)	1. Each analyzer 2. 25% of analyzers (at least 1)	1. Once per year 2. Each calendar quarter	Actual concentration[2] and measured (indicated) concentration[3] for each level
Manual Methods for SO_2, and NO_2	Check of analytical procedure with audit standard solutions	Analytical system	Each day samples are analyzed, at least twice per quarter	Actual concentration and measured (indicated) concentration for each audit solution
TSP, PM_{10}	Check of sampler flow rate	1. Each sampler 2. 25% of samplers (at least 1)	1. Once per year 2. Each calendar quarter	Actual flow rate and flow rate indicated by the sampler
Lead	1. Check of sample flow rate as for TSP 2. Check of analytical system with Pb audit strips	1. Each sampler 2. Analytical system	1. Include with TSP 2. Each quarter	1. Same as for TSP 2. Actual concentration and measured (indicated) concentration of audit samples (μg Pb/strip)
$PM_{2.5}$				
Manual and Automated Methods-Precision	Collocated samplers	25% of SLAMS (monitors with Conc affecting NAAQS violation status)	Once every six days	1. Particle mass concentration indicated by sampler and by collocated sampler 2. 24-hour value for automated methods
Manual and Automated Methods-Accuracy and Bias	1. Check of sampler flow rate	Every SLAMS monitor	1. Automated—once every 2 weeks; Manual—each calendar quarter (4/year)	1. Actual flow rate and flow rate indicated by sampler

TABLE A–1 TO APPENDIX A—MINIMUM DATA ASSESSMENT REQUIREMENTS—Continued

Method	Assessment Method	Coverage	Minimum Frequency	Parameters Reported
	2. Audit with reference method		2. Minimum 4 measurements per year	2. Particle mass concentration indicated by sampler and by audit reference sampler

[1] Concentration times 100 for CO.
[2] Effective concentration for open path analyzers.
[3] Corrected concentration, if applicable, for open path analyzers.

TABLE A–2 TO APPENDIX A—SUMMARY OF $PM_{2.5}$ COLLOCATION AND AUDITS PROCEDURES AS AN EXAMPLE OF A TYPICAL REPORTING ORGANIZATION NEEDING 43 MONITORS, HAVING PROCURED FRMS AND THREE OTHER EQUIVALENT METHOD TYPES

Method Designation	Total # of Monitors	Total # Collocated	# of Collocated FRMs	# of Collocated Monitors of Same Type	# of Independent FRM Audits
FRM	25	6	6	n/a	6
Type A	10	3	2	1	3
Type C	2	1	1	0	1
Type D	6	2	1	1	2

[62 FR 38833, July 18, 1997; 63 FR 7714, 7715, Feb. 17, 1998]

APPENDIX B TO PART 58—QUALITY ASSURANCE REQUIREMENTS FOR PREVENTION OF SIGNIFICANT DETERIORATION (PSD) AIR MONITORING

1. *General Information*

This appendix specifies the minimum quality assurance requirements for the control and assessment of the quality of the PSD ambient air monitoring data submitted to EPA by an organization operating a network of PSD stations. Such organizations are encouraged to develop and maintain quality assurance programs more extensive than the required minimum.

Quality assurance of air monitoring systems includes two distinct and important interrelated functions. One function is the control of the measurement process through the implementation of policies, procedures, and corrective actions. The other function is the assessment of the quality of the monitoring data (the product of the measurement process). In general, the greater the effort and effectiveness of the control of a given monitoring system, the better will be the resulting quality of the monitoring data. The results of data quality assessments indicate whether the control efforts need to be increased.

Documentation of the quality assessments of the monitoring data is important to data users, who can then consider the impact of the data quality in specific applications (see Reference 1). Accordingly, assessments of PSD monitoring data quality are required to be made and reported periodically by the monitoring organization.

To provide national uniformity in the assessment and reporting of data quality among all PSD networks, specific assessment and reporting procedures are prescribed in detail in sections 3, 4, 5, and 6 of this appendix.

In contrast, the control function encompasses a variety of policies, procedures, specifications, standards, and corrective measures which affect the quality of the resulting data. The selection and extent of the quality control activities—as well as additional quality assessment activities—used by a monitoring organization 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 organization to develop a quality control system that is most efficient and effective for its own circumstances.

For purposes of this appendix, ''organization'' is defined as a source owner/operator, a government agency, or their contractor that operates an ambient air pollution monitoring network for PSD purposes.

2. *Quality Assurance Requirements*

2.1 Each organization must develop and implement a quality assurance program consisting of policies, procedures, specifications, standards and documentation necessary to:

(1) Provide data of adequate quality to meet monitoring objectives and quality assurance requirements of the permit-granting authority, and

(2) Minimize loss of air quality data due to malfunctions or out-of-control conditions.

This quality assurance program must be described in detail, suitably documented, and approved by the permit-granting authority. The Quality Assurance Program will be reviewed during the system audits described in section 2.4.

2.2 Primary guidance for developing the Quality Assurance Program is contained in References 2 and 3, which also contain many suggested procedures, checks, and control specifications. Section 2.0.9 of Reference 3 describes specific guidance for the development of a Quality Assurance Program for automated analyzers. Many specific quality control checks and specifications for manual methods are included in the respective reference methods described in part 50 of this chapter or in the respective equivalent method descriptions available from EPA (see Reference 4). Similarly, quality control procedures related to specifically designated reference and equivalent analyzers are contained in their respective operation and instruction manuals. This guidance, and any other pertinent information from appropriate sources, should be used by the organization in developing its quality assurance program.

As a minimum, each quality assurance program must include operational procedures for each of the following activities:

(1) Selection of methods, analyzers, or samplers;

(2) Training;

(3) Installation of equipment;

(4) Selection and control of calibration standards;

(5) Calibration;

(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 (see section 2.6 of appendix C of this part);

(10) Preventive and remedial maintenance;

(11) Recording and validating data;

(12) Date quality assessment (precision and accuracy);

(13) Documentation of quality control information.

2.3 Pollutant Standards.

2.3.1 Gaseous standards (permeation tubes, permeation devices or cylinders of compressed gas) used to obtain test concentrations for CO, SO_2, and NO_2 must be traceable to either a National Institute of Standards and Technology (NIST) gaseous Standard Reference Material (SRM) or an NIST/EPA-approved commercially available Certified Reference Material (CRM). CRM's are described in Reference 5, and a list of CRM sources is available from Quality Assurance Division (MD–77), Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. A recommended protocol for certifying gaseous standards against an SRM or CRM is given in section 2.0.7 of Reference 3. Direct use of a CRM as a working standard is acceptable, but direct use of an NIST SRM as a working standard is discouraged because of the limited supply and expense of SRM's.

2.3.2 Test concentrations for ozone must be obtained in accordance with the UV photometric calibration procedure specified in appendix D of part 50 of this chapter, or by means of a certified ozone transfer standard. Consult References 6 and 7 for guidance on primary and transfer standards for ozone.

2.3.3. Flow measurement must be made by a flow measuring instrument that is traceable to an authoritative volume or other standard. Guidance for certifying various types of flowmeters is provided in Reference 3.

2.4 Performance and System Audit Programs. The organization operating a PSD monitoring network must participate in EPA's national performance audit program. The permit granting authority, or EPA, may conduct system audits of the ambient air monitoring programs of organizations operating PSD networks. See section 1.4.16 of reference 2 and section 2.0.11 of reference 3 for additional information about these programs. Organizations should contact either the appropriate EPA Regional Quality Control Coordinator or the Quality Assurance Branch, AREAL/RTP, at the address given in reference 3 for instructions for participation.

3. *Data Quality Assessment Requirements*

All ambient monitoring methods or analyzers used in PSD monitoring shall be tested periodically, as described in this section 3, to quantitatively assess the quality of the data being routinely collected. The results of these tests shall be reported as specified in section 6. Concentration standards used for the tests must be as specified in section 2.3. Additional information and guidance in the technical aspects of conducting these tests may be found in Reference 3 or in the operation or instruction manual associated with the analyzer or sampler. Concentration measurements reported from analyzers or analytical systems must be derived by means of the same calibration curve and data processing system used to obtain the routine air monitoring data. Table B–1 provides a summary of the minimum data quality assessment requirements, which are described in more detail in the following sections.

3.1 Precision of Automated Methods. A one-point precision check must be carried out at least once every two weeks on each automated analyzer used to measure SO_2, NO_2, O_2, and CO. The precision check is made

by challenging the analyzer with a precision check gas of known concentration (effective concentration for open path analyzers) between 0.08 and 0.10 ppm for SO_2, NO_2, and O_3 analyzers, and between 8 and 10 ppm for CO analyzers. The standards from which precision check test concentrations are obtained must meet the specifications of section 2.3. Except for certain CO analyzers described below, point analyzers must operate in their normal sampling mode during the precision check, and the test atmosphere must pass through all filters, scrubbers, conditioners and other components used during normal ambient sampling and as much of the ambient air inlet system as is practicable. If permitted by the associated operation or instruction manual, a CO point analyzer may be temporarily modified during the precision check to reduce vent or purge flows, or the test atmosphere may enter the analyzer at a point other than the normal sample inlet, provided that the analyzer's response is not likely to be altered by these deviations from the normal operational mode.

Open path analyzers are tested by inserting a test cell containing a precision check gas concentration into the optical measurement beam of the instrument. If possible, the normally used transmitter, receiver, and, as appropriate, reflecting devices should be used during the test, and the normal monitoring configuration of the instrument should be altered as little as possible to accommodate the test cell for the test. However, if permitted by the associated operation or instruction manual, an alternate local light source or an alternate optical path that does not include the normal atmospheric monitoring path may be used. The actual concentration of the precision check gas in the test cell must be selected to produce an ''effective concentration'' in the range specified above. Generally, the precision test concentration measurement will be the sum of the atmospheric pollutant concentration and the precision test concentration. If so, the result must be corrected to remove the atmospheric concentration contribution. The ''corrected concentration'' is obtained by subtracting the average of the atmospheric concentrations measured by the open path instrument under test immediately before and immediately after the precision check test from the precision test concentration measurement. If the difference between these before and after measurements is greater than 20 percent of the effective concentration of the test gas, discard the test result and repeat the test. If possible, open path analyzers should be tested during periods when the atmospheric pollutant concentrations are relatively low and steady.

If a precision check is made in conjunction with a zero or span adjustment, it must be made prior to such zero or span adjustment. The difference between the actual concentration (effective concentration for open path analyzers) of the precision check gas and the corresponding concentration measurement (corrected concentration, if applicable, for open path analyzers) indicated by the analyzer is used to assess the precision of the monitoring data as described in section 4.1. Report data only from automated analyzers that are approved for use in the PSD network.

3.2 Accuracy of Automated Methods. Each sampling quarter, audit each analyzer that monitors for SO_2, NO_2, O_3, or CO at least once. The audit is made by challenging the analyzer with at least one audit gas of known concentration (effective concentration for open path analyzers) from each of the following ranges that fall within the measurement range of the analyzer being audited:

Audit level	Concentration range, ppm		CO
	SO_2, O_3,	NO_2,	
1	0.03–0.08	0.03–0.08	3–8
2	0.15–0.20	0.15–0.20	15–20
3	0.36–0.45	0.35–0.45	35–45
4	0.80–0.90	.....	80–90

NO_2 audit gas for chemiluminescence-type NO_2 analyzers must also contain at least 0.08 ppm NO.

NOTE: NO concentrations substantially higher than 0.08 ppm, as may occur when using some gas phase titration (GPT) techniques, may lead to audit errors in chemiluminescence analyzers due to inevitable minor NO-NO_X channel imbalance. Such errors may be atypical of routine monitoring errors to the extent that such NO concentrations exceed typical ambient NO concentrations. These errors may be minimized by modifying the GPT technique to lower the NO concentrations remaining in the NO_2 audit gas to levels closer to typical ambient NO concentrations at the site.

The standards from which audit gas test concentrations are obtained must meet the specifications of section 2.3. Working and transfer standards and equipment used for auditing must be different from the standards and equipment used for calibration and spanning. The auditing standards and calibration standards may be referenced to the same NIST, SRM, CRM, or primary UV photometer. The auditor must not be the operator/analyst who conducts the routine monitoring, calibration and analysis.

For point analyzers, the audit shall be carried out by allowing the analyzer to analyze the audit test atmosphere in the same manner as described for precision checks in section 3.1. The exception given in section 3.1 for certain CO analyzers does not apply for audits.

Open path analyzers are audited by inserting a test cell containing an audit gas concentration into the optical measurement beam of the instrument. If possible, the normally used transmitter, receiver, and, as appropriate, reflecting devices should be used during the audit, and the normal monitoring configuration of the instrument should be modified as little as possible to accommodate the test cell for the audit. However, if permitted by the associated operation or instruction manual, an alternate local light source or an alternate optical path that does not include the normal atmospheric monitoring path may be used. The actual concentrations of the audit gas in the test cell must be selected to produce ''effective concentrations'' in the range specified in this section 3.2. Generally, each audit concentration measurement result will be the sum of the atmospheric pollutant concentration and the audit test concentration. If so, the result must be corrected to remove the atmospheric concentration contribution. The ''corrected concentration'' is obtained by subtracting the average of the atmospheric concentrations measured by the open path instrument under test immediately before and immediately after the audit test (or preferably before and after each audit concentration level) from the audit concentration measurement. If the difference between these before and after measurements is greater than 20 percent of the effective concentration of the test gas standards, discard the test result for that concentration level and repeat the test for that level. If possible, open path analyzers should be audited during periods when the atmospheric pollutant concentrations are relatively low and steady. Also, the monitoring path length must be reverified to within ±3 percent to validate the audit, since the monitoring path length is critical to the determination of the effective concentration.

The differences between the actual concentrations (effective concentrations for open path analyzers) of the audit test gas and the corresponding concentration measurements (corrected concentrations, if applicable, for open path analyzers) indicated by the analyzer are used to assess the accuracy of the monitoring data as described in section 4.2. Report data only from automated analyzers that are approved for use in the PSD network.

3.3 Precision of Manual Methods.

3.3.1 TSP and PM_{10} Methods. For a given organization's monitoring network, one sampling site must have collocated samplers. A site with the highest expected 24-hour pollutant concentration must be selected. The two samplers must be within 4 meters of each other but at least 2 meters apart to preclude airflow interference. Calibration, sampling and analysis must be the same for both collocated samplers as well as for all other samplers in the network. The collocated samplers must be operated as a minimum every third day when continuous sampling is used. When a less frequent sample schedule is used, the collocated samplers must be operated at least once each week. For each pair of collocated samplers, designate one sampler as the sampler which will be used to report air quality for the site and designate the other as the duplicate sampler. The differences in measured concentration (μ g/m^3) between the two collocated samplers are used to calculate precision as described in section 5.1.

3.3.2 Pb Method. The operation of collocated samplers at one sampling site must be used to assess the precision of the reference or an equivalent Pb method. The procedure to be followed for Pb methods is the same as described in 3.3.1 for the TSP method. If approved by the permit granting authority, the collocated TSP samplers may serve as the collocated lead samplers.

3.4 Accuracy of Manual Methods.

3.4.1 TSP and PM_{10} Methods. Each sampling quarter, audit the flow rate of each sampler at least once. Audit the flow at the normal flow rate, using a certified flow transfer standard (see reference 2). The flow transfer standard used for the audit must not be the same one used to calibrate the flow of the sampler being audited, although both transfer standards may be referenced to the same primary flow or volume standard. The difference between the audit flow measurement and the flow indicated by the sampler's flow indicator is used to calculate accuracy, as described in paragraph 5.2.

Great care must be used in auditing high-volume samplers having flow regulators because the introduction of resistance plates in the audit device can cause abnormal flow patterns at the point of flow sensing. For this reason, the orifice of the flow audit device should be used with a normal glass fiber filter in place and without resistance plates in auditing flow regulated high-volume samplers, or other steps should be taken to assure that flow patterns are not perturbed at the point of flow sensing.

3.4.2 Pb Method. For the reference method (appendix G of part 50 of this chapter) during each sampling quarter audit the flow rate of each high-volume Pb sampler at least once. The procedure to be followed for lead methods is the same as described in section 3.4.1 for the TSP method.

For each sampling quarter, audit the Pb analysis using glass fiber filter strips containing a known quantity of lead. Audit samples are prepared by depositing a Pb solution on 1.9 cm by 20.3 cm (¾ inch by 8 inch) unexposed glass fiber filter strips and allowing to dry thoroughly. The audit samples must be prepared using reagents different from those

used to calibrate the Pb analytical equipment being audited. Prepare audit samples in the following concentration ranges:

Ranges	Pb concentration μ g/strip	Equivalent ambient Pb concentration [1] μ g/m³
1	100 to 300	0.5 to 1.5.
2	600 to 1,000	3.0 to 5.0.

[1] Equivalent ambient Pb concentration in μ g/m³ is based on sampling at 1.7 m³/min for 24 hours on 20.3 cm × 25.4 cm (8 inch × 10 inch) glass fiber filter.

Audit samples must be extracted using the same extraction procedure used for exposed filters.

Analyze at least one audit sample in each of the two ranges each day that samples are anlayzed. The difference between the audit concentration (in mu;g Pb/strip) and the analyst's measured concentration (in mu;g Pb/strip is used to calculate accuracy as described in section 5.4.

The accuracy of an equivalent method is assessed in the same manner as the reference method. The flow auditing device and Pb analysis audit samples must be compatible with the specific requirements of the equivalent method.

4. *Calculations for Automated Methods*

4.1 Single Analyzer Precision. Each organization, at the end of each sampling quarter, shall calculate and report a precision probability interval for each analyzer. Directions for calculations are given below and directions for reporting are given in section 6. If monitoring data are invalidated during the period represented by a given precision check, the results of that precision check shall be excluded from the calculations. Calculate the percentage difference (d_i) for each precision check using equation 1.

$$d_i = \frac{Y_1 - X_1}{X_1} \times 100 \qquad (1)$$

where:

Y_i = analyzer's indicated concentration from the i-th precision check

X_i = known concentration of the test gas used for the i-th precision check.

For each instrument, calculate the quarterly average (d_j), equation 2, and the standard deviation (S_j), equation 3.

$$d_j = \frac{1}{n}\sum_{i=1}^{n} d_i \qquad (2)$$

$$S_j = \sqrt{\frac{1}{n-1}\left[\sum_{i=1}^{n} d^2{}_i - \frac{1}{n}\left(\sum_{i=1}^{n} d_i\right)^2\right]} \qquad (3)$$

where n is the number of precision checks on the instrument made during ther sampling quarter. For example, n should be 6 or 7 if span checks are made biweekly during a quarter.

Calculate the 95 percent probability limits for precision using equation 4 and 5.

Upper 95 Percent Probability Limit = $d_j + 1.96\ S_j$ (4)

Lower 95 Percent Probability Limit = $d_j - 1.96\ S_j$ (5)

4.2 Single Analyzer Accuracy. Each organization, at the end of each sampling quarter, shall calculate and report the percentage difference for each audit concentration for each analyzer audited during the quarter. Directions for calculations are given below (directions for reporting are given in section 6).

Calculate and report the percentage difference (d_i) for each audit concentration using equation 1 where Y_i is the analyzer's indicated concentration from the i-th audit check and X_i is the known concentration of the audit gas used for the i-th audit check.

5. *Calculations for Manual Methods*

5.1 Single Instrument Precision for TSP, Pb and PM_{10}. Estimates of precision for ambient air quality particulate measurements are calculated from results obtained from collocated samplers as described in section 3.3. At the end of each sampling quarter, calculate and report a precision probability interval, using weekly result from the collocated samplers. Directions for calculations are given below, and directions for reporting are given in section 6.

For the paired measurements obtained as described in sections 3.3.1 and 3.3.2, calculate the percent difference (d_i) using equation 1a, where Y_i is the concentration of pollutant measured by the duplicate sampler, and X_i is the concentration measured by the sampler reporting air quality for the site. Calculate the quarterly average percent difference (d_j), equation 2; standard deviation (S_j), equation 3; and upper and lower 95 percent probability limits for precision, equations 6 and 7.

$$d_i = \frac{Y_i - X_i}{(Y_i + X_i)/2} \times 100 \qquad (1a)$$

Upper 95 percent probability limit = $d_j + 1.96\ S_j/\sqrt{2}$ (6)

Lower 95 percent probability limit = $d_j - 1.96\ S_j/\sqrt{2}$ (7)

5.2 Single Instrument Accuracy for TSP and PM_{10}. Each organization, at the end of each sampling quarter, shall calculate and report the percentage difference for each high-volume or PM_{10} sampler audited during

the quarter. Directions for calculation are given below and directions for reporting are given in section 6.

For the flow rate audit described in section 3.4, let X_i represent the known flow rate and Y_i represent the indicated flow rate. Calculate the percentage difference (d_i) using equation 1.

5.3 Single Instrument Accuracy for Pb. Each organization, at the end of each sampling quarter, shall calculate and report the percentage difference for each high-volume lead sampler audited during the quarter. Directions for calculation are given in 5.2 and directions for reporting are given in section 6.

5.4 Single-Analysis-Day Accuracy for Pb. Each organization, at the end of each sampling quarter, shall calculate and report the percentage difference for each Pb analysis audit during the quarter. Directions for calculations are given below and directions for reporting are given in section 6.

For each analysis audit for Pb described in section 3.4.2, let X_i represent the known value of the audit sample and Y_i the indicated value of Pb. Calculate the percentage difference (d_i) for each audit at each concentration level using equation 1.

6. *Organization Reporting Requirements.*

At the end of each sampling quarter, the organization must report the following data assessment information:

(1) For automated analyzers—precision probability limits from section 4.1 and percentage differences from section 4.2, and

(2) For manual methods—precision probability limits from section 5.1 and percentage differences from sections 5.2 and 5.3. The precision and accuracy information for the entire sampling quarter must be submitted with the air monitoring data. All data used to calculate reported estimates of precision and accuracy including span checks, collocated sampler and audit results must be made available to the permit granting authority upon request.

TABLE B–1—MINIMUM PSD DATA ASSESSMENT REQUIREMENTS

Method	Assessment method	Coverage	Frequency	Parameters reported
Precision:				
Automated Methods for SO_2, NO_2, O_3, and CO.	Response check at concentration between .08 & .10 ppm (8 & 10 ppm for CO)[2].	Each analyzer	Once per 2 weeks	Actual concentration[2] & measured concentration.[3]
TSP, PM_{10}, Lead	Collocated samplers	Highest concentration site in monitoring network.	Once per week or every 3rd day for continuous sampling.	Two concentration measurements.
Accuracy:				
Automated Methods for SO_2, NO_2, O_3, and CO.	Response check at: .03–.08 ppm;[1,2] .15–.20 ppm;[1,2] .35–.45 ppm;[1,2] .80–.90 ppm;[1,2] (if applicable).	Each analyzer	Once per sampling quarter.	Actual concentration[2] & measured (indicated) concentration[3] for each level.
TSP, PM_{10}	Sampler flow check	Each sampler	Once per sampling quarter.	Actual flow rate and flow rate indicated by the sampler.
Lead	1. Sample flow rate check.. 2. Check analytical system with Pb audit strips.	1. Each sampler. 2. Analytical system	1. Once/quarter. 2. Each quarter Pb samples are analyzed.	1. Same as for TSP. 2. Actual concentration & measured concentration of audit samples (μ g Pb/strip).

[1] Concentration shown times 100 for CO.
[2] Effective concentration for open path analyzers.
[3] Corrected concentration, if applicable, for open path analyzers.

References

1. Rhodes, R.C. Guideline on the Meaning and Use of Precision and Accuracy Data Required by 40 CFR part 58, appendices A and B. EPA–600/4–83–023. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, June, 1983.

2. ''Quality Assurance Handbook for Air Pollution Measurement Systems, Volume I—Principles.'' EPA–600/9–76–005. March 1976. Available from U.S Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory (MD–77), Research Triangle Park, NC 27711.

3. ''Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II—Ambient Air Specific Methods.'' EPA–600/4–77–027a. May 1979. Available from U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory(MD–77), Research Triangle Park, NC 27711.

4. ''List of Designated Reference and Equivalent Methods.'' Available from U.S. Environmental Protection Agency, Department E (MD–77), Research Triangle Park, NC 27711.

5. Hughes, E.E. and J. Mandel. A Procedure for Establishing Traceability of Gas Mixtures to Certain National Bureau of Standards SRM's. EPA–600/7–81–010. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, May, 1981. (Joint NBS/EPA Publication)

6. Paur, R.J. and F.F. McElroy. Technical Assistance Document for the Calibration of Ambient Ozone Monitors. EPA–600/4–79–057. U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory (MD–77), Research Triangle Park, NC 27711, September, 1979.

7. McElroy, F.F. Transfer Standards for the Calibration of Ambient Air Monitoring Analyzers for Ozone. EPA–600/4–79–056. U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory (MD–77), Research Triangle Park, NC 27711, September, 1979.

[44 FR 27571, May 10, 1979; 44 FR 65070, Nov. 9, 1979; 44 FR 72592, Dec. 14, 1979, as amended at 46 FR 44168, Sept. 3, 1981; 48 FR 2530, Jan. 20, 1983; 51 FR 9596, Mar. 19, 1986; 52 FR 24741, July 1, 1987; 59 FR 41628, 41629, Aug. 12, 1994; 60 FR 52321, Oct. 6, 1995]

APPENDIX C TO PART 58—AMBIENT AIR QUALITY MONITORING METHODOLOGY

1.0 *Purpose*

This appendix specifies the monitoring methods (manual methods or automated analyzers) which must be used in State ambient air quality monitoring stations.

2.0 *State and Local Air Monitoring Stations (SLAMS)*

2.1 Except as otherwise provided in this appendix, a monitoring method used in a SLAMS must be a reference or equivalent method as defined in § 50.1 of this chapter.

2.2 *Substitute PM_{10} samplers.*

2.2.1 For purposes of showing compliance with the NAAQS for particulate matter, a high volume TSP sampler described in 40 CFR part 50, appendix B, may be used in a SLAMS in lieu of a PM_{10} monitor as long as the ambient concentrations of particles measured by the TSP sampler are below the PM_{10} NAAQS. If the TSP sampler measures a single value that is higher than the PM_{10} 24-hour standard, or if the annual average of its measurements is greater than the PM_{10} annual standard, the TSP sampler operating as a substitute PM_{10} sampler must be replaced with a PM_{10} monitor. For a TSP measurement above the 24-hour standard, the TSP sampler should be replaced with a PM_{10} monitor before the end of the calendar quarter following the quarter in which the high concentration occurred. For a TSP annual average above the annual standard, the PM_{10} monitor should be operating by June 30 of the year following the exceedance.

2.2.2 In order to maintain historical continuity of ambient particulate matter trends and patterns for PM_{10} NAMS that were previously TSP NAMS, the TSP high volume sampler must be operated concurrently with the PM_{10} monitor for a one-year period beginning with the PM_{10} NAMS start-up date. The operating schedule for the TSP sampler must be at least once every 6 days regardless of the PM_{10} sampling frequency.

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.

2.4 Approval of non-designated $PM_{2.5}$ methods operated at specific individual sites. A method for $PM_{2.5}$ that has not been designated as a reference or equivalent method as defined in § 50.1 of this chapter may be approved for use for purposes of section 2.1 of this appendix at a particular SLAMS under the following stipulations.

2.4.1 The method must be demonstrated to meet the comparability requirements (except as provided in this section 2.4.1) set forth in § 53.34 of this chapter in each of the four seasons at the site at which it is intended to be used. For purposes of this section 2.4.1, the requirements of § 53.34 of this chapter shall apply except as follows:

2.4.1.1 The method shall be tested at the site at which it is intended to be used, and there shall be no requirement for tests at any other test site.

2.4.1.2 For purposes of this section 2.4, the seasons shall be defined as follows: Spring shall be the months of March, April, and May; summer shall be the months of June, July, and August; fall shall be the months of September, October, and November; and winter shall be the months of December, January, and February; when alternate seasons are approved by the Administrator.

2.4.1.3 No PM_{10} samplers shall be required for the test, as determination of the $PM_{2.5}$/PM_{10} ratio at the test site shall not be required.

2.4.1.4 The specifications given in table C–4 of part 53 of this chapter for Class I methods shall apply, except that there shall be no requirement for any minimum number of sample sets with Rj greater than 40 $\mu g/m^3$ for 24-hour samples or greater than 15 $\mu g/m_3$ average concentration collected over a 48-hour period.

2.4.2 The monitoring agency wishing to use the method must develop and implement appropriate quality assurance procedures for the method.

2.4.3 The monitoring agency wishing to use the method must develop and implement appropriate procedures for assessing and reporting the precision and accuracy of the method comparable to the procedures set forth in appendix A of this part for designated reference and equivalent methods.

2.4.4 The assessment of network operating precision using collocated measurements with reference method ''audit'' samplers required under section 3 of appendix A of this part shall be carried out semi-annually rather than annually (i.e., monthly audits with assessment determinations each 6 months).

2.4.5 Requests for approval under this section 2.4 must meet the general submittal requirements of sections 2.7.1 and 2.7.2.1 of this appendix and must include the requirements in sections 2.4.5.1 through 2.4.5.7 of this appendix.

2.4.5.1 A clear and unique description of the site at which the method or sampler will be used and tested, and a description of the nature or character of the site and the particulate matter that is expected to occur there.

2.4.5.2 A detailed description of the method and the nature of the sampler or analyzer upon which it is based.

2.4.5.3 A brief statement of the reason or rationale for requesting the approval.

2.4.5.4 A detailed description of the quality assurance procedures that have been developed and that will be implemented for the method.

2.4.5.5 A detailed description of the procedures for assessing the precision and accuracy of the method that will be implemented for reporting to AIRS.

2.4.5.6 Test results from the comparability tests as required in section 2.4.1 through 2.4.1.4 of this appendix.

2.4.5.7 Such further supplemental information as may be necessary or helpful to support the required statements and test results.

2.4.6 Within 120 days after receiving a request for approval of the use of a method at a particular site under this section 2.4 and such further information as may be requested for purposes of the decision, the Administrator will approve or disapprove the method by letter to the person or agency requesting such approval.

2.5 Approval of non-designated methods under §58.13(f). An automated (continuous) method for $PM_{2.5}$ that is not designated as either a reference or equivalent method as defined in §50.1 of this chapter may be approved under §58.13(f) for use at a SLAMS for the limited purposes of §58.13(f). Such an analyzer that is approved for use at a SLAMS under §58.13(f), identified as correlated acceptable continuous (CAC) monitors, shall not be considered a reference or equivalent method as defined in §50.1 of this chapter by virtue of its approval for use under §58.13(f), and the $PM_{2.5}$ monitoring data obtained from such a monitor shall not be otherwise used for purposes of part 50 of this chapter.

2.6 Use of Methods With Higher, Nonconforming Ranges in Certain Geographical Areas.

2.6.1 [Reserved]

2.6.2 Nonconforming Ranges. An analyzer may be used (indefinitely) on a range which extends to concentrations higher than two times the upper limit specified in table B–1 of part 53 of this chapter if:

2.6.2.1 The analyzer has more than one selectable range and has been designated as a reference or equivalent method on at least one of its ranges, or has been approved for use under section 2.5 (which applies to analyzers purchased before February 18, 1975);

2.6.2.2 The pollutant intended to be measured with the analyzer is likely to occur in concentrations more than two times the upper range limit specified in table B–1 of part 53 of this chapter in the geographical area in which use of the analyzer is proposed; and

2.6.2.3 The Administrator determines that the resolution of the range or ranges for which approval is sought is adequate for its intended use. For purposes of this section (2.6), ''resolution'' means the ability of the analyzer to detect small changes in concentration.

2.6.3 Requests for approval under section 2.6.2 must meet the submittal requirements of section 2.7. Except as provided in subsection 2.7.3, each request must contain the information specified in subsection 2.7.2 in addition to the following:

2.6.3.1 The range or ranges proposed to be used;

2.6.3.2 Test data, records, calculations, and test results as specified in subsection 2.7.2.2 for each range proposed to be used;

2.6.3.3 An identification and description of the geographical area in which use of the analyzer is proposed;

2.6.3.4 Data or other information demonstrating that the pollutant intended to be measured with the analyzer is likely to occur in concentrations more than two times the upper range limit specified in table B–1 of part 53 of this chapter in the geographical area in which use of the analyzer is proposed; and

2.6.3.5 Test data or other information demonstrating the resolution of each proposed range that is broader than that permitted by section 2.5.

2.6.4 Any person who has obtained approval of a request under this section (2.6.2) shall assure that the analyzer for which approval was obtained is used only in the geographical area identified in the request and only while operated in the range or ranges specified in the request.

2.7 Requests for Approval; Withdrawal of Approval.

2.7.1 Requests for approval under sections 2.4, 2.6.2, or 2.8 of this appendix must be submitted to: Director, National Exposure Assessment Laboratory, Department E, (MD-77B), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

2.7.2 Except as provided in section 2.7.3, each request must contain:

2.7.2.1 A statement identifying the analyzer (e.g., by serial number) and the method of which the analyzer is representative (e.g., by manufacturer and model number); and

2.7.2.2 Test data, records, calculations, and test results for the analyzer (or the method of which the analyzer is representative) as specified in subpart B, subpart C, or both (as applicable) of part 53 of this chapter.

2.7.3 A request may concern more than one analyzer or geographical area and may incorporate by reference any data or other information known to EPA from one or more of the following:

2.7.3.1 An application for a reference or equivalent method determination submitted to EPA for the method of which the analyzer is representative, or testing conducted by the applicant or by EPA in connection with such an application;

2.7.3.2 Testing of the method of which the analyzer is representative at the initiative of the Administrator under §53.7 of this chapter; or

2.7.3.3 A previous or concurrent request for approval submitted to EPA under this section (2.7).

2.7.4 To the extent that such incorporation by reference provides data or information required by this section (2.7) or by sections 2.4, 2.5, or 2.6, independent data or duplicative information need not be submitted.

2.7.5 After receiving a request under this section (2.7), the Administrator may request such additional testing or information or conduct such tests as may be necessary in his judgment for a decision on the request.

2.7.6 If the Administrator determines, on the basis of any information available to him, that any of the determinations or statements on which approval of a request under this section (2.7) was based are invalid or no longer valid, or that the requirements of section 2.4, 2.5, or 2.6, as applicable, have not been met, he may withdraw the approval after affording the person who obtained the approval an opportunity to submit information and arguments opposing such action.

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. For purposes of this section (2.8), ''alternative method'' means an analyzer the use of which has been approved under section 2.4, 2.5, or 2.6 of this appendix or some combination thereof.

2.8.2 Requests for approval under this section (2.8) must meet the submittal requirements of sections 2.7.1 and 2.7.2.1 of this appendix.

2.8.3 Each request submitted under this section (2.8) must include:

2.8.3.1 A description, in such detail as may be appropriate, of the desired modification;

2.8.3.2 A brief statement of the purpose(s) of the modification, including any reasons for considering it necessary or advantageous;

2.8.3.3 A brief statement of belief concerning the extent to which the modification will or may affect the performance characteristics of the method; and

2.8.3.4 Such further information as may be necessary to explain and support the statements required by sections 2.8.3.2 and 2.8.3.3.

2.8.4 Within 75 days after receiving a request for approval under this section (2.8) and such further information as he may request for purposes of his decision, the Administrator will approve or disapprove the modification in question by letter to the person or agency requesting such approval.

2.8.5 A temporary modification that will or might alter the performance characteristics of a reference, equivalent, or alternative method may be made without prior approval under this section (2.8) if the method is not functioning or is malfunctioning, provided that parts necessary for repair in accordance with the applicable operation manual cannot be obtained within 45 days. Unless such temporary modification is later approved under section 2.8.4, the temporarily modified method shall be repaired in accordance with the applicable operation manual as quickly as practicable but in no event later than 4 months after the temporary modification was made, unless an extension of time is granted by the Administrator. Unless and until the temporary modification is approved, air quality data obtained with the method as temporarily modified must be clearly identified as such when submitted in accordance with §58.28 or §58.35 of this chapter and must be accompanied by a report containing the information specified in section 2.8.3. A request that the Administrator approve a temporary modification may be submitted in accordance with sections 2.8.1 through 2.8.4. In such cases the request will be considered as if a request for prior approval had been made.

2.9 Use of IMPROVE Samplers at a SLAMS. ''IMPROVE'' samplers may be used in SLAMS for monitoring of regional background and regional transport concentrations of fine particulate matter. The IMPROVE samplers were developed for use in the Interagency Monitoring of Protected Visual Environments (IMPROVE) network to characterize all of the major components and

many trace constituents of the particulate matter that impair visibility in Federal Class I Areas. These samplers are routinely operated at about 70 locations in the United States. IMPROVE samplers consist of four sampling modules that are used to collect twice weekly 24-hour duration simultaneous samples. Modules A, B, and C collect $PM_{2.5}$ on three different filter substrates that are compatible with a variety of analytical techniques, and module D collects a PM_{10} sample. $PM_{2.5}$ mass and elemental concentrations are determined by analysis of the 25mm diameter stretched Teflon filters from module A. More complete descriptions of the IMPROVE samplers and the data they collect are available elsewhere (references 4, 5, and 6 of this appendix).

* * * * *

3.0 *National Air Monitoring Stations (NAMS)*

3.1 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).

4.0 *Photochemical Assessment Monitoring Stations (PAMS)*

4.1 Methods used for O_3 monitoring at PAMS must be automated reference or equivalent methods as defined in §50.1 of this chapter.

4.2 Methods used for NO, NO_2 and NO_X monitoring at PAMS should be automated reference or equivalent methods as defined for NO_2 in §50.1 of this chapter. If alternative NO, NO_2 or NO_X monitoring methodologies are proposed, such techniques must be detailed in the network description required by §58.40 and subsequently approved by the Administrator.

4.3 Methods for meteorological measurements and speciated VOC monitoring are included in the guidance provided in references 2 and 3. If alternative VOC monitoring methodology (including the use of new or innovative technologies), which is not included in the guidance, is proposed, it must be detailed in the network description required by §58.40 and subsequently approved by the Administrator.

5.0 *Particulate Matter Episode Monitoring*

5.1 For short-term measurements of PM_{10} during air pollution episodes (see §51.152 of this chapter) the measurement method must be:

5.1.1 Either the ''Staggered PM_{10}'' method or the ''PM_{10} Sampling Over Short Sampling Times'' method, both of which are based on the reference method for PM_{10} and are described in reference 1: or

5.1.2 Any other method for measuring PM_{10}:

5.1.2.1 Which has a measurement range or ranges appropriate to accurately measure air pollution episode concentration of PM_{10},

5.1.2.2 Which has a sample period appropriate for short-term PM_{10} measurements, and

5.1.2.3 For which a quantitative relationship to a reference or equivalent method for PM_{10} has been established at the use site. Procedures for establishing a quantitative site-specific relationship are contained in reference 1.

5.2 Quality Assurance. PM_{10} methods other than the reference method are not covered under the quality assessment requirements of appendix A. Therefore, States must develop and implement their own quality assessment procedures for those methods allowed under this section 4. These quality assessment procedures should be similar or analogous to those described in section 3 of appendix A for the PM_{10} reference method.

6.0 *References*

1. Pelton, D. J. Guideline for Particulate Episode Monitoring Methods, GEOMET Technologies, Inc., Rockville, MD. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68–02–3584. EPA 450/4–83–005. February 1983.

2. Technical Assistance Document For Sampling and Analysis of Ozone Precursors. Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. EPA 600/8–91–215. October 1991.

3. Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV. Meteorological Measurements. Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. EPA 600/4–90–0003. August 1989.

(4) Eldred, R.A., Cahill, T.A., Wilkenson, L.K., et al., Measurements of fine particles and their chemical components in the IMPROVE/NPS networks, in Transactions of the International Specialty Conference on Visibility and Fine Particles, Air and Waste Management Association: Pittsburgh, PA, 1990; pp 187-196.

(5) Sisler, J.F., Huffman, D., and Latimer, D.A.; Spatial and temporal patterns and the chemical composition of the haze in the United States: An analysis of data from the IMPROVE network, 1988-1991, ISSN No. 0737-5253-26, National Park Service, Ft. Collins, CO, 1993.

(6) Eldred, R.A., Cahill, T.A., Pitchford, M., and Malm, W.C.; IMPROVE—a new remote area particulate monitoring system for visibility studies, Proceedings of the 81st Annual

Meeting of the Air Pollution Control Association, Dallas, Paper 88-54.3, 1988.

[44 FR 27571, May 10, 1979, as amended at 44 FR 37918, June 29, 1979; 44 FR 65070, Nov. 9, 1979; 51 FR 9597, Mar. 19, 1986; 52 FR 24741, 24742, July 1, 1987; 58 FR 8469, Feb. 12, 1993; 59 FR 41628, Aug. 12, 1994; 62 FR 38843, July 18, 1997]

APPENDIX D TO PART 58—NETWORK DESIGN FOR STATE AND LOCAL AIR MONITORING STATIONS (SLAMS), NATIONAL AIR MONITORING STATIONS (NAMS), AND PHOTOCHEMICAL ASSESSMENT MONITORING STATIONS (PAMS)

1. SLAMS Monitoring Objectives and Spatial Scales
2. SLAMS Network Design Procedures
2.1 Background Information for Establishing SLAMS
2.2 Substantive Changes in SLAMS/NAMS Network Design Elements
2.3 Sulfur Dioxide (SO_2) Design Criteria for SLAMS
2.4 Carbon Monoxide (CO) Design Criteria for SLAMS
2.5 Ozone (O_3) Design Criteria for SLAMS
2.6 Nitrogen Dioxide (NO_2) Design Criteria for SLAMS
2.7 Lead (Pb) Design Criteria for SLAMS
2.8 Particluate Matter Design Criteria for SLAMS
3. Network Design for National Air Monitoring Stations (NAMS)
3.1 [Reserved]
3.2 Sulfur Dioxide (SO_2) Design Criteria for NAMS
3.3 Carbon Monoxide (CO) Design Criteria for NAMS
3.4 Ozone (O_3) Design Criteria for NAMS
3.5 Nitrogen Dioxide (NO_2) Design Criteria for NAMS
3.6 Lead (Pb) Design Criteria for NAMS
3.7 Particulate Matter Design Criteria for NAMS
4. Network Design for Photochemical Assessment Monitoring Stations (PAMS)
5. Summary
6. References

1. *SLAMS Monitoring Objectives and Spatial Scales*

The purpose of this appendix is to describe monitoring objectives and general criteria to be applied in establishing the State and Local Air Monitoring Stations (SLAMS) networks and for choosing general locations for new monitoring stations. It also describes criteria for determining the number and location of National Air Monitoring Stations (NAMS), Photochemical Assessment Monitoring Stations (PAMS), and core Stations for $PM_{2.5}$. These criteria will also be used by EPA in evaluating the adequacy of the SLAMS/NAMS/PAMS and core $PM_{2.5}$ networks.

The network of stations that comprise SLAMS should be designed to meet a minimum of six 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.

(4) To determine general background concentration levels.

(5) To determine the extent of Regional pollutant transport among populated areas; and in support of secondary standards.

(6) To determine the welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

It should be noted that this appendix contains no criteria for determining the total number of stations in SLAMS networks, except in areas where Pb concentrations currently exceed or have exceeded the Pb NAAQS during any one quarter of the most recent eight quarters. The optimum size of a particular SLAMS network involves trade offs among data needs and available resources that EPA believes can best be resolved during the network design process.

This appendix focuses on the relationship between monitoring objectives and the geographical location of monitoring stations. Included are a rationale and set of general criteria for identifying candidate station locations in terms of physical characteristics which most closely match a specific monitoring objective. The criteria for more specifically siting the monitoring station, including spacing from roadways and vertical and horizontal probe and path placement, are described in appendix E of this part.

To clarify the nature of the link between general monitoring objectives and the physical location of a particular monitoring station, the concept of spatial scale of representativeness of a monitoring station is defined. 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.

Thus, spatial scale of representativeness is described in terms of the physical dimensions of the air parcel nearest to a monitoring station throughout which actual pollutant concentrations are reasonably similar. The scale of representativeness of most interest for the monitoring objectives defined above are as follows:

Microscale—defines the concentrations in air volumes associated with area dimensions

ranging from several meters up to about 100 meters.

Middle Scale—defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.

Neighborhood Scale—defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range.

Urban Scale—defines the overall, citywide conditions with dimensions on the order of 4 to 50 kilometers. This scale would usually require more than one site for definition.

Regional Scale—defines usually a rural area of reasonably homogeneous geography and extends from tens to hundreds of kilometers.

National and Global Scales—these measurement scales represent concentrations characterizing the nation and the globe as a whole.

Proper siting of a monitoring station requires precise specification of the monitoring objective which usually includes a desired spatial scale of representativeness. For example, consider the case where the objective is to determine maximum CO concentrations in areas where pedestrians may reasonably be exposed. Such areas would most likely be located within major street canyons of large urban areas and near traffic corridors. Stations located in these areas are most likely to have a microscale of representativeness since CO concentrations typically peak nearest roadways and decrease rapidly as the monitor is moved from the roadway. In this example, physical location was determined by consideration of CO emission patterns, pedestrian activity, and physical characteristics affecting pollutant dispersion. Thus, spatial scale of representativeness was not used in the selection process but was a *result* of station location.

In some cases, the physical location of a station is determined from joint consideration of both the basic monitoring objective, and a desired spatial scale of representativeness. For example, to determine CO concentrations which are typical over a reasonably broad geographic area having relatively high CO concentrations, a neighborhood scale station is more appropriate. Such a station would likely be located in a residential or commercial area having a high overall CO emission density but not in the immediate vicinity of any single roadway. Note that in this example, the desired scale of representativeness was an important factor in determining the physical location of the monitoring station.

In either case, classification of the station by its intended objective and spatial scale of representativeness is necessary and will aid in interpretation of the monitoring data.

Table 1 illustrates the relationship between the four basic monitoring objectives and the scales of representativeness that are generally most appropriate for that objective.

TABLE 1—RELATIONSHIP AMONG MONITORING OBJECTIVES AND SCALE OF REPRESENTATIVENESS

Monitoring Objective	Appropriate Siting Scales
Highest concentration	Micro, Middle, neighborhood (sometimes urban[1])
Population	Neighborhood, urban
Source impact	Micro, middle, neighborhood
General/background	Neighborhood, urban, regional
Regional transport	Urban/regional
Welfare-related impacts	Urban/regional

[1] Urban denotes a geographic scale applicable to both cities and rural areas

Open path analyzers can often be used effectively and advantageously to provide better monitoring representation for population exposure monitoring and general or background monitoring in urban and neighborhood scales of representation. Such analyzers may also be able to provide better area coverage or operational advantages in high concentration and source-impact monitoring in middle scale and possibly microscale areas. However, siting of open path analyzers for the latter applications must be carried out with proper regard for the specific monitoring objectives and for the path-averaging nature of these analyzers. Monitoring path lengths need to be commensurate with the intended scale of representativeness and located carefully with respect to local sources or potential obstructions. For short-term/high-concentration or source-oriented monitoring, the monitoring path may need to be further restricted in length and be oriented approximately radially with respect to the source in the downwind direction, to provide adequate peak concentration sensitivity. Alternatively, multiple (e.g., orthogonal) paths may be used advantageously to obtain both wider area coverage and peak concentration sensitivity. Further discussion on this topic is included in section 2.2 of this appendix.

Subsequent sections of this appendix describe in greater detail the most appropriate scales of representativeness and general monitoring locations for each pollutant.

2. *SLAMS Network Design Procedures*

The preceding section of this appendix has stressed the importance of defining the objectives for monitoring a particular pollutant. Since monitoring data are collected to ''represent'' the conditions in a section or subregion of a geographical area, the previous section included a discussion of the scale of representativeness of a monitoring station. The use of this physical basis for locating stations allows for an objective approach to network design.

The discussion of scales in sections 2.3 through 2.8 of this appendix does not include all of the possible scales for each pollutant. The scales that are discussed are those that are felt to be most pertinent for SLAMS network design.

In order to evaluate a monitoring network and to determine the adequacy of particular monitoring stations, it is necessary to examine each pollutant monitoring station individually by stating its monitoring objective and determining its spatial scale of representativeness. This will do more than insure compatibility among stations of the same type. It will also provide a physical basis for the interpretation and application of the data. This will help to prevent mismatches between what the data actually represent and what the data are interpreted to represent. It is important to note that SLAMS are not necessarily sufficient for completely describing air quality. In many situations, diffusion models must be applied to complement ambient monitoring, e.g., determining the impact of point sources or defining boundaries of nonattainment areas.

Information such as emissions density, housing density, climatological data, geographic information, traffic counts, and the results of modeling will be useful in designing regulatory networks. Air pollution control agencies have shown the value of screening studies, such as intensive studies conducted with portable samplers, in designing networks. In many cases, in selecting sites for core $PM_{2.5}$ or carbon monoxide SLAMS, and for defining the boundaries of $PM_{2.5}$ optional community monitoring zones, air pollution control agencies will benefit from using such studies to evaluate the spatial distribution of pollutants.

2.1 Background Information for Establishing SLAMS. Background information that must be considered in the process of selecting SLAMS from the existing network and in establishing new SLAMS includes emission inventories, climatological summaries, and local geographical characteristics. Such information is to be used as a basis for the judgmental decisions that are required during the station selection process. For new stations, the background information should be used to decide on the actual location considering the monitoring objective and spatial scale while following the detailed procedures in References 1 through 4.

Emission inventories are generally the most important type of background information needed to design the SLAMS network. The emission data provide valuable information concerning the size and distribution of large point sources. Area source emissions are usually available for counties but should be subdivided into smaller areas or grids where possible, especially if diffusion modeling is to be used as a basis for determining where stations should be located. Sometimes this must be done rather crudely, for example, on the basis of population or housing units. In general, the grids should be smaller in areas of dense population than in less densely populated regions.

Emission inventory information for point sources should be generally available for any area of the country for annual and seasonal averaging times. Specific information characterizing the emissions from large point sources for the shorter averaging times (diurnal variations, load curves, etc.) can often be obtained from the source. Area source emission data by season, although not available from the EPA, can be generated by apportioning annual totals according to degree days.

Detailed area source data are also valuable in evaluating the adequacy of an existing station in terms of whether the station has been located in the desired spatial scale of representativeness. For example, it may be the desire of an agency to have an existing CO station measuring in the neighborhood scale.

By examining the traffic data for the area and examining the physical location of the station with respect to the roadways, a determination can be made as to whether or not the station is indeed measuring the air quality on the desired scale.

The climatological summaries of greatest use are the frequency distributions of wind speed and direction. The wind rose is an easily interpreted graphical presentation of the directional frequencies. Other types of useful climatological data are also available, but generally are not as directly applicable to the site selection process as are the wind statistics.

In many cases, the meteorological data originating from the most appropriate (not necessarily the nearest) national weather service (NWS) airport station in the vicinity of the prospective siting area will adequately reflect conditions over the area of interest, at least for annual and seasonal averaging times. In developing data in complex meteorological and terrain situations, diffusion meteorologists should be consulted. NWS stations can usually provide most of the relevant weather information in support of network design activities anywhere in the country. Such information includes joint frequency distributions of winds and atmospheric stability (stability-wind roses).

The geographical material is used to determine the distribution of natural features, such as forests, rivers, lakes, and manmade features. Useful sources of such information may include road and topographical maps, aerial photographs, and even satellite photographs. This information may include the terrain and land-use setting of the prospective monitor siting area, the proximity of larger water bodies, the distribution of pollutant sources in the area, the location of

NWS airport stations from which weather data may be obtained, etc. Land use and topographical characteristics of specific areas of interest can be determined from U.S. Geological Survey (USGS) maps and land use maps. Detailed information on urban physiography (building/street dimensions, etc.) can be obtained by visual observations, aerial photography, and also surveys to supplement the information available from those sources. Such information could be used in determining the location of local pollutant sources in and around the prospective station locations.

2.2 Substantive Changes in SLAMS/NAMS Network Design Elements. Two important purposes of the SLAMS monitoring data are to examine and evaluate overall air quality within a certain region, and to assess the trends in air pollutant levels over several years. The EPA believes that one of the primary tools for providing these characterizations is an ambient air monitoring program which implements technically representative networks. The design of these networks must be carefully evaluated not only at their outset, but at relatively frequent intervals thereafter, using an appropriate combination of other important technical tools, including: dispersion and receptor modeling, saturation studies, point and area source emissions analyses, and meteorological assessments. The impetus for these subsequent reexaminations of monitoring network adequacy stems not only from the need to evaluate the effect that changes in the environment may pose, but also from the recognition that new and/or refined tools and techniques for use in impact assessments are continually emerging and available for application.

Substantiative changes to an ambient air monitoring network are both inevitable and necessary; however, any changes in any substantive aspect of an existing SLAMS network or monitoring site that might affect the continuity or comparability of pollutant measurements over time must be carefully and thoroughly considered. Such substantive changes would include cessation of monitoring at an existing site, relocation of an existing site, a change in the type of monitoring method used, any change in the probe or path height or orientation that might affect pollutant measurements, any significant changes in calibration procedures or standards, any significant change in operational or quality assurance procedures, any significant change in the sources or the character of the area in the vicinity of a monitoring site, or any other change that could potentially affect the continuity or comparability of monitoring data obtained before and after the change.

In general, these types of changes should be made cautiously with due consideration given to the impact of such changes on the network/site's ability to meet its intended goals. Some of these changes will be inevitable (such as when a monitoring site will no longer be available and the monitor must be relocated, for example). Other changes may be deemed necessary and advantageous, after due consideration of their impact, even though they may have a deleterious effect on the long-term comparability of the monitoring data. In these cases, an effort should be made to quantify, if possible, or at least characterize, the nature or extent of the effects of the change on the monitoring data. In all cases, the changes and all information pertinent to the effect of the change should be properly and completely documented for evaluation by trends analysts.

The introduction of open path methods to the SLAMS monitoring network may seem relatively straightforward, given the kinds of technical analyses required in this appendix. However, given the uncertainties attendant to these analyses and the critical nature and far-reaching regulatory implications of some sites in the current SLAMS network composed of point monitors, there is a need to 'bridge' between databases generated by these different candidate methods to evaluate and promote continuity in understanding of the historical representativeness of the database.

Concurrent, nominally collocated monitoring must be conducted in all instances where an open path analyzer is effectively intended to replace a criteria pollutant point monitor which meets either of the following:

1. Data collected at the site represents the maximum concentration for a particular nonattainment area; or

2. Data collected at the site is currently used to characterize the development of a nonattainment area State implementation plan.

The Regional Administrator, the Administrator, or their appropriate designee may also require collocated monitoring at other sites which are, based on historical technical data, significant in assessing air quality in a particular area. The term of this requirement is determined by the Regional Administrator (for SLAMS), Administrator (for NAMS), or their appropriate designee. The recommended minimum term consists of one year (or one season of maximum pollutant concentration) with a maximum term indexed to the subject pollutant NAAQS compliance interval (e.g., three calendar years for ozone). The requirement involves concurrent monitoring with both the open path analyzer and the existing point monitor during this term. Concurrent monitoring with more than one point analyzer with an open path analyzer using one or more measurement paths may also be advantageous to confirm adequate peak concentration sensitivity or to optimize the location and length of the monitoring path or paths.

All or some portion of the above requirement may be waived by the Regional Administrator (for SLAMS), the Administrator (for NAMS), or their designee in response to a request, based on accompanying technical information and analyses, or in certain unavoidable instances caused by logistical circumstances.

These requirements for concurrent monitoring also generally apply to situations where the relocation of any SLAMS site, using either a point monitor or an open path analyzer, within an area is being contemplated.

2.3 Sulfur Dioxide (SO_2) Design Criteria for SLAMS. The spatial scales for SO_2 SLAMS monitoring are the middle, neighborhood, urban, and regional scales. Because of the nature of SO_2 distributions over urban areas, the middle scale is the most likely scale to be represented by a single measurement in an urban area, but only if the undue effects from local sources (minor or major point sources) can be eliminated. Neighborhood scales would be those most likely to be represented by single measurements in suburban areas where the concentration gradients are less steep. Urban scales would represent areas where the concentrations are uniform over a larger geographical area. Regional scale measurements would be associated with rural areas.

Middle Scale—Some data uses associated with middle scale measurements for SO_2 include assessing the effects of control strategies to reduce urban concentrations (especially for the 3-hour and 24-hour averaging times) and monitoring air pollution episodes.

Neighborhood Scale—This scale applies in areas where the SO_2 concentration gradient is relatively flat (mainly suburban areas surrounding the urban center) or in large sections of small cities and towns. In general, these areas are quite homogeneous in terms of SO_2 emission rates and population density. Thus, neighborhood scale measurements may be associated with baseline concentrations in areas of projected growth and in studies of population responses to exposure to SO_2. Also concentration maxima associated with air pollution episodes may be uniformly distributed over areas of neighborhood scale, and measurements taken within such an area would represent neighborhood, and to a limited extent, middle scale concentrations.

Urban Scale—Data from this scale could be used for the assessment of air quality trends and the effect of control strategies on urban scale air quality.

Regional Scale—These measurements would be applicable to large homogeneous areas, particularly those which are sparsely populated. Such measurements could provide information on background air quality and interregional pollutant transport.

After the spatial scale has been selected to meet the monitoring objectives for each station location, the procedures found in reference 2 should be used to evaluate the adequacy of each existing SO_2 station and must be used to relocate an existing station or to locate any new SLAMS stations. The background material for these procedures should consist of emission inventories, meteorological data, wind roses, and maps for population and topographical characteristics of specific areas of interest. Isopleth maps of SO_2 air quality as generated by diffusion models[5] are useful for the general determination of a prospective area within which the station is eventually placed.

2.4 Carbon Monoxide (CO) Design Criteria for SLAMS. Micro, middle, and neighborhood scale measurements are necessary station classifications for SLAMS since most people are exposed to CO concentrations in these scales. Carbon monoxide maxima occur primarily in areas near major roadways and intersections with high traffic density and poor atmospheric ventilation. As these maxima can be predicted by ambient air quality modeling, a large fixed network of CO monitors is not required. Long-term CO monitoring should be confined to a limited number of micro and neighborhood scale stations in large metropolitan areas to measure maximum pollution levels and to determine the effectiveness of control strategies.

Microscale—Measurements on this scale would represent distributions within street canyons, over sidewalks, and near major roadways. The measurements at a particular location in a street canyon would be typical of one high concentration area which can be shown to be a representation of many more areas throughout the street canyon or other similar locations in a city. This is a scale of measurement that would provide valuable information for devising and evaluating ''hot spot'' control measures.

Middle Scale—This category covers dimensions from 100 meters to 0.5 kilometer. In certain cases discussed below, it may apply to regions that have a total length of several kilometers. In many cases of interest, sources and land use may be reasonably homogeneous for long distances along a street, but very inhomogeneous normal to the street. This is the case with strip development and freeway corridors. Included in this category are measurements to characterize the CO concentrations along the urban features just enumerated. When a location is chosen to represent conditions in a block of street development, then the characteristic dimensions of this scale are tens of meters by hundreds of meters. If an attempt is made to characterize street-side conditions throughout the downtown area or along an extended stretch of freeway, the dimensions may be tens of meters by kilometer.

The middle scale would also include the parking lots and feeder streets associated with indirect sources which attract significant numbers of pollutant emitters, particularly autos. Shopping centers, stadia, and office buildings are examples of indirect sources.

Neighborhood Scale—Measurements in this category would represent conditions throughout some reasonably homogeneous urban subregions, with dimensions of a few kilometers and generally more regularly shaped than the middle scale. Homogeneity refers to CO concentration, but it probably also applies to land use. In some cases, a location carefully chosen to provide neighborhood scale data, might represent not only the immediate neighborhood, but also neighborhoods of the same type in other parts of the city. These kinds of stations would provide information relating to health effects because they would represent conditions in areas where people live and work. Neighborhood scale data would provide valuable information for developing, testing, and revising concepts and models that describe the larger scale concentration patterns, especially those models relying on spatially smoothed emission fields for inputs. These types of measurements could also be used for interneighborhood comparisons within or between cities.

After the spatial scale has been determined to meet the monitoring objectives for each location, the location selection procedures, as shown in reference 3 should be used to evaluate the adequacy of each existing CO station and must be used to relocate an existing station or to locate any new SLAMS stations. The background material necessary for these procedures may include the average daily traffic on all streets in the area, wind roses for different hours of the day, and maps showing one-way streets, street widths, and building heights. If the station is to typify the area with the highest concentrations, the streets with the greatest daily traffic should be identified. If some streets are one-way, those streets that have the greatest traffic during the afternoon and evening hours should be selected as tentative locations, because the periods of high traffic volume are usually of greatest duration through the evening hours. However, the strength of the morning inversion has to be considered along with the traffic volume and pattern when seeking areas with the highest concentrations. Traffic counters near the stations will provide valuable data for interpreting the observed CO Concentrations.

Monitors should not be placed in the vicinity of possible anomalous source areas. Examples of such areas include toll gates on turnpikes, metered freeway ramps, and drawbridge approaches. Additional information on network design may be found in reference 3.

2.5 Ozone (O_3) Design Criteria for SLAMS. Ozone is not directly emitted into the atmosphere but results from complex photochemical reactions involving organic compounds, oxides of nitrogen, and solar radiation.

The relationships between primary emissions (precursors) and secondary pollutants (O_3) tend to produce large separations spatially and temporally between the major sources and the areas of high oxidant pollution. This suggests that the meteorological transport process and the relationships between sources and sinks need to be considered in the development of the network design criteria and placement of monitoring stations, especially in measuring peak concentration levels.

The principal spatial scales for SLAMS purposes based on the monitoring objectives are neighborhood, urban, regional, and to a lesser extent, middle scale. Since ozone requires appreciable formation time, the mixing of reactants and products occurs over large volumes of air, and this reduces the importance of monitoring small scale spatial variability.

Middle Scale—Measurement in this scale would represent conditions close to sources of NO_X such as roads where it would be expected that suppression of O_3 concentrations would occur. Trees also may have a strong scavenging effect on O_3 and may tend to suppress O_3 concentrations in their immediate vicinity. Measurements at these stations would represent conditions over relatively small portions of the urban area.

Neighborhood Scale—Measurements in this category represent conditions throughout some reasonably homogeneous urban subregion, with dimensions of a few kilometers. Homogeneity refers to pollutant concentrations. Neighborhood scale data will provide valuable information for developing, testing, and revising concepts and models that describe urban/regional concentration patterns. They will be useful to the understanding and definition of processes that take periods of hours to occur and hence involve considerable mixing and transport. Under stagnation conditions, a station located in the neighborhood scale may also experience peak concentration levels within the urban areas.

Urban Scale—Measurement in this scale will be used to estimate concentrations over large portions of an urban area with dimensions of several kilometers to 50 or more kilometers. Such measurements will be used for determining trends, and designing area-wide control strategies. The urban scale stations would also be used to measure high concentrations downwind of the area having the highest precursor emissions.

Regional Scale—This scale of measurement will be used to typify concentrations over large portions of a metropolitan area and

even larger areas with dimensions of as much as hundreds of kilometers. Such measurements will be useful for assessing the ozone that is transported into an urban area. Data from such stations may be useful in accounting for the ozone that cannot be reduced by control strategies in that urban area.

The location selection procedure continues after the spatial scale is selected based on the monitoring objectives. The appropriate network design procedures as found in reference 4, should be used to evaluate the adequacy of each existing O_3 monitor and must be used to relocate an existing station or to locate any new O_3 SLAMS stations. The first step in the siting procedure would be to collect the necessary background material, which may consist of maps, emission inventories for nonmethane hydrocarbons and oxides of nitrogen (NO_X), climatological data, and existing air quality data for ozone, nonmethane hydrocarbons, and NO_2/NO.

For locating a neighborhood scale station to measure typical city concentrations, a reasonably homogeneous geographical area near the center of the region should be selected which is also removed from the influence of major NO_X sources. For an urban scale station to measure the high concentration areas, the emission inventories should be used to define the extent of the area of important nonmethane hydrocarbons and NO_X emissions. The most frequent wind speed and direction for periods of important photochemical activity should be determined. Then the prospective monitoring area should be selected in a direction from the city that is most frequently downwind during periods of photochemical activity. The distance from the station to the upwind edge of the city should be about equal to the distance traveled by air moving for 5 to 7 hours at wind speeds prevailing during periods of photochemical activity. Prospective areas for locating O_3 monitors should always be outside the area of major NO_X.

In locating a neighborhood scale station which is to measure high concentrations, the same procedures used for the urban scale are followed except that the station should be located closer to the areas bordering on the center city or slightly further downwind in an area of high density population.

For regional scale background monitoring stations, the most frequent wind associated with important photochemical activity should be determined. The prospective monitoring area should be upwind for the most frequent direction and outside the area of city influence.

Since ozone levels decrease significantly in the colder parts of the year in many areas, ozone is required to be monitored at NAMS and SLAMS monitoring sites only during the ''ozone season'' as designated in the AIRS files on a State by State basis and described below:

OZONE MONITORING SEASON BY STATE

State	Begin month	End month
Alabama	March	October.
Alaska	April	October.
Arizona	January	December.
Arkansas	March	November.
California	January	December.
Colorado	March	September.
Connecticut	April	September.
Delaware	April	October.
District of Columbia	April	October.
Florida	March	October.
Georgia	March	October.
Hawaii	January	December.
Idaho	April	October.
Illinois	April	October.
Indiana	April	September.
Iowa	April	October.
Kansas	April	October.
Kentucky	March	October.
Louisiana	January	December.
Maine	April	September.
Maryland	April	October.
Massachusetts	April	September.
Michigan	April	September.
Minnesota	April	October.
Mississippi	March	October.
Missouri	April	October.
Montana	June	September.
Nebraska	April	October.
Nevada	January	December.
New Hampshire	April	September.
New Jersey	April	October.
New Mexico	January	December.
New York	April	October.
North Carolina	April	October.
North Dakota	May	September.
Ohio	April	October.
Oklahoma	March	November.
Oregon	May	September.
Pennsylvania	April	October.
Puerto Rico	January	December.
Rhode Island	April	September.
South Carolina	April	October.
South Dakota	June	September.
Tennessee	March	October.
Texas AQCR 4,5,7,10,11	January	December
Texas AQCR 1, 2, 3, 6, 8, 9, 12.	March	October
Utah	May	September.
Vermont	April	September.
Virginia	April	October.
Washington	May	September.
West Virginia	April	October.
Wisconsin	April 15	October 15.
Wyoming	April	October.
American Samoa	January	December.
Guam	January	December.
Virgin Islands	January	December.

Additional discussion on the procedures for siting ozone stations may be found in reference 4.

2.6 Nitrogen Dioxide (NO_2) Design Criteria for SLAMS. The typical spatial scales of representativeness associated with nitrogen dioxide monitoring based on monitoring objectives are middle, neighborhood, and urban. Since nitrogen dioxide is primarily formed in

the atmosphere from the oxidation of NO, large volumes of air and mixing times usually reduce the importance of monitoring on small scale spatial variability especially for long averaging times. However, there may be some situations where NO_2 measurements would be made on the middle scale for both long- and short-term averages.

Middle Scale—Measurements on this scale would cover dimensions from about 100 meters to 0.5 kilometer. These measurements would characterize the public exposure to NO_2 in populated areas. Also monitors that are located closer to roadways than the minimum distances specified in table 3 of appendix E of this part, would be represented by measurements on this scale.

Neighborhood and Urban Scales—The same considerations as discussed in section 2.5 for O_3 would also apply to NO_2.

After the spatial scale is selected based on the monitoring objectives, then the siting procedures as found in reference 4 should be used to evaluate the adequacy of each existing NO_2 station and must be used to relocate an existing station or to locate any new NO_2 SLAMS stations. The siting procedures begin with collecting the background material. This background information may include the characteristics of the area and its sources under study, climatological data to determine where concentration maxima are most likely to be found, and any existing monitoring data for NO_2.

For neighborhood or urban scales, the emphasis in site selection will be in finding those areas where long-term averages are expected to be the highest. Nevertheless, it should be expected that the maximum NO_2 concentrations will occur in approximately the same locations as the maximum total oxides of nitrogen concentrations. The best course would be to locate the station somewhat further downwind beyond the expected point of maximum total oxides of nitrogen to allow more time for the formation of NO_2. The dilution of the emissions further downwind from the source should be considered along with the need for reaction time for NO_2 formation in locating stations to measure peak concentration. If dispersion is favorable, maximum concentrations may occur closer to the emission sources than the locations predicted from oxidation of NO to NO_2 alone. This will occur downwind of sources based on winter wind direction or in areas where there are high ozone concentrations and high density NO_2 emissions such as on the fringe of the central business district or further downwind. The distance and direction downwind would be based on ozone season wind patterns.

Once the major emissions areas and wind patterns are known, areas of potential maximum NO_2 levels can be determined. Nitrogen dioxide concentrations are likely to decline rather rapidly outside the urban area. Therefore, the best location for measuring NO_2 concentrations will be in neighborhoods near the edge of the city.

2.7 *Lead (Pb) Design Criteria for SLAMS.* Presently, less than 1 percent of the Nation's Pb air pollution emissions originate from on-road mobile source exhaust. The majority of Pb emissions come from point sources, such as metals processing facilities, waste disposal and recycling, and fuel combustion (reference 19 of this appendix). The SLAMS networks are used to assess the air quality impacts of Pb point sources, and to determine the broad population exposure from any Pb source. The most important spatial scales to effectively characterize the emissions from point sources are the micro, middle, and neighborhood scales. For purposes of establishing monitoring stations to represent large homogeneous areas other than the above scales of representativeness, urban or regional scale stations may also be needed.

Microscale—This scale would typify areas in close proximity to lead point sources. Emissions from point sources such as primary and secondary lead smelters, and primary copper smelters may under fumigation conditions likewise result in high ground level concentrations at the microscale. In the latter case, the microscale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Data collected at microscale stations provide information for evaluating and developing ''hot-spot'' control measures.

Middle Scale—This scale generally represents Pb air quality levels in areas up to several city blocks in size with dimensions on the order of approximately 100 meters to 500 meters. The middle scale may for example, include schools and playgrounds in center city areas which are close to major Pb point sources. Pb monitors in such areas are desirable because of the higher sensitivity of children to exposures of elevated Pb concentrations (reference 7 of this appendix). Emissions from point sources frequently impact on areas at which single sites may be located to measure concentrations representing middle spatial scales.

Neighborhood Scale—The neighborhood scale would characterize air quality conditions throughout some relatively uniform land use areas with dimensions in the 0.5 to 4.0 kilometer range. Stations of this scale would provide monitoring data in areas representing conditions where children live and play. Monitoring in such areas is important since this segment of the population is more susceptible to the effects of Pb. Where a neighborhood site is located away from immediate Pb sources, the site may be very useful in representing typical air quality values for a larger residential area, and therefore suitable for population exposure and trends analyses.

Urban Scale—Such stations would be used to present ambient Pb concentrations over an entire metropolitan area with dimensions in the 4 to 50 kilometer range. An urban scale station would be useful for assessing trends in citywide air quality and the effectiveness of larger scale air pollution control strategies.

Regional Scale—Measurements from these stations would characterize air quality levels over areas having dimensions of 50 to hundreds of kilometers. This large scale of representativeness, rarely used in Pb monitoring, would be most applicable to sparsely populated areas and could provide information on background air quality and inter-regional pollutant transport.

Monitoring for ambient Pb levels is required for all major urbanized areas where Pb levels have been shown or are expected to be of concern due to the proximity of Pb point source emissions. Sources emitting five tons per year or more of actual point and fugitive Pb emissions would generally be candidates for lead ambient air monitoring. Modeling may be needed to determine if a source has the potential to exceed the quarterly lead National Ambient Air Quality Standards (NAAQS). The total number and type of stations for SLAMS are not prescribed but must be determined on a case-by-case basis. As a minimum, there must be two stations in any area where Pb concentrations currently exceed or have exceeded the Pb NAAQS during any one quarter of the most recent eight quarters. Where the Pb air quality violations are widespread or the emissions density, topography, or population locations are complex and varied, there may be a need to establish more than two Pb ambient air monitoring stations. The EPA Regional Administrator may specify more than two monitoring stations if it is found that two stations are insufficient to adequately determine if the Pb standard is being attained and maintained. The Regional Administrator may also specify that stations be located in areas outside the boundaries of the urbanized areas.

Concerning the previously discussed required minimum of two stations, at least one of the stations must be a category (a) type station and the second may be either category (a) or (b) depending upon the extent of the point source's impact and the existence of residential neighborhoods surrounding the source. When the source is located in an area that is subject to NAMS requirements as in Section 3 of this Appendix, it is preferred that the NAMS site be used to describe the population's exposure and the second SLAMS site be used as a category (a) site. Both of these categories of stations are defined in section 3.

To locate monitoring stations, it will be necessary to obtain background information such as point source emissions inventories, climatological summaries, and local geographical characteristics. Such information should be used to identify areas that are most suitable to the particular monitoring objective and spatial scale of representativeness desired. References 9 & 10 of this appendix provide additional guidance on locating sites to meet specific urban area monitoring objectives and should be used in locating new stations or evaluating the adequacy of existing stations.

After locating each Pb station and, to the extent practicable, taking into consideration the collective impact of all Pb sources and surrounding physical characteristics of the siting area, a spatial scale of representativeness must be assigned to each station.

2.8 *Particulate Matter Design Criteria for SLAMS.*

As with other pollutants measured in the SLAMS network, the first step in designing the particulate matter network is to collect the necessary background information. Various studies in references 11, 12, 13, 14, 15, and 16 of section 6 of this appendix have documented the major source categories of particulate matter and their contribution to ambient levels in various locations throughout the country.

2.8.0.1 Sources of background information would be regional and traffic maps, and aerial photographs showing topography, settlements, major industries and highways. These maps and photographs would be used to identify areas of the type that are of concern to the particular monitoring objective. After potentially suitable monitoring areas for particulate matter have been identified on a map, modeling may be used to provide an estimate of particulate matter concentrations throughout the area of interest. After completing the first step, existing particulate matter stations should be evaluated to determine their potential as candidates for SLAMS designation. Stations meeting one or more of the six basic monitoring objectives described in section 1 of this appendix must be classified into one of the five scales of representativeness (micro, middle, neighborhood, urban and regional) if the stations are to become SLAMS. In siting and classifying particulate matter stations, the procedures in references 17 and 18 of section 6 of this appendix should be used.

2.8.0.2 The most important spatial scales to effectively characterize the emissions of particulate matter from both mobile and stationary sources are the middle scales for PM_{10} and neighborhood scales for both PM_{10} and $PM_{2.5}$. For purposes of establishing monitoring stations to represent large homogenous areas other than the above scales of representativeness and to characterize regional transport, urban or regional scale stations would also be needed. Most $PM_{2.5}$ monitoring in urban areas should be representative of a neighborhood scale.

2.8.0.3 Microscale—This scale would typify areas such as downtown street canyons and traffic corridors where the general public would be exposed to maximum concentrations from mobile sources. In some circumstances, the microscale is appropriate for particulate stations; core SLAMS on the microscale should, however, be limited to urban sites that are representative of long-term human exposure and of many such microenvironments in the area. In general, microscale particulate matter sites should be located near inhabited buildings or locations where the general public can be expected to be exposed to the concentration measured. Emissions from stationary sources such as primary and secondary smelters, power plants, and other large industrial processes may, under certain plume conditions, likewise result in high ground level concentrations at the microscale. In the latter case, the microscale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Data collected at microscale stations provide information for evaluating and developing hot spot control measures. Unless these sites are indicative of population-oriented monitoring, they may be more appropriately classified as SPMs.

2.8.0.4 Middle Scale—Much of the measurement of short-term public exposure to coarse fraction particles (PM_{10}) is on this scale and on the neighborhood scale; for fine particulate, much of the measurement is on the neighborhood scale. People moving through downtown areas, or living near major roadways, encounter particles that would be adequately characterized by measurements of this spatial scale. Thus, measurements of this type would be appropriate for the evaluation of possible short-term exposure public health effects of particulate matter pollution. In many situations, monitoring sites that are representative of micro-scale or middle-scale impacts are not unique and are representative of many similar situations. This can occur along traffic corridors or other locations in a residential district. In this case, one location is representative of a neighborhood of small scale sites and is appropriate for evaluation of long-term or chronic effects. This scale also includes the characteristic concentrations for other areas with dimensions of a few hundred meters such as the parking lot and feeder streets associated with shopping centers, stadia, and office buildings. In the case of PM_{10}, unpaved or seldom swept parking lots associated with these sources could be an important source in addition to the vehicular emissions themselves.

2.8.0.5 Neighborhood Scale—Measurements in this category would represent conditions throughout some reasonably homogeneous urban subregion with dimensions of a few kilometers and of generally more regular shape than the middle scale. Homogeneity refers to the particulate matter concentrations, as well as the land use and land surface characteristics. Much of the $PM_{2.5}$ exposures are expected to be associated with this scale of measurement. In some cases, a location carefully chosen to provide neighborhood scale data would represent not only the immediate neighborhood but also neighborhoods of the same type in other parts of the city. Stations of this kind provide good information about trends and compliance with standards because they often represent conditions in areas where people commonly live and work for periods comparable to those specified in the NAAQS. In general, most $PM_{2.5}$ monitoring in urban areas should have this scale. A $PM_{2.5}$ monitoring location is assumed to be representative of a neighborhood scale unless the monitor is adjacent to a recognized $PM_{2.5}$ emissions source or is otherwise demonstrated to be representative of a smaller spatial scale by an intensive monitoring study. This category also may include industrial and commercial neighborhoods especially in districts of diverse land use where residences are interspersed.

2.8.0.6 Neighborhood scale data could provide valuable information for developing, testing, and revising models that describe the larger-scale concentration patterns, especially those models relying on spatially smoothed emission fields for inputs. The neighborhood scale measurements could also be used for neighborhood comparisons within or between cities. This is the most likely scale of measurements to meet the needs of planners.

2.8.0.7 Urban Scale—This class of measurement would be made to characterize the particulate matter concentration over an entire metropolitan or rural area ranging in size from 4 to 50 km. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large scale air pollution control strategies. Core $PM_{2.5}$ SLAMS may have this scale.

2.8.0.8 Regional Scale—These measurements would characterize conditions over areas with dimensions of as much as hundreds of kilometers. As noted earlier, using representative conditions for an area implies some degree of homogeneity in that area. For this reason, regional scale measurements would be most applicable to sparsely populated areas with reasonably uniform ground cover. Data characteristics of this scale would provide information about larger scale processes of particulate matter emissions, losses and transport. Especially in the case of $PM_{2.5}$, transport contributes to particulate concentrations and may affect multiple urban and State entities with large populations such as in the Eastern United States. Development of effective pollution control strategies requires an understanding

at regional geographical scales of the emission sources and atmospheric processes that are responsible for elevated $PM_{2.5}$ levels and may also be associated with elevated ozone and regional haze.

2.8.1 *Specific Design Criteria for $PM_{2.5}$.*

2.8.1.1 Monitoring Planning Areas.

Monitoring planning areas (MPAs) shall be used to conform to the community-oriented monitoring approach used for the $PM_{2.5}$ NAAQS given in part 50 of this chapter. MPAs are required to correspond to all metropolitan statistical areas (MSAs) with population greater than 200,000, and all other areas determined to be in violation of the $PM_{2.5}$ NAAQS.[1] MPAs for other designated parts of the State are optional. All MPAs shall be defined on the basis of existing, delineated mapping data such as State boundaries, county boundaries, zip codes, census blocks, or census block groups.

2.8.1.2 $PM_{2.5}$ Monitoring Sites within the State's PM Monitoring Network Description.

2.8.1.2.1 The minimum required number, type of monitoring sites, and sampling requirements for $PM_{2.5}$ are based on monitoring planning areas described in the PM monitoring network description and proposed by the State in accordance with §58.20.

2.8.1.2.2 Comparisons to the $PM_{2.5}$ NAAQS may be based on data from SPMs in addition to SLAMS (including NAMS, core SLAMS and collocated $PM_{2.5}$ sites at PAMS), that meet the requirements of §58.13 and Appendices A, C and E of this part, that are included in the PM monitoring network description. For comparison to the annual NAAQS, the monitors should be neighborhood scale community-oriented locations. Special purpose monitors that meet part 58 requirements will be exempt from NAAQS comparisons with the $PM_{2.5}$ NAAQS for the first 2 calendar years of their operation to encourage $PM_{2.5}$ monitoring initially. After this time, however, any SPM that records a violation of the $PM_{2.5}$ NAAQS must be seriously considered as a potential SLAMS site during the annual SLAMS network review in accordance with §58.25. If such SPMs are not established as a SLAMS, the agency must document in its annual report the technical basis for excluding it as a SLAMS.

2.8.1.2.3 The health-effects data base that served as the basis for selecting the new $PM_{2.5}$ standards relied on a spatial average approach that reflects average community-oriented area-wide PM exposure levels. Under this approach, the most effective way to reduce total population risk is by lowering the annual distributions of ambient 24-hour $PM_{2.5}$ concentrations, as opposed to controlling peak 24-hour concentrations on individual days. The annual standard selected by EPA will generally be the controlling standard for lowering both short- and long-term $PM_{2.5}$ concentrations on an area-wide basis and will achieve this result. In order to be consistent with this rationale, therefore, $PM_{2.5}$ data collected from SLAMS and special purpose monitors that are representative, not of area-wide but rather, of relatively unique population-oriented microscale, or localized hot spot, or unique population-oriented middle-scale impact sites are only eligible for comparison only to the 24-hour $PM_{2.5}$ NAAQS. However, in instances where certain population-oriented micro- or middle-scale $PM_{2.5}$ monitoring sites are determined by the EPA Regional Administrator to collectively identify a larger region of localized high ambient $PM_{2.5}$ concentrations, data from these population-oriented sites would be eligible for comparison to the annual NAAQS.

2.8.1.2.4 Within each MPA, the responsible air pollution control agency shall install core SLAMS, other required SLAMS and as many $PM_{2.5}$ stations judged necessary to satisfy the SLAMS requirements and monitoring objectives of this appendix.

2.8.1.3 Core Monitoring Stations for $PM_{2.5}$.

Core monitoring stations or sites are a subset of the SLAMS network for $PM_{2.5}$ that are sited to represent community-wide air quality. These core sites include sites to be collocated at PAMS.

2.8.1.3.1 Within each monitoring planning area, the responsible air pollution control agency shall install the following core $PM_{2.5}$ SLAMS:

(a) At least two core $PM_{2.5}$ SLAMS per MSA with population greater than 500,000 sampling everyday, unless exempted by the Regional Administrator, including at least one station in a population-oriented area of expected maximum concentration and at least one station in an area of poor air quality and at least one additional core monitor collocated at a PAMS site in each PAMS area[2].

(b) At least one core $PM_{2.5}$ SLAMS per MSA with population greater than 200,000 and less than or equal to 500,000 sampling every third day.

(c) Additional core $PM_{2.5}$ SLAMS per MSA with population greater than 1 million, sampling every third day, as specified in the following table:

[1]The boundaries of MPAs do not have to necessarily correspond to those of MSAs and existing intra or interstate air pollution planning districts may be utilized.

[2]The core monitor to be collocated at a PAMS site shall not be considered a part of the PAMS as described in section 4 of this appendix, but shall instead be considered to be a component of the particular MPA $PM_{2.5}$ network.

TABLE 1—REQUIRED NUMBER OF CORE SLAMS ACCORDING TO MSA POPULATION

MSA Population	Minimum Required No. of Core Sites[1]
>1 M	3
>2 M	4
>4 M	6
>6 M	8
>8 M	10

[1]Core SLAMS at PAMS are in addition to these numbers.

2.8.1.3.2 The site situated in the area of expected maximum concentration is analogous to NAMS ''category a.'' [3] This will henceforth be termed a category a core SLAMS site. The site located in the area of poor air quality with high population density or representative of maximum population impact is analogous to NAMS, ''category b.'' This second site will be called a category b core SLAMS site.

2.8.1.3.3 Those MPAs that are substantially impacted by several different and geographically disjoint local sources of fine particulate should have separate core sites to monitor each influencing source region.

2.8.1.3.4 Within each monitoring planning area, one or more required core SLAMS may be exempted by the Regional Administrator. This may be appropriate in areas where the highest concentration is expected to occur at the same location as the area of maximum or sensitive population impact, or areas with low concentrations (e.g., highest concentrations are less than 80 percent of the NAAQS). When only one core monitor for $PM_{2.5}$ is included in a MPA or optional CMZ, however, a ''category a'' core site is strongly preferred to determine community-oriented $PM_{2.5}$ concentrations in areas of high average $PM_{2.5}$ concentration.

2.8.1.3.5 More than the minimum number of core SLAMS should be deployed as necessary in all MPAs. Except for the core SLAMS described in section 2.8.1.3.1 of this appendix, the additional core SLAMS must only comply with the minimum sampling frequency for SLAMS specified in §58.13(e).

2.8.1.3.6 A subset of the core $PM_{2.5}$ SLAMS shall be designated NAMS as discussed in section 3.7 of this appendix. The selection of core monitoring sites in relation to MPAs and CMZs is discussed further in section 2.8.3 of this appendix.

[3]The measured maximum concentrations at core population-oriented sites should be consistent with the averaging time of the NAAQS. Therefore, sites only with high concentrations for shorter averaging times (say 1-hour) should not be category ''a'' core SLAMS monitors.

2.8.1.3.7 Core monitoring sites shall represent neighborhood or larger spatial scales. A monitor that is established in the ambient air that is in or near a populated area, and meets appropriate 40 CFR part 58 criteria (i.e., meets the requirements of §58.13 and §58.14, Appendices A, C, and E of this part) can be presumed to be representative of at least a neighborhood scale, is eligible to be called a core site and shall produce data that are eligible for comparison to both the 24-hour and annual $PM_{2.5}$ NAAQS. If the site is adjacent to a dominating local source or can be shown to have average 24-hour concentrations representative of a smaller spatial scale, then the site would only be compared to the 24-hour $PM_{2.5}$ NAAQS.

2.8.1.3.8 Continuous fine particulate monitoring at core SLAMS. At least one continuous fine particulate analyzer (e.g., beta attenuation analyzer; tapered-element, oscillating microbalance (TEOM); transmissometer; nephelometer; or other acceptable continuous fine particulate monitor) shall be located at a core monitoring $PM_{2.5}$ site in each metropolitan area with a population greater than 1 million. These analyzers shall be used to provide improved temporal resolution to better understand the processes and causes of elevated $PM_{2.5}$ concentrations and to facilitate public reporting of $PM_{2.5}$ air quality and will be in accordance with appropriate methodologies and QA/QC procedures approved by the Regional Administrator.

2.8.1.4 Other $PM_{2.5}$ SLAMS Locations.

In addition to the required core sites described in section 2.8.1.3 of this appendix, the State shall also install and operate on an every third day sampling schedule at least one SLAMS to monitor for regional background and at least one SLAMS to monitor regional transport. These monitoring stations may be at a community-oriented site and their requirement may be satisfied by a corresponding SLAMS monitor in an area having similar air quality in another State. The State shall also be required to establish additional SLAMS sites based on the total population outside the MSA(s) associated with monitoring planning areas that contain required core SLAMS. There shall be one such additional SLAMS for each 200,000 people. The minimum number of SLAMS may be deployed anywhere in the State to satisfy the SLAMS monitoring objectives including monitoring of small scale impacts which may not be community-oriented or for regional transport as described in section 1 of this appendix. Other SLAMS may also be established and are encouraged in a State $PM_{2.5}$ network.

2.8.1.5 Additional $PM_{2.5}$ Analysis Requirements.

(a) Within 1 year after September 16, 1997, chemical speciation will be required at approximately 25 $PM_{2.5}$ core sites collocated at PAMS sites (1 type 2 site per PAMS area)

and at approximately 25 other core sites for a total of approximately 50 sites. The selection of these sites will be performed by the Administrator in consultation with the Regional Administrator and the States. Chemical speciation is encouraged at additional sites. At a minimum, chemical speciation to be conducted will include analysis for elements, selected anions and cations, and carbon. Samples for required speciation will be collected using appropriate monitoring methods and sampling schedule in accordance with procedures approved by the Administrator.

(b) Air pollution control agencies shall archive $PM_{2.5}$ filters from all other SLAMS sites for a minimum of one year after collection. These filters shall be made available for supplemental analyses at the request of EPA or to provide information to State and local agencies on the composition for $PM_{2.5}$. The filters shall be archived in accordance with procedures approved by the Administrator.

2.8.1.6 Community Monitoring Zones.

2.8.1.6.1 The CMZs describe areas within which two or more core monitors may be averaged for comparison with the annual $PM_{2.5}$ NAAQS. This averaging approach as specified in 40 CFR part 50, appendix N, is directly related to epidemiological studies used as the basis for the $PM_{2.5}$ NAAQS. A CMZ should characterize an area of relatively similar annual average air quality (i.e., the average concentrations at individual sites shall not exceed the spatial average by more than 20 percent) and exhibit similar day to day variability (e.g., the monitoring sites should not have low correlations, say less than 0.6). Moreover, the entire CMZ should principally be affected by the same major emission sources of $PM_{2.5}$.

2.8.1.6.2 Each monitoring planning area may have at least one CMZ, that may or may not cover the entire MPA. In metropolitan statistical areas (MSAs) for which MPAs are required, the CMZs may completely cover the entire MSA. When more than one CMZ is described within an MPA, CMZs shall not overlap in their geographical coverage. All areas in the ambient air may become a CMZ.

2.8.1.6.3. As $PM_{2.5}$ networks are first established, core sites would be used individually for making comparisons to the annual $PM_{2.5}$ NAAQS. As these networks evolve, individual monitors may not be adequate by themselves to characterize the annual average community wide air quality. This is especially true for areas with sharp gradients in annual average air quality. Therefore, CMZs with multiple core SLAMS or other eligible sites as described in accordance with section 2.8.1.2 to this appendix, may be established for the purposes of providing improved estimates of community wide air quality and for making comparisons to the annual NAAQS. This CMZ approach is subject to the constraints of section 2.8.1.6.1 to this appendix.

2.8.1.6.4 The spatial representativeness of individual monitoring sites should be considered in the design of the network and in establishing the boundaries of CMZs. Communities within the MPA with the highest $PM_{2.5}$ concentrations must have a high priority for $PM_{2.5}$ monitoring. Until a sufficient number of monitoring stations or CMZs are established, however, the monitored air quality in all parts of the MPA may not be precisely known. It would be desirable, however, to design the placement of monitors so that those portions of the MPAs without monitors could be characterized as having average concentrations less than the monitored portions of the network.

2.8.1.7 Selection of Monitoring Locations Within MPAs or CMZs.

2.8.1.7.1 Figure 1 of this appendix illustrates a hypothetical monitoring planning area and shows the location of monitors in relation to population and areas of poor air quality. Figure 2 of this appendix shows the same hypothetical MPA as Figure 1 of this appendix and illustrates potential community monitoring zones and the location of core monitoring sites within them.

2.8.1.7.2 In Figure 1 of this appendix, a hypothetical monitoring planning area is shown representing a typical Eastern US urban areas. The ellipses represent zones with relatively high population and poor air quality, respectively. Concentration isopleths are also depicted. The highest population density is indicated by the urban icons, while the area of worst air quality is presumed to be near the industrial symbols. The monitoring area should have at least one core monitor to represent community wide air quality in each sub-area affected by different emission sources. Each monitoring planning area with population greater than 500,000 is required to have at least two core population-oriented monitors that will sample everyday (with PAMS areas requiring three) and may have as many other core SLAMS, other SLAMS, and SPMs as necessary. All SLAMS should generally be population-oriented, while the SPMs can focus more on other monitoring objectives, e.g., identifying source impacts and the area boundaries with maximum concentration. C_a denotes ''category a'' core SLAMS site (community-oriented site in area of expected maximum concentration); it is shown within the populated area and closest to the area with highest concentration. C_b denotes a ''category b'' core SLAMS site (area of poor air quality with high population density or representative of maximum population impact); it is shown in the area of poor air quality, closest to highest population density. All other core SLAMS in this MPA are denoted by ''C.'' S denotes other SLAMS

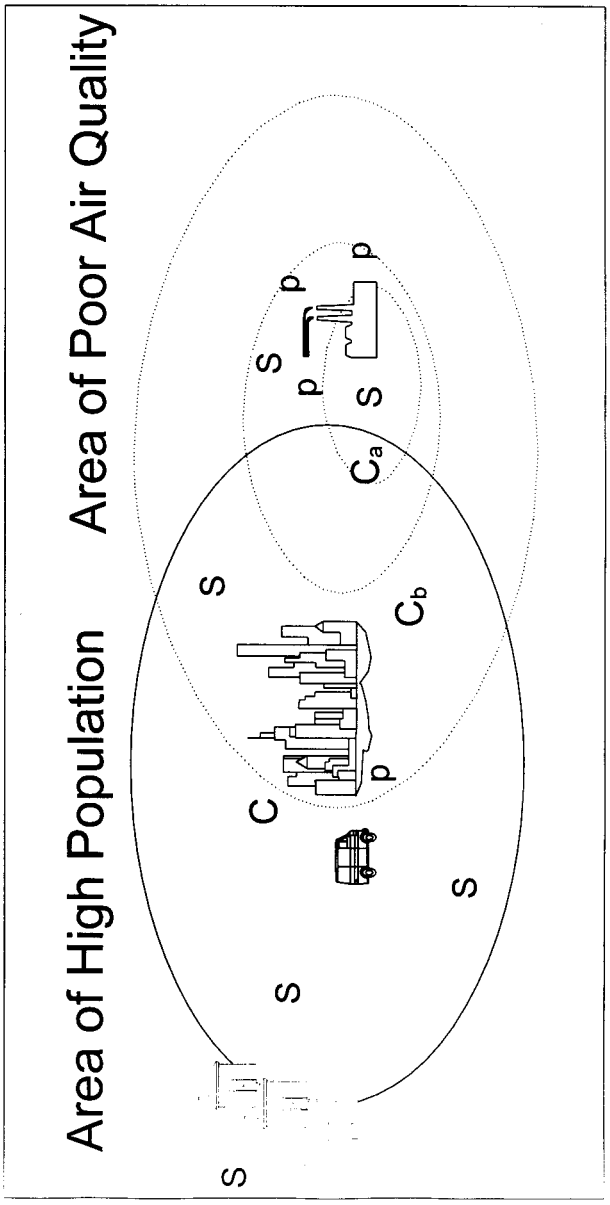
sites (monitoring for any objective: Max concentration, population exposure, source-oriented, background, or regional transport or in support of secondary NAAQS). P denotes a Special Purpose Monitor (a specialized monitor that, for example, may use a non-reference sampler). Finally, note that all SPMs would be subject to the 2-year moratorium against data comparison to the NAAQS for the first 2 complete calendar years of its operation.

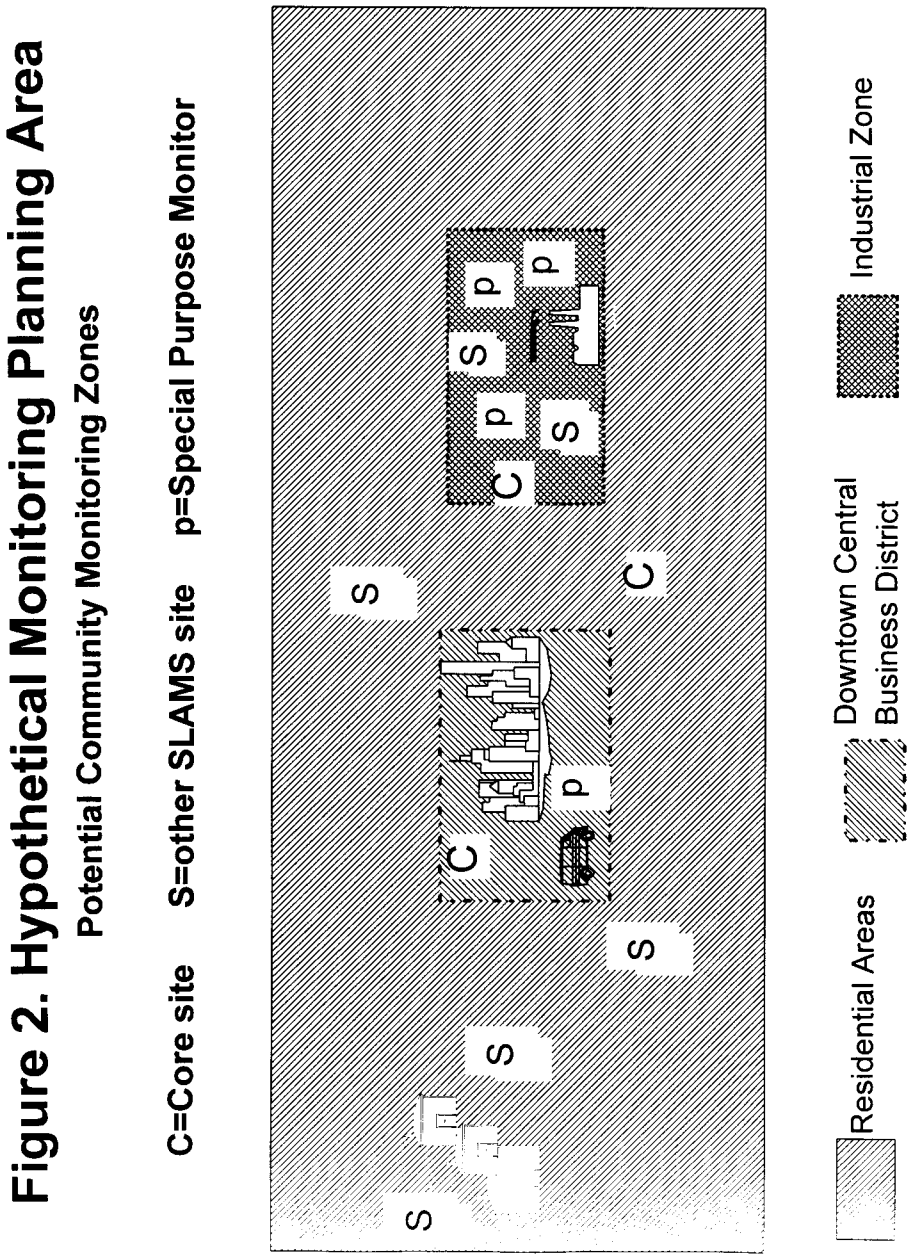
2.8.1.7.3 A Monitoring Planning Area may have one or more community monitoring zones (CMZ) for aggregation of data from eligible SLAMS and SPM sites for comparison to the annual NAAQS. The planning area has large gradients of average air quality and, as shown in Figure 2 may be assigned three CMZs: An industrial zone, a downtown central business district (CBD), and a residential area. (If there is not a large difference between downtown concentrations and other residential areas, a separate CBD zone would not be appropriate).

Figure 1. Hypothetical Monitoring Planning Area

Eastern Urban Model - showing location of monitors in relation to population and area of poor air quality

C=Core site S=other SLAMS site p=Special Purpose Monitor



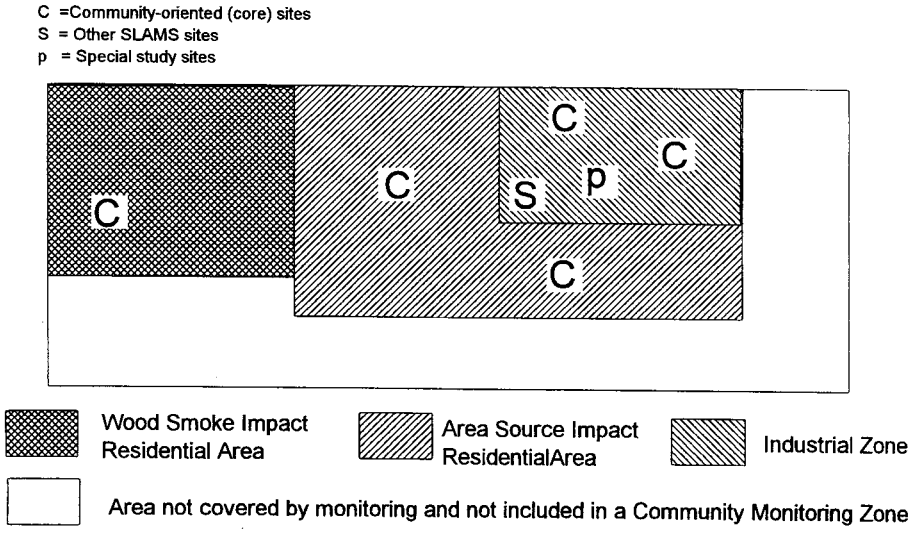


2.8.1.7.4 Figure 3 of this appendix illustrates how CMZs and $PM_{2.5}$ monitors might be located in a hypothetical MPA typical of a Western State. Western States with more localized sources of PM and larger geographic area could require a different mix of SLAMS and SPM monitors and may need

more total monitors. As the networks are deployed, the available monitors may not be sufficient to completely represent all geographic portions of the Monitoring Planning Area. Due to the distribution of pollution and population and because of the number and spatial representativeness of monitors, the MPAs and CMZs may not cover the entire State.

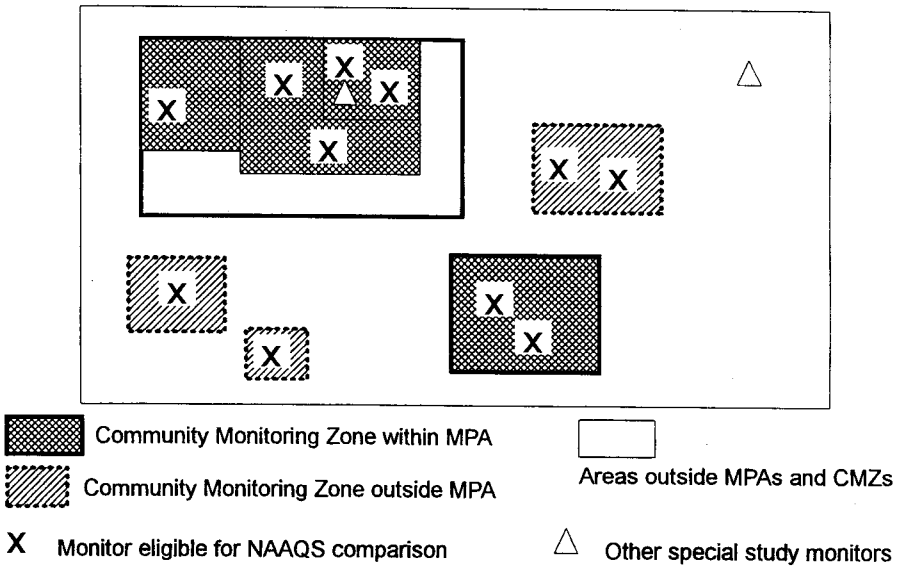
Figure 3. Hypothetical Monitoring Planning Area

Potential Community Monitoring Zones in Western MPA



2.8.1.7.5 Figure 4 of this appendix shows how the MPAs, CMZs, and $PM_{2.5}$ monitors might be distributed within a hypothetical State. Areas of the State included within MPAs are shown within heavy solid lines. Two MPAs are illustrated. Areas in the State outside the MPAs will also include monitors, but this monitoring coverage may be limited. This portion of the State may also be represented by CMZs (shown by areas enclosed within dotted lines). The monitors that are intended for comparison to the NAAQS are indicated by X. Furthermore, eligible monitors within a CMZ could be averaged for comparison to the annual NAAQS or examined individually for comparison to both NAAQS. Both within the MPAs and in the remainder of the State, some special study monitors might not satisfy applicable 40 CFR part 58 requirements and will not be eligible for comparison to the NAAQS.

Figure 4. MPAs and CMZs in Hypothetical State



2.8.2 *Substitute PM Monitoring Sites.*

2.8.2.1 Section 2.2 of appendix C of this part describes conditions under which TSP samplers can be used as substitutes for PM_{10}. This provision is intended to be used when PM_{10} concentrations are expected to be very low and substitute TSP samplers can be used to satisfy the minimum number of PM_{10} samplers needed for an adequate PM_{10} network.

2.8.2.2 If data produced by substitute PM samplers exceed the concentration levels described in appendix C of this part, then the need for this sampler to be converted to a PM_{10} or $PM_{2.5}$ sampler, shall be considered in the PM monitoring network review. If the State does not believe that a PM_{10} or $PM_{2.5}$ sampler should be sited, the State shall submit documentation to EPA as part of its annual PM report to justify this decision. If a PM site is not designated as a substitute site in the PM monitoring network description, then high concentrations at this site would not necessarily cause this site to become a $PM_{2.5}$ or PM_{10} site, whichever is indicated.

2.8.2.3 Consistent with §58.1, combinations of SLAMS PM_{10} or $PM_{2.5}$ monitors and other monitors may occupy the same structure without any mutual effect on the regulatory definition of the monitors.

3. *Network Design for National Air Monitoring Stations (NAMS)*

The NAMS must be stations selected from the SLAMS network with emphasis given to urban and multisource areas. Areas to be monitored must be selected based on urbanized population and pollutant concentration levels. Generally, a larger number of NAMS are needed in more polluted urban and multisource areas. The network design criteria discussed below reflect these concepts. However, it should be emphasized that deviations from the NAMS network design criteria may be necessary in a few cases. Thus, these design criteria are not a set of rigid rules but rather a guide for achieving a proper distribution of monitoring sites on a national scale.

The primary objective for NAMS is to monitor in the areas where the pollutant concentration and the population exposure are expected to be the highest consistent with the averaging time of the NAAQS. Accordingly, the NAMS fall into two categories:

Category (a): Stations located in area(s) of expected maximum concentrations, generally microscale for CO, microscale or middle scale for Pb, middle scale or neighborhood scale for population-oriented particulate matter, urban or regional scale for Regional transport $PM_{2.5}$, neighborhood scale for SO2, and NO2, and urban scale for O_3.

Category (b): Stations which combine poor air quality with a high population density but not necessarily located in an area of expected maximum concentrations (neighborhood scale, except urban scale for NO_2). Category (b) monitors would generally be representative of larger spatial scales than category (a) monitors.

For each urban area where NAMS are required, both categories of monitoring stations must be established. In the case of Pb and SO_2 if only one NAMS is needed, then category (a) must be used. The analysis and interpretation of data from NAMS should consider the distinction between these types of stations as appropriate.

For each MSA where NAMS are required, both categories of monitoring stations must be established. In the case of SO_2 if only one NAMS is needed, then category (a) must be used. The analysis and interpretation of data from NAMS should consider the distinction between these types of stations as appropriate.

The concept of NAMS is designed to provide data for national policy analyses/trends and for reporting to the public on major metropolitan areas. It is not the intent to monitor in every area where the NAAQS are violated. On the other hand, the data from SLAMS should be used primarily for nonattainment decisions/ analyses in specific geographical areas. Since the NAMS are stations from the SLAMS network, station locating procedures for NAMS are part of the SLAMS network design process.

3.1 [Reserved]

3.2 Sulfur Dioxide (SO_2) Design Criteria for NAMS. It is desirable to have a greater number of NAMS in the more polluted and densely populated urban and multisource areas. The data in table 3 show the approximate number of permanent stations needed in urban areas to characterize the national and regional SO_2 air quality trends and geographical patterns. These criteria require that the number of NAMS in areas where urban populations exceed 1,000,000 and concentrations also exceed the primary NAAQS may range from 6 to 10 and that in areas where the SO_2 problem is minor, only one or two (or no) monitors are required. For those cases where more than one station is required for an urban area, there should be at least one station for category (a) and category (b) objectives as discussed in section 3. Where three or more stations are required, the mix of category (a) and (b) stations is determined on a case-by-case basis. The actual number and location of the NAMS must be determined by EPA Regional Offices and the State Agency, subject to the approval of EPA Headquarters, Office of Air Quality Planning and Standards (OAQPS).

TABLE 3—SO_2 NATIONAL AIR MONITORING STATION CRITERIA

[Approximate number of stations per area] [a]

Population category	High concentration [b]	Medium concentration [c]	Low concentration [d]
>1,000,000	6–10	4–8	2–4
500,000 to 1,000,000	4–8	2–4	1–2
250,000 to 500,000	3–4	1–2	0–1
100,000 to 250,000	1–2	0–1	0

[a] Selection of urban areas and actual number of stations per area will be jointly determined by EPA and the State agency.
[b] High concentration—exceeding level of the primary NAAQS.
[c] Medium concentration—exceeding 60 percent of the level of the primary or 100% of the secondary NAAQS.
[d] Low concentration—less than 60 percent of the level of the primary or 100% of the secondary NAAQS.

The estimated number of SO_2 NAMS which would be required nationwide ranges from approximately 200 to 300. This number of NAMS SO_2 monitors is sufficient for national trend purposes due to the low background SO_2 levels, and the fact that air quality is very sensitive to SO_2 emission changes. The actual number of stations in any specific area depends on local factors such as meteorology, topography, urban and regional air quality gradients, and the potential for significant air quality improvements or degradation. The greatest density of stations should be where urban populations are large and where pollution levels are high. Fewer NAMS are necessary in the western States since concentrations are seldom above the NAAQS in their urban areas. Exceptions to this are in the areas where an expected shortage of clean fuels indicates that ambient air quality may be degraded by increased SO_2 emissions. In such cases, a minimum number of NAMS is required to provide EPA with a proper national perspective on significant changes in air quality.

Like TSP, the worst air quality in an urban area is to be used as the basis for determining the required number of SO_2 NAMS (see table 3). This includes SO_2 air quality levels within populated parts of urbanized areas, that are affected by one or two point sources of SO_2 if the impact of the source(s) extends over a reasonably broad geographic scale (neighborhood or larger). Maximum SO_2 air quality levels in remote unpopulated areas should be excluded as a basis for selecting NAMS regardless of the sources affecting the concentration levels. Such remote areas are more appropriately monitored by SLAMS or SPM networks and/or characterized by diffusion model calculations as necessary.

3.3 Carbon Monoxide (CO) Design Criteria for NAMS. Information is needed on ambient CO levels in major urbanized areas where CO levels have been shown or inferred to be a significant concern. At the national level, EPA will not routinely require data from as

many stations as are required for PM–10, and perhaps SO_2, since CO trend stations are principally needed to assess the overall air quality progress resulting from the emission controls required by the Federal motor vehicle control program (FMVCP) and other local controls.

Although State and local air programs may require extensive monitoring to document and measure the local impacts of CO emissions and emission controls, an adequate national perspective is possible with as few as two stations per major urban area. The two categories for which CO NAMS would be required are: (a) Peak concentration areas such as are found around major traffic arteries and near heavily traveled streets in downtown areas (micro scale); and (b) neighborhoods where concentration exposures are significant (middle scale, neighborhood scale).

The peak concentration station (micro scale) is usually found near heavily traveled downtown streets (street canyons), but could be found along major arterials (corridors), either near intersections or at low elevations which are influenced by downslope drainage patterns under low inversion conditions. The peak concentration station should be located so that it is representative of several similar source configurations in the urban area, where the general population has access. Thus, it should reflect one of many potential peak situations which occur throughout the urban area. It is recognized that this does not measure air quality which represents large geographical areas. Thus, a second type of station on the neighborhood scale is necessary to provide data representative of the high concentration levels which exist over large geographical areas.

The category (b) (middle scale or neighborhood scale) should be located in areas with a stable, high population density, projected continuity of neighborhood character, and high traffic density. The stations should be located where no major zoning changes, new highways, or new shopping centers are being considered. The station should be where a significant CO pollution problem exists, but not be unduly influenced by any one line source. Rather, it should be more representative of the overall effect of the sources in a significant portion of the urban area.

Because CO is generally associated with heavy traffic and population clusters, an urbanized area with a population greater than 500,000 is the principal critertion for identifying the urban areas for which pairs of NAMS for this pollutant will be required. The criterion is based on judgment that stations in urban areas with greater than 500,000 population would provide sufficient data for national analysis and national reporting to Congress and the public. Also, it has generally been shown that major CO problems are found in areas greater than 500,000 population.

3.4 Ozone (O_3) Design Criteria for NAMS. The criterion for selecting locations for ozone NAMS is any urbanized area having a population of more than 200,000. This population cut off is used since the sources of hydrocarbons are both mobile and stationary and are more diverse. Also, because of local and national control strategies and the complex chemical process of ozone formation and transport, more sampling stations than for CO are needed on a national scale to better understand the ozone problem. This selection criterion is based entirely on population and will include those relatively highly populated areas where most of the oxidant precursors originate.

Each urban area will generally require only two ozone NAMS, One station would be representative of maximum ozone concentrations (category (a), urban scale) under the wind transport conditions as discussed in section 2.5. The exact location should balance local factors affecting transport and buildup of peak O_3 levels with the need to represent population exposure. The second station (category (b), neighborhood scale), should be representative of high density population areas on the fringes of the central business district along the predominant summer/fall daytime wind direction. This latter station should measure peak O_3 levels under light and variable or stagnant wind conditions. Two ozone NAMS stations will be sufficient in most urban areas since spatial gradients for ozone generally are not as sharp as for other criteria pollutants.

3.5 Nitrogen Dioxide (NO_2) Criteria for NAMS. Nitrogen dioxide NAMS will be required in those areas of the country which have a population greater than 1,000,000. These areas will have two NO_2 NAMS. It is felt that stations in these major metropolitan areas would provide sufficient data for a national analysis of the data, and also because NO_2 problems occur in areas of greater than 1,000,000 population.

Within urban areas requiring NAMS, two permanent monitors are sufficient. The first station (category (a), middle scale or neighborhood scale) would be to measure the photochemical production of NO_2 and would best be located in that part of the urban area where the emission density of NO_X is the highest. The second station (category (b) urban scale), would be to measure the NO_2 produced from the reaction of NO with O_3 and should be downwind of the area of peak NO_X emission areas.

3.6 *Lead (Pb) Design Criteria for NAMS.* In order to achieve the national monitoring objective, one NAMS site must be located in one of the two cities with the greatest population in the following ten regions of the country (the choice of which of the two metropolitan areas should have the lead NAMS

requirement is made by the Administrator or the Administrator's designee using the recommendation of the Regional Administrators or the Regional Administrators' designee):

TABLE 1—EPA REGIONS & TWO CURRENT LARGEST MSA/CMSAS (USING 1995 CENSUS DATA)

Region (States)	Two Largest MSA/CMSAs
I (Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont).	Boston-Worcester-Lawrence CMSA, Hartford, CT MSA.
II (New Jersey, New York, Puerto Rico, U.S. Virgin Islands)	New York-Northern New Jersey-Long Island, CMSA, San Juan-Caguas-Arecibo, PR CMSA.
III (Delaware, Maryland, Pennsylvania, Virginia, West Virginia, Washington, DC).	Washington-Baltimore CMSA, Philadelphia-Wilmington-Atlantic City CMSA.
IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee).	Miami-Fort Lauderdale CMSA, Atlanta, GA MSA.
V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)	Chicago-Gary-Kenosha CMSA, Detroit-Ann Arbor-Flint CMSA.
VI (Arkansas, Louisiana, New Mexico, Oklahoma, Texas)	Dallas-Fort Worth CMSA, Houston-Galveston-Brazoria CMSA.
VII (Iowa, Kansas, Missouri, Nebraska)	St. Louis MSA, Kansas City MSA.
VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming).	Denver-Boulder-Greeley CMSA, Salt Lake City-Ogden MSA.
IX (American Samoa, Arizona, California, Guam, Hawaii, Nevada).	Los Angeles-Riverside-Orange County CMSA, San Francisco-Oakland-San Jose CMSA.
X (Alaska, Idaho, Oregon, Washington)	Seattle-Tacoma-Bremerton CMSA, Portland-Salem CMSA.

In addition, one NAMS site must be located in each of the MSA/CMSAs where one or more violations of the quarterly Pb NAAQS have been recorded over the previous eight quarters. If a violation of the quarterly Pb NAAQS is measured at a monitoring site outside of a MSA/CMSA, one NAMS site must be located within the county in a populated area, apart from the Pb source, to assess area wide Pb air pollution levels. These NAMS sites should represent the maximum Pb concentrations measured within the MSA/CMSA, city, or county that is not directly affected from a single Pb point source. Further, in order that on-road mobile source emissions may continue to be verified as not contributing to lead NAAQS violations, roadside ambient lead monitors should be considered as viable NAMS site candidates. A NAMS site may be a microscale or middle scale category (a) station, located adjacent to a major roadway (e.g., >30,000 ADT), or a neighborhood scale category (b) station that is located in a highly populated residential section of the MSA/CMSA or county where the traffic density is high. Data from these sites will be used to assess general conditions for large MSA/CMSAs and other populated areas as a marker for national trends, and to confirm continued attainment of the Pb NAAQS. In some cases, the MSA/CMSA subject to the latter lead NAMS requirement due to a violating point source will be the same MSA/CMSA subject to the lead NAMS requirement based upon its population. For these situations, the total minimum number of required lead NAMS is one.

3.7 *Particulate Matter Design Criteria for NAMS.*

3.7.1 Table 4 indicates the approximate number of permanent stations required in MSAs to characterize national and regional PM_{10} air quality trends and geographical patterns. The number of PM_{10} stations in areas where MSA populations exceed 1,000,000 must be in the range from 2 to 10 stations, while in low population urban areas, no more than two stations are required. A range of monitoring stations is specified in table 4 because sources of pollutants and local control efforts can vary from one part of the country to another and therefore, some flexibility is allowed in selecting the actual number of stations in any one locale.

3.7.2 Through promulgation of the NAAQS for $PM_{2.5}$, the number of PM_{10} SLAMS is expected to decrease, but requirements to maintain PM_{10} NAMS remain in effect. The PM_{10} NAMS are retained to provide trends data, to support national assessments and decisions, and in some cases to continue demonstration that a NAAQS for PM_{10} is maintained as a requirement under a State Implementation Plan.

3.7.3 The $PM_{2.5}$ NAMS shall be a subset of the core $PM_{2.5}$ SLAMS and other SLAMS intended to monitor for regional transport. The $PM_{2.5}$ NAMS are planned as long-term monitoring stations concentrated in metropolitan areas. A target range of 200 to 300 stations shall be designated nationwide. The largest metropolitan areas (those with a population greater than approximately one million) shall have at least one $PM_{2.5}$ NAMS stations.

3.7.4 The number of total $PM_{2.5}$ NAMS per Region will be based on recommendations of the EPA Regional Offices, in concert with their State and local agencies, in accordance with the network design goals described in sections 3.7.5 through 3.7.7 of this appendix. The selected stations should represent the range of conditions occurring in the Regions

and will consider factors such as total number or type of sources, ambient concentrations of particulate matter, and regional transport.

3.7.5 The approach for $PM_{2.5}$ NAMS is intended to give State and local agencies maximum flexibility while apportioning a limited national network. By advancing a range of monitors per Region, EPA intends to balance the national network with respect to geographic area and population. Table 5 presents the target number of $PM_{2.5}$ NAMS per Region to meet the national goal of 200 to 300 stations. These numbers consider a variety of factors such as Regional differences in metropolitan population, population density, land area, sources of particulate emissions, and the numbers of PM_{10} NAMS.

3.7.6 States will be required to establish approximately 50 NAMS sites for routine chemical speciation of $PM_{2.5}$. These sites will include those collocated at approximately 25 PAMS sites and approximately 25 other core SLAMS sites to be selected by the Administrator. After 5 years of data collection, the Administrator may exempt some sites from collecting speciated data. The number of NAMS sites at which speciation will be performed each year and the number of samples per year will be determined by the Administrator.

3.7.7 Since emissions associated with the operation of motor vehicles contribute to urban area particulate matter levels, consideration of the impact of these sources must be included in the design of the NAMS network, particularly in MSAs greater than 500,000 population. In certain urban areas particulate emissions from motor vehicle diesel exhaust currently is or is expected to be a significant source of particulate matter ambient levels. The actual number of NAMS and their locations must be determined by EPA Regional Offices and the State agencies, subject to the approval of the Administrator as required by §58.32. The Administrator's approval is necessary to ensure that individual stations conform to the NAMS selection criteria and that the network as a whole is sufficient in terms of number and location for purposes of national analyses.

TABLE 4—PM_{10} NATIONAL AIR MONITORING STATION CRITERIA

[Approximate Number of Stations per MSA] [1]

Population Category	High Concentration [2]	Medium Concentration [3]	Low Concentration [4]
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

[1] Selection of urban areas and actual number of stations per area will be jointly determined by EPA and the State agency.

[2] High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding either PM_{10} NAAQS by 20 percent or more.

[3] Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS.

[4] Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.

3.7.7.1 Selection of urban areas and actual number of stations per area will be jointly determined by EPA and the State agency.

3.7.7.2 High concentration areas are those for which: Ambient PM_{10} data show ambient concentrations exceeding either PM_{10} NAAQS by 20 percent or more.

3.7.7.3 Medium concentration areas are those for which: Ambient PM_{10} data show ambient concentrations exceeding either 80 percent of the PM_{10} NAAQS.

3.7.7.4 Low concentration areas are those for which: Ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.

TABLE 5—GOALS FOR NUMBER OF $PM_{2.5}$ NAMS BY REGION

EPA Region	Number of NAMS [1]	Percent of National Total
1	15 to 20	6 to 8
2	20 to 30	8 to 12
3	20 to 25	8 to 10
4	35 to 50	14 to 20
5	35 to 50	14 to 20
6	25 to 35	10 to 14
7	10 to 15	4 to 6
8	10 to 15	4 to 6
9	25 to 40	10 to 16
10	10 to 15	4 to 6
Total	205–295	100

[1] Each region will have one to three NAMS having the monitoring of regional transport as a primary objective.

4. *Network Design for Photochemical Assessment Monitoring Stations (PAMS)*

In order to obtain more comprehensive and representative data on O_3 air pollution, the 1990 Clean Air Act Amendments require enhanced monitoring for ozone (O_3), oxides of nitrogen (NO, NO_2, and NO_X), and monitoring for VOC in O_3 nonattainment areas classified as serious, severe, or extreme. This will be accomplished through the establishment of a network of Photochemical Assessment Monitoring Stations (PAMS).

4.1 PAMS Data Uses. Data from the PAMS are intended to satisfy several coincident needs related to attainment of the National Ambient Air Quality Standards (NAAQS), SIP control strategy development and evaluation, corroboration of emissions tracking, preparation of trends appraisals, and exposure assessment.

(a) *NAAQS attainment and control strategy development.* Like SLAMS and NAMS data, PAMS data will be used for monitoring O_3 exceedances and providing input for attainment/nonattainment decisions. In addition,

PAMS data will help resolve the roles of transported and locally emitted O_3 precursors in producing an observed exceedance and may be utilized to identify specific sources emitting excessive concentrations of O_3 precursors and potentially contributing to observed exceedances of the O_3 NAAQS. The PAMS data will enhance the characterization of O_3 concentrations and provide critical information on the precursors which cause O_3, therefore extending the database available for future attainment demonstrations. These demonstrations will be based on photochemical grid modeling and other approved analytical methods and will provide a basis for prospective mid-course control strategy corrections. PAMS data will provide information concerning (1) which areas and episodes to model to develop appropriate control strategies; (2) boundary conditions required by the models to produce quantifiable estimates of needed emissions reductions; and (3) the evaluation of the predictive capability of the models used.

(b) *SIP control strategy evaluation.* The PAMS will provide data for SIP control strategy evaluation. Long-term PAMS data will be used to evaluate the effectiveness of these control strategies. Data may be used to evaluate the impact of VOC and NO_X emission reductions on air quality levels for O_3 if data is reviewed following the time period during which control measures were implemented. Speciation of measured VOC data will allow determination of which organic species are most affected by the emissions reductions and assist in developing cost-effective, selective VOC reductions and control strategies. A State or local air pollution control agency can therefore ensure that strategies which are implemented in their particular nonattainment area are those which are best suited for that area and achieve the most effective emissions reductions (and therefore largest impact) at the least cost.

(c) *Emissions tracking.* PAMS data will be used to corroborate the quality of VOC and NO_X emission inventories. Although a perfect mathematical relationship between emission inventories and ambient measurements does not yet exist, a qualitative assessment of the relative contributions of various compounds to the ambient air can be roughly compared to current emission inventory estimates to evaluate the accuracy of the emission inventories. In addition, PAMS data which are gathered year round will allow tracking of VOC and NO_X emission reductions, provide additional information necessary to support Reasonable Further Progress (RFP) calculations, and corroborate emissions trends analyses. While the regulatory assessments of progress will be made in terms of emission inventory estimates, the ambient data can provide independent trends analyses and corroboration of these assessments which either verify or highlight possible errors in emissions trends indicated by inventories. The ambient assessments, using speciated data, can gauge the accuracy of estimated changes in emissions. The speciated data can also be used to assess the quality of the VOC speciated and NO_X emission inventories for input during photochemical grid modeling exercises and identify potential urban air toxic pollutant problems which deserve closer scrutiny.

The speciated VOC data will be used to determine changes in the species profile, resulting from the emission control program, particularly those resulting from the reformulation of fuels.

(d) *Trends.* Long-term PAMS data will be used to establish speciated VOC, NO_X, and limited toxic air pollutant trends, and supplement the O_3 trends database. Multiple statistical indicators will be tracked, including O_3 and its precursors during the events encompassing the days during each year with the highest O_3 concentrations, the seasonal means for these pollutants, and the annual means at representative locations.

The more PAMS that are established in and near nonattainment areas, the more effective the trends data will become. As the spatial distribution and number of O_3 and O_3 precursor monitors improves, trends analyses will be less influenced by instrument or site location anomalies. The requirement that surface meteorological monitoring be established at each PAMS will help maximize the utility of these trends analyses by comparisons with meteorological trends, and transport influences. The meteorological data can also help interpret the ambient air pollution trends by taking meteorological factors into account.

(e) *Exposure assessment.* PAMS data will be used to better characterize O_3 and toxic air pollutant exposure to populations living in serious, severe, or extreme areas. Annual mean toxic air pollutant concentrations will be calculated to help estimate the average risk to the population associated with individual VOC species, which are considered toxic, in urban environments.

4.2 PAMS Monitoring Objectives. Unlike the SLAMS and NAMS design criteria which are pollutant specific, PAMS design criteria are site specific. Concurrent measurements of O_3, NO_X, speciated VOC, and meteorology are obtained at PAMS. Design criteria for the PAMS network are based on selection of an array of site locations relative to O_3 precursor source areas and predominant wind directions associated with high O_3 events. Specific monitoring objectives are associated with each location. The overall design should enable characterization of precursor emission sources within the area, transport of O_3 and its precursors into and out of the area, and the photochemical processes related to O_3 nonattainment, as well as developing an

initial, though limited, urban air toxic pollutant database. Specific objectives that must be addressed include assessing ambient trends in O_3, NO, NO_2, NO_X, VOC (including carbonyls), and VOC species, determining spatial and diurnal variability of O_3, NO, NO_2, NO_X, and VOC species and assessing changes in the VOC species profiles that occur over time, particularly those occurring due to the reformulation of fuels. A maximum of five PAMS sites are required in an affected nonattainment area depending on the population of the Metropolitan Statistical Area/Consolidated Metropolitan Statistical Area (MSA/CMSA) or nonattainment area, whichever is larger. Specific monitoring objectives associated with each of these sites result in four distinct site types. Note that detailed guidance for the locating of these sites may be found in reference 19.

Type (1) sites are established to characterize upwind background and transported O_3 and its precursor concentrations entering the area and will identify those areas which are subjected to overwhelming transport. Type (1) sites are located in the predominant morning upwind direction from the local area of maximum precursor emissions during the O_3 season and at a distance sufficient to obtain urban scale measurements as defined in section 1 of this appendix. Typically, type (1) sites will be located near the edge of the photochemical grid model domain in the predominant morning upwind direction from the city limits or fringe of the urbanized area. Depending on the boundaries and size of the nonattainment area and the orientation of the grid, this site may be located outside of the nonattainment area. The appropriate predominant morning wind direction should be determined from historical wind data occurring during the period 7 a.m. to 10 a.m. on high O_3 days or on those days which exhibit the potential for producing high O_3 levels, i.e., O_3-conducive days as described in reference 25. Alternate schemes for specifying this morning wind direction may be submitted as a part of the network description required by §§58.40 and 58.41. Data measured at type (1) sites will be used principally for the following purposes:

- Future development and evaluation of control strategies,
- Identification of incoming pollutants,
- Corroboration of NO_X and VOC emission inventories,
- Establishment of boundary conditions for future photochemical grid modeling and mid-course control strategy changes, and
- Development of incoming pollutant trends.

Type (2) sites are established to monitor the magnitude and type of precursor emissions in the area where maximum precursor emissions are expected to impact and are suited for the monitoring of urban air toxic pollutants. Type (2) sites are located immediately downwind of the area of maximum precursor emissions and are typically placed near the downwind boundary of the central business district to obtain neighborhood scale measurements. The appropriate downwind direction should be obtained similarly to that for type (1) sites. Additionally, a second type (2) site may be required depending on the size of the area, and should be placed in the second-most predominant morning wind direction as noted previously. Data measured at type (2) sites will be used principally for the following purposes:

- Development and evaluation of imminent and future control strategies,
- Corroboration of NO_X and VOC emission inventories,
- Augmentation of RFP tracking,
- Verification of photochemical grid model performance,
- Characterization of O_3 and toxic air pollutant exposures (appropriate site for measuring toxic emissions impact),
- Development of pollutant trends, particularly toxic air pollutants and annual ambient speciated VOC trends to compare with trends in annual VOC emission estimates, and
- Determination of attainment with the NAAQS for NO_2 and O_3.

Type (3) sites are intended to monitor maximum O_3 concentrations occurring downwind from the area of maximum precursor emissions. Locations for type (3) sites should be chosen so that urban scale measurements are obtained. Typically, type (3) sites will be located 10 to 30 miles downwind from the fringe of the urban area. The downwind direction should also be determined from historical wind data, but should be identified as those afternoon winds occurring during the period 1 p.m. to 4 p.m. on high O_3 days or on those days which exhibit the potential for producing high O_3 levels. Alternate schemes for specifying this afternoon wind direction may also be submitted as a part of the network description required by §§58.40 and 58.41. Data measured at type (3) sites will be used principally for the following purposes:

- Determination of attainment with the NAAQS for O_3 (this site may coincide with an existing maximum concentration O_3 monitoring site),
- Evaluation of future photochemical grid modeling applications,
- Future development and evaluation of control strategies,
- Development of pollutant trends, and
- Characterization of O_3 pollutant exposures.

Type (4) sites are established to characterize the extreme downwind transported O_3 and its precursor concentrations exiting the area and will identify those areas which are potentially contributing to overwhelming transport in other areas. Type (4) sites are

located in the predominant afternoon downwind direction, as determined for the type (3) site, from the local area of maximum precursor emissions during the O_3 season and at a distance sufficient to obtain urban scale measurements as defined elsewhere in this appendix. Typically, type (4) sites will be located near the downwind edge of the photochemical grid model domain. Alternate schemes for specifying the location of this site may be submitted as a part of the network description required by §§58.40 and 58.41. Data measured at type (4) sites will be used principally for the following purposes:

• Development and evaluation of O_3 control strategies,

• Identification of emissions and photochemical products leaving the area,

• Establishment of boundary conditions for photochemical grid modeling,

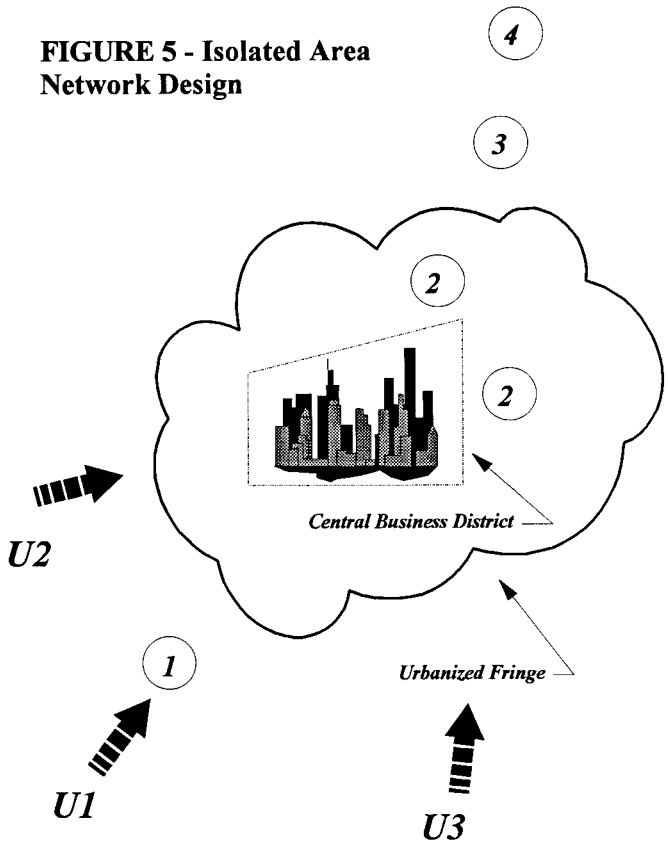
• Development of pollutant trends,

• Background and upwind information for other downwind areas, and

• Evaluation of photochemical grid model performance.

States choosing to submit an individual network description for each affected nonattainment area, irrespective of its proximity to other affected areas, must fulfill the requirements for isolated areas as described in section 4 of this appendix, as an example, and illustrated by Figure 5. States containing areas which experience significant impact from long-range transport or are proximate to other nonattainment areas (even in other States) should collectively submit a network description which contains alternative sites to those that would be required for an isolated area. Such a submittal should, as a guide, be based on the example provided in Figure 6, but must include a demonstration that the design satisfies the monitoring data uses and fulfills the PAMS monitoring objectives described in sections 4.1 and 4.2 of this appendix.

FIGURE 5 - Isolated Area Network Design



LEGEND:

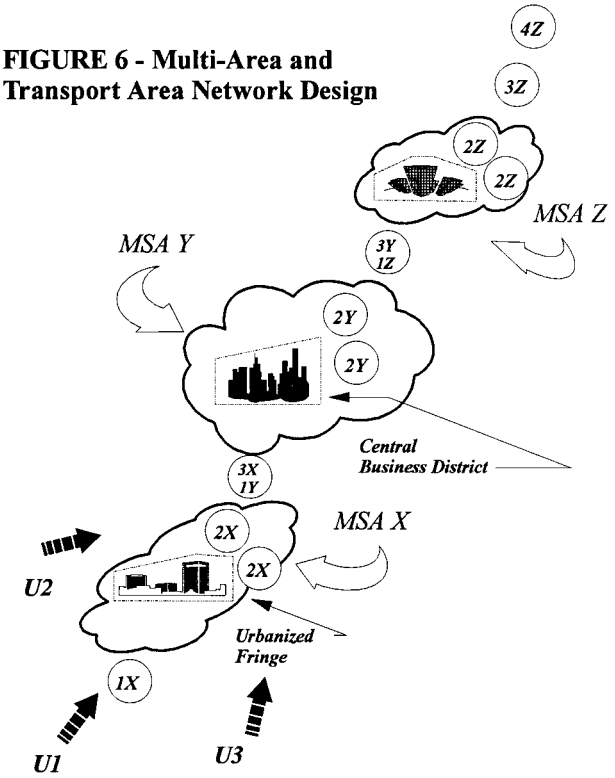
(1) - A circle denotes a PAMS Site. The number inside describes the Site number.

U1 - High ozone day predominant morning wind direction

U2 - Second most predominant high ozone day morning wind direction

U3 - High ozone day predominant afternoon wind direction

FIGURE 6 - Multi-Area and Transport Area Network Design



LEGEND:

(1X) - A circle denotes a PAMS Site. The number inside describes the Site number and the letter indicates the associated MSA/CMSA, e.g., a circle with 1X indicates a Site #1 for MSA X. Since PAMS can serve multiple purposes for more than one MSA/CMSA, Sites with mutiple associations are identified with multiple number and letter identifiers.

U1 - High ozone day predominant morning wind direction

U2 - Second most predominant high ozone day morning wind direction

U3 - High ozone day predominant afternoon wind direction

Alternative PAMS network designs should, on a site-by-site basis, provide those data necessary to enhance the attainment/non-attainment database for criteria pollutants and explain the origins of overwhelming O_3 transport. The alternative PAMS data should be usable for the corroboration and verification of O_3 precursor emissions inventories and should comprise a qualitative (if not quantitative) measure of the accuracy of RFP calculations. The data should be sufficient to evaluate the effectiveness of the implemented O_3 control strategies and should provide data necessary to establish photochemical grid modeling boundary conditions and necessary inputs including appropriate meteorological parameters, and provide measurements which can serve as model evaluation tools. Further, utilizing its PAMS database (alternative or not), a State should be able to draw conclusions regarding population exposure and conduct trends analyses for both criteria and non-criteria pollutants. Overall, the PAMS network should serve as one of several complementary means, together with modeling and analysis of other data bases (e.g., inventories) and availability of control technology, etc., for States to justify the modification of existing control programs, design

new programs, and evaluate future courses of actions for O_3 control.

4.3 Monitoring Period. PAMS precursor monitoring will be conducted annually throughout the months of June, July and August (as a minimum) when peak O_3 values are expected in each area; however, precursor monitoring during the entire O_3 season for the area is preferred. Alternate precursor monitoring periods may be submitted for approval as a part of the PAMS network description required by §58.40. Changes to the PAMS monitoring period must be identified during the annual SLAMS Network Review specified in §58.20. PAMS O_3 monitors must adhere to the O_3 monitoring season specified in section 2.5 of appendix D. To ensure a degree of national consistency, monitoring for the 1993 season should commence as follows:

One in 3-day sampling—June 3, 1993.

One in 6-day sampling—June 6, 1993.

These monitoring dates will thereby be coincident with the previously-established, intermittent schedule for particulate matter. States initiating sampling earlier (or later) than June 3, 1993 should adjust their schedules to coincide with this national schedule.

4.4 Minimum Monitoring Network Requirements. The minimum required number and type of monitoring sites and sampling requirements are based on the population of the affected MSA/CMSA or nonattainment area (whichever is larger). The MSA/CMSA basis for monitoring network requirements was chosen because it typically is the most representative of the area which encompasses the emissions sources contributing to nonattainment. The MSA/CMSA emissions density can also be effectively and conveniently portrayed by the surrogate of population. Additionally, a network which is adequate to characterize the ambient air of an MSA/CMSA often must extend beyond the boundaries of such an area (especially for O_3 and its precursors); therefore, the use of smaller geographical units (such as counties or nonattainment areas which are smaller than the MSA/CMSA) for monitoring network design purposes is inappropriate. Various sampling requirements are imposed according to the size of the area to accommodate the impact of transport on the smaller MSAs/CMSAs, to account for the spatial variations inherent in large areas, to satisfy the differing data needs of large versus small areas due to the intractability of the O_3 nonattainment problem, and to recognize the potential economic impact of implementation on State and local government. Population figures must reflect the most recent decennial U.S. census population report. Specific guidance on determining network requirements is provided in reference 19. Minimum network requirements are outlined in table 2.

TABLE 2—PAMS MINIMUM MONITORING NETWORK REQUIREMENTS [1]

Population of MSA/CMSA or nonattainment area [2]	Required site type [3]	Minimum speciated VOC sampling frequency [4]	Minimum carbonyl sampling frequency [4]
Less than 500,000	(1)	A or C	
	(2)	A or C	D or F [5]
500,000 to 1,000,000	(1)	A or C	
	(2)	B	E
	(3)	A or C	
1,000,000 to 2,000,000 ..	(1)	A or C	
	(2)	B	E
	(2)	B	E
	(3)	A or C	
More than 2,000,000	(1)	A or C	
	(2)	B	E
	(2)	B	E
	(3)	A or C	
	(4)	A or C	

[1] O_3 and NO_X (including NO and NO_2) monitoring should be continuous measurements.

[2] Whichever area is larger.

[3] See Figure 5.

[4] Frequency Requirements are as follows: A—Eight 3-hour samples every third day and one additional 24-hour sample every sixth day during the monitoring period; B—Eight 3-hour samples, every day during the monitoring period and one additional 24-hour sample every sixth day year-round; C—Eight 3-hour samples on the 5 peak O_3 days plus each previous day, eight 3-hour samples every sixth day, and one additional 24-hour sample every sixth day, during the monitoring period; D—Eight 3-hour samples every third day during the monitoring period; E—Eight 3-hour samples every day during the monitoring period; F—Eight 3-hour samples on the 5 peak O_3 days plus each previous day and eight 3-hour samples every sixth day during the monitoring period. (NOTE: multiple samples taken on a daily basis must begin at midnight and consist of sequential, non-overlapping sampling periods.)

[5] Carbonyl sampling frequency must match the chosen speciated VOC frequency.

Note that the use of Frequencies C or F requires the submittal of an ozone event forecasting scheme.

For purposes of network implementation and transition, EPA recommends the following priority order for the establishment of sites:

- The type (2) site which provides the most comprehensive data concerning O_3 precursor emissions and toxic air pollutants,
- The type (3) site which provides a maximum O_3 measurement and total conversion of O_3 precursors,
- The type (1) site which delineates the effect of incoming precursor emissions and concentrations of O_3 and provides upwind boundary conditions,
- The type (4) site which provides extreme downwind boundary conditions, and
- The second type (2) site which provides comprehensive data concerning O_3 precursor emissions and toxic air pollutants in the second-most predominant morning wind direction on high O_3 days.

Note also that O_3 event (peak day) monitoring will require the development of a scheme for forecasting such high O_3 days or will necessitate the stipulation of what meteorological conditions constitute a potential high O_3 day; monitoring could then be

triggered only via meteorological projections. The O_3 event forecasting and monitoring scheme should be submitted as a part of the network description required by §§58.40 and 58.41 and should be reviewed during each annual SLAMS Network Review specified in §58.20.

4.5 Transition Period. A variable period of time is proposed for phasing in the operation of all required PAMS. Within 1 year after (1) February 12, 1993, (2) or date of redesignation or reclassification of any existing O_3 nonattainment area to serious, severe, or extreme, or (3) the designation of a new area and classification to serious, severe, or extreme O_3 nonattainment, a minimum of one type (2) site must be operating. Operation of the remaining sites must, at a minimum, be phased in at the rate of one site per year during subsequent years as outlined in the approved PAMS network description provided by the State.

4.6 Meteorological Monitoring. In order to support monitoring objectives associated with the need for various air quality analyses, model inputs and performance evaluations, meteorological monitoring including wind measurements at 10 meters above ground is required at each PAMS site. Monitoring should begin with site establishment. In addition, upper air meteorological monitoring is required for each PAMS area. Upper air monitoring should be initiated as soon as possible, but no later than 2 years after (1) February 12, 1993, (2) or date of redesignation or reclassification of any existing O_3 nonattainment area to serious, severe, or extreme, or (3) the designation of a new area and classification to serious, severe, or extreme O_3 nonattainment. The upper air monitoring site may be located separately from the type (1) through (4) sites, but the location should be representative of the upper air data in the nonattainment area. Upper air meteorological data must be collected during those days specified for monitoring by the sampling frequencies in table 2. of section 4.4 of this appendix D in accordance with current EPA guidance.

5. *Summary*.

Table 6 of this appendix shows by pollutant, all of the spatial scales that are applicable for SLAMS and the required spatial scales for NAMS. There may also be some situations, as discussed later in appendix E of this part, where additional scales may be allowed for NAMS purposes.

TABLE 6—SUMMARY OF SPATIAL SCALES FOR SLAMS AND REQUIRED SCALES FOR NAMS

Spatial Scale	Scales Applicable for SLAMS						
	SO_2	CO	O_3	NO_2	Pb	PM_{10}	$PM_{2.5}$
Micro		✔			✔	✔	✔
Middle	✔	✔	✔	✔	✔	✔	✔
Neighborhood	✔	✔	✔	✔	✔	✔	✔
Urban	✔		✔	✔	✔	✔	✔
Regional	✔		✔		✔	✔	✔
	Scales Required for NAMS						
Micro		✔			✔	✔	✔[1]
Middle					✔	✔	✔[1]
Neighborhood	✔	✔	✔	✔	✔	✔	✔
Urban			✔	✔			✔[2]
Regional							✔[2]

[1] Only permitted if representative of many such micro-scale environments in a residential district (for middle scale, at least two).
[2] Either urban or regional scale for regional transport sites.

6. *References*

1. Ludwig, F. L., J. H. S. Kealoha, and E. Shelar. Selecting Sites for Monitoring Total Suspended Particulates. Stanford Research Institute, Menlo Park, CA. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–77–018. June 1977, revised December 1977.

2. Ball, R. J. and G. E. Anderson. Optimum Site Exposure Criteria for SO_2 Monitoring. The Center for the Environment and Man, Inc., Hartford, CT. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–77–013. April 1977.

3. Ludwig, F. L. and J. H. S. Kealoha. Selecting Sites for Carbon Monoxide Monitoring. Stanford Research Institute, Menlo Park, CA. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–75–077. September 1975.

4. Ludwig, F. L. and E. Shelar. Site Selecting for the Monitoring of Photochemical Air Pollutants. Stanford Research Institute, Menlo Park, CA. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–78–013. April 1978.

5. Guideline on Air Quality Models. OAQPS, U.S. Environmental Protection

Agency, Research Triangle Park, NC. OAQPS No. 1.2–080. April 1978.

6. Lead Guideline Document, U. S. Environmental Protection Agency, Research Triangle Park, NC. EPA–452/R–93–009.

7. Air Quality Criteria for Lead. Office of Research and Development, U.S. Environmental Protection Agency, Washington, DC. EPA–600/8–83–028 aF–dF, 1986, and supplements EPA–600/8–89/049F, August 1990. (NTIS document numbers PB87–142378 and PB91–138420.)

8. Johnson, D. E., et al. Epidemiologic Study of the Effects of Automobile Traffic on Blood Lead Levels, Southwest Research Institute, Houston, TX. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA–600/1–78–055. August 1978.

9. Optimum Site Exposure Criteria for Lead Monitoring. PEDCo Environmental, Inc., Cincinnati, OH. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68–02–3013. (May 1981.)

10. ''Guidance for Conducting Ambient Air Monitoring for Lead Around Point Sources,'' Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC EPA–454/R–92–009, May 1997.

11. Cooper, J.A., et. al. Summary of the Portland Aerosol Characterization Study. (Presented at the 1979 Annual Air Pollution Association Meeting, Cincinnati, OH. APCA #79–24.4).

12. Bradway, R.M. and F.A. Record. National Assessment of the Urban Particulate Problem. Volume 1. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA–450/3–76–024. July 1976.

13. U.S. Environmental Protection Agency, Air Quality Criteria for Particulate Matter and Sulfur Oxides, Volume 2. Environmental Criteria and Assessment Office, Research Triangle Park, NC. December 1981.

14. Watson, J.G., et al. Analysis of Inhalable and Fine Particulate Matter Measurements. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA–450/4–81–035. December 1981.

15. Record, F.A. and L.A. Baci. Evaluation on Contribution of Wind Blown Dust from the Desert Levels of Particulate Matter in Desert Communities. GCA Technology Division, Bedford, MA. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA–450/2–80–078. August 1980.

16. Goldstein, E.A. and Paly M. The Diesel Problem in New York City. Project on the Urban Environment. Natural Resources Defense Council, Inc., New York, NY. April 1985.

17. Koch, R.C. and H.E. Rector. Optimum Network Design and Site Exposure Criteria for Particulate Matter. GEOMET Technologies, Inc., Rockville, MD. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68–02–3584. EPA 450/4–87–009. May 1987.

18. Watson et al. Guidance for Network Design and Optimum Site Exposure for $PM_{2.5}$ and PM_{10}. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC.

19. National Air Pollutant Emissions Trends, 1900–1995, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC. EPA–454/R96–007, October 1996, updated annually.

[44 FR 27571, May 10, 1979]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting appendix D to part 58, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

EFFECTIVE DATE NOTE: At at 60 FR 52323, October 6, 1995, appendix D to part 58 was amended in part by adding Section 2.2. This section contains information collection and recordkeeping requirements and will not become effective until approval has been given by the Office of Management and Budget.

APPENDIX E TO PART 58—PROBE AND MONITORING PATH SITING CRITERIA FOR AMBIENT AIR QUALITY MONITORING

1. Introduction
2 Sulfur Dioxide (SO_2), Ozone (O_3), and Nitrogen Dioxide (NO_2)
2.1 Horizontal and Vertical Placement
2.2 Spacing from Minor Sources (Applicable to SO_2 and O_3 Monitoring Only)
2.3 Spacing From Obstructions
2.4 Spacing From Trees
2.5 Spacing From Roadways (Applicable to O_3 and NO_2 Only)
2.6 Cumulative Interferences on a Monitoring Path
2.7 Maximum Monitoring Path Length
3 [Reserved]
4. Carbon Monoxide (CO)
4.1 Horizontal and Vertical Placement
4.2 Spacing From Obstructions
4.3 Spacing From Roadways
4.4 Spacing From Trees and Other Considerations
4.5 Cumulative Interferences on a Monitoring Path
4.6 Maximum Monitoring Path Length
5–6 [Reserved]
7. Lead(Pb)
7.1 Vertical Placement
7.2 Spacing From Obstructions
7.3 Spacing From Roadways
7.4 Spacing From Trees and Other Considerations.
8. Particulate Matter (PM_{10} and $PM_{2.5}$)

8.1 Vertical Placement
8.2 Spacing From Obstructions
8.3 Spacing From Roadways
8.4 Other Considerations
9. Probe Material and Pollutant Sample Residence Time
10. Photochemical Assessment Monitoring Stations (PAMS)
10.1 Horizontal and Vertical Placement
10.2 Spacing From Obstructions
10.3 Spacing From Roadways
10.4 Spacing From Trees
11. Discussion and Summary
12. Summary
13. References

1. *Introduction*

This appendix contains specific location criteria applicable to ambient air quality monitoring probes and monitoring paths after the general station siting has been selected based on the monitoring objectives and spatial scale of representation discussed in appendix D of this part. Adherence to these siting criteria is necessary to ensure the uniform collection of compatible and comparable air quality data.

The probe and monitoring path siting criteria discussed below must be followed to the maximum extent possible. It is recognized that there may be situations where some deviation from the siting criteria may be necessary. In any such case, the reasons must be thoroughly documented in a written request for a waiver that describes how and why the proposed siting deviates from the criteria. This documentation should help to avoid later questions about the validity of the resulting monitoring data. Conditions under which the EPA would consider an application for waiver from these siting criteria are discussed in section 11 of this appendix.

The spatial scales of representation used in this appendix, i.e., micro, middle, neighborhood, urban, and regional, are defined and discussed in appendix D of this part. The pollutant-specific probe and monitoring path siting criteria generally apply to all spatial scales except where noted otherwise. Specific siting criteria that are phrased with a ''must'' are defined as requirements and exceptions must be approved through the waiver provisions. However, siting criteria that are phrased with a ''should'' are defined as goals to meet for consistency but are not requirements.

2. *Sulfur Dioxide (SO_2), Ozone (O_3), and Nitrogen Dioxide (NO_2)*

Open path analyzers may be used to measure SO_2, O_3, and NO_2 at SLAMS/NAMS sites for middle, neighborhood, urban, and regional scale measurement applications. Additional information on SO_2, NO_2, and O_3 monitor siting criteria may be found in references 11 and 13.

2.1 Horizontal and Vertical Placement. The probe or at least 80 percent of the monitoring path must be located between 3 and 15 meters above ground level. The probe or at least 90 percent of the monitoring path must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas. If the probe or a significant portion of the monitoring path is located near the side of a building, then it should be located on the windward side of the building relative to the prevailing wind direction during the season of highest concentration potential for the pollutant being measured.

2.2 Spacing from Minor Sources (Applicable to SO_2 and O_3 Monitoring Only). Local minor sources of SO_2 can cause inappropriately high concentrations of SO_2 in the vicinity of probes and monitoring paths for SO_2. Similarly, local sources of nitric oxide (NO) and ozone-reactive hydrocarbons can have a scavenging effect causing unrepresentatively low concentrations of O_3 in the vicinity of probes and monitoring paths for O_3. To minimize these potential interferences, the probe or at least 90 percent of the monitoring path must be away from furnace or incineration flues or other minor sources of SO_2 or NO, particularly for open path analyzers because of their potential for greater exposure over the area covered by the monitoring path. The separation distance should take into account the heights of the flues, type of waste or fuel burned, and the sulfur content of the fuel. It is acceptable, however, to monitor for SO_2 near a point source of SO_2 when the objective is to assess the effect of this source on the represented population.

2.3 Spacing From Obstructions. Buildings and other obstacles may possibly scavenge SO_2, O_3, or NO_2. To avoid this interference, the probe or at least 90 percent of the monitoring path must have unrestricted airflow and be located away from obstacles so that the distance from the probe or monitoring path is at least twice the height that the obstacle protrudes above the probe or monitoring path. Generally, a probe or monitoring path located near or along a vertical wall is undesirable because air moving along the wall may be subject to possible removal mechanisms. A probe must have unrestricted airflow in an arc of at least 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. A sampling station having a probe located closer to an obstacle than this criterion allows should be classified as middle scale rather than neighborhood or urban scale, since the measurements from such a station would more closely represent the middle scale. A monitoring path must be clear of all trees, brush, buildings, plumes, dust, or other optical obstructions,

including potential obstructions that may move due to wind, human activity, growth of vegetation, etc. Temporary optical obstructions, such as rain, particles, fog, or snow, should be considered when siting an open path analyzer. Any of these temporary obstructions that are of sufficient density to obscure the light beam will affect the ability of the open path analyzer to continuously measure pollutant concentrations.

Special consideration must be devoted to the use of open path analyzers due to their inherent potential sensitivity to certain types of interferences, or optical obstructions. While some of these potential interferences are comparable to those to which point monitors are subject, there are additional sources of potential interferences which are altogether different in character. Transient, but significant obscuration of especially longer measurement paths could be expected to occur as a result of certain prevailing meteorological conditions (e.g., heavy fog, rain, snow) and/or aerosol levels that are of a sufficient density to prevent the open path analyzer's light transmission. If certain compensating measures are not otherwise implemented at the onset of monitoring (e.g., shorter path lengths, higher light source intensity), data recovery during periods of greatest primary pollutant potential could be compromised. For instance, if heavy fog or high particulate levels are coincident with periods of projected NAAQS-threatening pollutant potential, the representativeness of the resulting data record in reflecting maximum pollutant concentrations may be substantially impaired despite the fact that the site may otherwise exhibit an acceptable, even exceedingly high overall valid data capture rate.

In seeking EPA approval for inclusion of a site using an open path analyzer into the formal SLAMS/NAMS or PSD network, monitoring agencies must submit an analysis which evaluates both obscuration potential for a proposed path length for the subject area and the effect this potential is projected to have on the representativeness of the data record. This analysis should include one or more of the following elements, as appropriate for the specific circumstance: climatological information, historical pollutant and aerosol information, modeling analysis results, and any related special study results.

2.4 Spacing From Trees. Trees can provide surfaces for SO_2, O_3, or NO_2 adsorption or reactions and obstruct wind flow. To reduce this possible interference, the probe or at least 90 percent of the monitoring path should be 20 meters or more from the drip line of trees. If a tree or trees could be considered an obstacle, the probe or 90 percent of the monitoring path must meet the distance requirements of section 2.3 and be at least 10 meters from the drip line of the tree or trees. Since the scavenging effect of trees is greater for O_3 than for other criteria pollutants, strong consideration of this effect must be given to locating an O_3 probe or monitoring path to avoid this problem.

2.5 Spacing From Roadways (Applicable to O_3 and NO_2 Only). In siting an O_3 analyzer, it is important to minimize destructive interferences from sources of NO, since NO readily reacts with O_3. In siting NO_2 analyzers for neighborhood and urban scale monitoring, it is important to minimize interferences from automotive sources. Table 1 provides the required minimum separation distances between a roadway and a probe and between a roadway and at least 90 percent of a monitoring path for various ranges of daily roadway traffic. A sampling station having a point analyzer probe located closer to a roadway than allowed by the table 1 requirements should be classified as middle scale rather than neighborhood or urban scale, since the measurements from such a station would more closely represent the middle scale. If an open path analyzer is used at a site, the monitoring path(s) must not cross over a roadway with an average daily traffic count of 10,000 vehicles per day or more. For those situations where a monitoring path crosses a roadway with fewer than 10,000 vehicles per day, one must consider the entire segment of the monitoring path in the area of potential atmospheric interference from automobile emissions. Therefore, this calculation must include the length of the monitoring path over the roadway plus any segments of the monitoring path that lie in the area between the roadway and the minimum separation distance, as determined from table 1. The sum of these distances must not be greater than 10 percent of the total monitoring path length.

TABLE 1—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES OR MONITORING PATHS FOR MONITORING NEIGHBORHOOD—AND URBAN—SCALE OZONE AND NITROGEN DIOXIDE

Roadway average daily traffic, vehicles per day	Minimum separation distance,[1] meters
≤10,000	10
15,000	20
20,000	30
40,000	50
70,000	100
≥110,000	250

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

2.6 Cumulative Interferences on a Monitoring Path. The cumulative length or portion of a monitoring path that is affected by minor sources, obstructions, trees, or roadways must not exceed 10 percent of the total monitoring path length.

2.7 Maximum Monitoring Path Length. The monitoring path length must not exceed 1 kilometer for analyzers in neighborhood, urban, or regional scale. For middle scale monitoring sites, the monitoring path length must not exceed 300 meters. In areas subject to frequent periods of dust, fog, rain, or snow, consideration should be given to a shortened monitoring path length to minimize loss of monitoring data due to these temporary optical obstructions. For certain ambient air monitoring scenarios using open path analyzers, shorter path lengths may be needed in order to ensure that the monitoring station meets the objectives and spatial scales defined for SLAMS in appendix D. Therefore, the Regional Administrator or the Regional Administrator's designee may require shorter path lengths, as needed on an individual basis, to ensure that the SLAMS meet the appendix D requirements. Likewise, the Administrator or the Administrator's designee may specify the maximum path length used at monitoring stations designated as NAMS or PAMS as needed on an individual basis.

3. [Reserved]

4. *Carbon Monoxide (CO)*

Open path analyzers may be used to measure CO at SLAMS/NAMS sites for middle or neighborhood scale measurement applications. Additional information on CO monitor siting criteria may be found in reference 12.

4.1 Horizontal and Vertical Placement. Because of the importance of measuring population exposure to CO concentrations, air should be sampled at average breathing heights. However, practical factors require that the inlet probe be higher. The required height of the inlet probe for CO monitoring is therefore 3±½ meters for a microscale site, which is a compromise between representative breathing height and prevention of vandalism. The recommended 1 meter range of heights is also a compromise to some extent. For consistency and comparability, it would be desirable to have all inlets at exactly the same height, but practical considerations often prevent this. Some reasonable range must be specified and 1 meter provides adequate leeway to meet most requirements.

For the middle and neighborhood scale stations, the vertical concentration gradients are not as great as for the microscale station. This is because the diffusion from roads is greater and the concentrations would represent larger areas than for the microscale. Therefore, the probe or at least 80 percent of the monitoring path must be located between 3 and 15 meters above ground level for middle and neighborhood scale stations. The probe or at least 90 percent of the monitoring path must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas. If the probe or a significant portion of the monitoring path is located near the side of a building, then it should be located on the windward side of the building relative to both the prevailing wind direction during the season of highest concentration potential and the location of sources of interest, i.e., roadways.

4.2 Spacing From Obstructions. Buildings and other obstacles may restrict airflow around a probe or monitoring path. To avoid this interference, the probe or at least 90 percent of the monitoring path must have unrestricted airflow and be located away from obstacles so that the distance from the probe or monitoring path is at least twice the height that the obstacle protrudes above the probe or monitoring path. A probe or monitoring path located near or along a vertical wall is undesirable because air moving along the wall may be subject to possible removal mechanisms. A probe must have unrestricted airflow in an arc of at least 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. A monitoring path must be clear of all trees, brush, buildings, plumes, dust, or other optical obstructions, including potential obstructions that may move due to wind, human activity, growth of vegetation, etc. Temporary optical obstructions, such as rain, particles, fog, or snow, should be considered when siting an open path analyzer. Any of these temporary obstructions that are of sufficient density to obscure the light beam will affect the ability of the open path analyzer to continuously measure pollutant concentrations.

Special consideration must be devoted to the use of open path analyzers due to their inherent potential sensitivity to certain types of interferences, or optical obstructions. While some of these potential interferences are comparable to those to which point monitors are subject, there are additional sources of potential interferences which are altogether different in character. Transient, but significant obscuration of especially longer measurement paths could be expected to occur as a result of certain prevailing meteorological conditions (e.g., heavy fog, rain, snow) and/or aerosol levels that are of a sufficient density to prevent the open path analyzer's light transmission. If certain compensating measures are not otherwise implemented at the onset of monitoring (e.g., shorter path lengths, higher light source intensity), data recovery during periods of greatest primary pollutant potential could be compromised. For instance, if heavy fog or high particulate levels are coincident with periods of projected NAAQS-threatening pollutant potential, the representativeness of the resulting data record

in reflecting maximum pollutant concentrations may be substantially impaired despite the fact that the site may otherwise exhibit an acceptable, even exceedingly high overall valid data capture rate.

In seeking EPA approval for inclusion of a site using an open path analyzer into the formal SLAMS/NAMS or PSD network, monitoring agencies must submit an analysis which evaluates both obscuration potential for a proposed path length for the subject area and the effect this potential is projected to have on the representativeness of the data record. This analysis should include one or more of the following elements, as appropriate for the specific circumstance: climatological information, historical pollutant and aerosol information, modeling analysis results, and any related special study results.

4.3 Spacing From Roadways. Street canyon and traffic corridor stations (microscale) are intended to provide a measurement of the influence of the immediate source on the pollution exposure of the population. In order to provide some reasonable consistency and comparability in the air quality data from microscale stations, a minimum distance of 2 meters and a maximum distance of 10 meters from the edge of the nearest traffic lane must be maintained for these CO monitoring inlet probes. This should give consistency to the data, yet still allow flexibility of finding suitable locations.

Street canyon/corridor (microscale) inlet probes must be located at least 10 meters from an intersection and preferably at a midblock location. Midblock locations are preferable to intersection locations because intersections represent a much smaller portion of downtown space than do the streets between them. Pedestrian exposure is probably also greater in street canyon/corridors than at intersections. Also, the practical difficulty of positioning sampling inlets is less at midblock locations than at the intersection. However, the final siting of the monitor must meet the objectives and intent of appendix D, sections 2.4, 3, 3.3, and appendix E, section 4.

In determining the minimum separation between a neighborhood scale monitoring station and a specific line source, the presumption is made that measurements should not be substantially influenced by any one roadway. Computations were made to determine the separation distance, and table 2 provides the required minimum separation distance between roadways and a probe or 90 percent of a monitoring path. Probes or monitoring paths that are located closer to roads than this criterion allows should not be classified as a neighborhood scale, since the measurements from such a station would closely represent the middle scale. Therefore, stations not meeting this criterion should be classified as middle scale.

TABLE 2—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES OR MONITORING PATHS FOR MONITORING NEIGHBORHOOD SCALE CARBON MONOXIDE

Roadway average daily traffic, vehicles per day	Minimum separation distance [1] for probes or 90% of a monitoring path (meters)
≤10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≤60,000	150

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

4.4 Spacing From Trees and Other Considerations. Since CO is relatively nonreactive, the major factor concerning trees is as obstructions to normal wind flow patterns. For middle and neighborhood scale stations, trees should not be located between the major sources of CO, usually vehicles on a heavily traveled road, and the monitor. The probe or at least 90 percent of the monitoring path must be 10 meters or more from the drip line of trees which are between the probe or the monitoring path and the road and which extend at least 5 meters above the probe or monitoring path. For microscale stations, no trees or shrubs should be located between the probe and the roadway.

4.5 Cumulative Interferences on a Monitoring Path. The cumulative length or portion of a monitoring path that is affected by obstructions, trees, or roadways must not exceed 10 percent of the total monitoring path length.

4.6 Maximum Monitoring Path Length. The monitoring path length must not exceed 1 kilometer for analyzers used for neighborhood scale monitoring applications, or 300 meters for middle scale monitoring applications. In areas subject to frequent periods of dust, fog, rain, or snow, consideration should be given to a shortened monitoring path length to minimize loss of monitoring data due to these temporary optical obstructions. For certain ambient air monitoring scenarios using open path analyzers, shorter path lengths may be needed in order to ensure that the monitoring station meets the objectives and spatial scales defined for SLAMS in appendix D. Therefore, the Regional Administrator or the Regional Administrator's designee may require shorter path lengths, as needed on an individual basis, to ensure that the SLAMS meet the appendix D requirements. Likewise, the Administrator or the Administrator's designee may specify the maximum path length used

at monitoring stations designated as NAMS or PAMS as needed on an individual basis.

5.–6. [Reserved]

7. *Lead (Pb)*

7.1 *Vertical Placement.* Optimal placement of the sampler inlet for Pb monitoring should be at breathing height level. However, practical factors such as prevention of vandalism, security, and safety precautions must also be considered when siting a Pb monitor. Given these considerations, the sampler inlet for microscale Pb monitors must be 2–7 meters above ground level. The lower limit was based on a compromise between ease of servicing the sampler and the desire to avoid unrepresentative conditions due to re-entrainment from dusty surfaces. The upper limit represents a compromise between the desire to have measurements which are most representative of population exposures and a consideration of the practical factors noted above.

For middle or larger spatial scales, increased diffusion results in vertical concentration gradients which are not as great as for the small scales. Thus, the required height of the air intake for middle or larger scales is 2–15 meters.

7.2 Spacing From Obstructions. The sampler must be located away from obstacles such as buildings, so that the distance between obstacles and the sampler is at least twice the height that the obstacle protrudes above the sampler.

A minimum of 2 meters of separation from walls, parapets, and penthouses is required for rooftop samplers. No furnace or incinerator flues should be nearby. The height and type of flues and the type, quality, and quantity of waste or fuel burned determine the separation distances. For example, if the emissions from the chimney have high lead content and there is a high probability that the plume would impact on the sampler during most of the sampling period, then other buildings/locations in the area that are free from the described sources should be chosen for the monitoring site.

There must be unrestricted airflow in an arc of at least 270° around the sampler.

Since the intent of the category (a) site is to measure the maximum concentrations from a road or point source, there must be no significant obstruction between a road or point source and the monitor, even though other spacing from obstruction criteria are met. The predominant direction for the season with the greatest pollutant concentration potential must be included in the 270° arc.

7.3. *Spacing from Roadways.* This criteria applies only to those Pb sites designed to assess lead concentrations from mobile sources. Numerous studies have shown that ambient Pb levels near mobile sources are a function of the traffic volume and are most pronounced at ADT >30,000 within the first 15 meters on the downwind side of the roadways. Numberous studies have shown that ambient lead levels near mobile source are a function of the traffic volume and are most pronounced at ADT ≥30,000 within the first 15 meters, on the downwind side of the roadways. (1, 16–19) Therefore, stations to measure the peak concentration from mobile sources should be located at the distance most likely to produce the highest concentrations. For the microscale station, the location must be between 5 and 15 meters from the major roadway. For the middle scale station, a range of acceptable distances from the major roadway is shown in table 4. This table also includes separation distances between a roadway and neighborhood or larger scale stations. These distances are based upon the data of reference 16 which illustrates that lead levels remain fairly constant after certain horizontal distances from the roadway. As depicted in the above reference, this distance is a function of the traffic volume.

TABLE 3—SEPARATION DISTANCE BETWEEN PB STATIONS AND ROADWAYS (EDGE OF NEAREST TRAFFIC LANE)

Roadway average daily traffic vehicles per day	Separation distance between roadways and stations, meters		
	Micro-scale	Middle scale	Neighborhood urban regional scale
≦10,000	5–15	[1]>15–50	[1]>50
20,000	5–15	>15–75	>75
≧40,000	5–15	>15–100	>100

[1] Distances should be interpolated based on traffic flow.

7.4. *Spacing from trees and other considerations.* Trees can provide surfaces for deposition or adsorption of Pb particles and obstruct normal wind flow patterns. For microscale and middle scale category (a) sites there must not be any tree(s) between the source of the Pb and the sampler. For neighborhood scale category (b) sites, the sampler should be at least 20 meters from the drip line of trees. The sampler must, however, be placed at least 10 meters from the drip line of trees which could be classified as an obstruction, i.e., the distance between the tree(s) and the sampler is less than the height that the tree protrudes above the sampler.

8. *Particulate Matter (PM_{10} and $PM_{2.5}$)*

8.1 Vertical Placement. Although there are limited studies on the PM_{10} concentration gradients around roadways or other ground level sources, References 1, 2, 4, 18 and 19 of this appendix show a distinct variation in the distribution of TSP and Pb levels near roadways, TSP, which is greatly affected by gravity, has large concentration gradients, both horizontal and vertical, immediately

adjacent to roads. Lead, being predominately sub-micron in size, behaves more like a gas and exhibits smaller vertical and horizontal gradients than TSP. PM_{10}, being intermediate in size between these two extremes exhibits dispersion properties of both gas and settleable particulates and does show vertical and horizontal gradients.[30] Similar to monitoring for other pollutants, optimal placement of the sampler inlet for PM_{10} monitoring should be at breathing height level. However, practical factors such as prevention of vandalism, security, and safety precautions must also be considered when siting a PM_{10} monitor. Given these considerations, the sampler inlet for microscale PM_{10} monitors must be 2–7 meters above ground level. The lower limit was based on a compromise between ease of servicing the sampler and the desire to avoid re-entrainment from dusty surfaces. The upper limit represents a compromise between the desire to have measurements which are most representative of population exposures and a consideration of the practical factors noted above. Although microscale or middle scale stations are not the preferred spatial scale for $PM_{2.5}$ sites, there are situations where such sites are representative of several locations within an area where large segments of the population may live or work (e.g., central business district of Metropolitan area). In these cases, the sampler inlet for such microscale $PM_{2.5}$ stations must also be 2-7 meters above ground level.

For middle or larger spatial scales, increased diffusion results in vertical concentration gradients that are not as great as for the microscale. Thus, the required height of the air intake for middle or larger scales is 2–15 meters.

8.2 Spacing From Obstructions. If the sampler is located on a roof or other structure, then there must be a minimum of 2 meters separation from walls, parapets, penthouses, etc. No furnace or incineration flues should be nearby. This separation distance from flues is dependent on the height of the flues, type of waste or fuel burned, and quality of the fuel (ash content). In the case of emissions from a chimney resulting from natural gas combustion, as a precautionary measure, the sampler should be placed at least 5 meters from the chimney.

On the other hand, if fuel oil, coal, or solid waste is burned and the stack is sufficiently short so that the plume could reasonably be expected to impact on the sampler intake a significant part of the time, other buildings/locations in the area that are free from these types of sources should be considered for sampling. Trees provide surfaces for particulate desposition and also restrict airflow. Therefore, the sampler should be placed at least 20 meters from the dripline and must be 10 meters from the dripline when the tree(s) acts as an obstruction.

The sampler must also be located away from obstacles such as buildings, so that the distance between obstacles and the sampler is at least twice the height that the obstacle protrudes above the sampler except for street canyon sites. Sampling stations that are located closer to obstacles than this criterion allows should not be classified as neighborhood, urban, or regional scale, since the measurements from such a station would closely represent middle scale stations. Therefore, stations not meeting the criterion should be classified as middle scale.

There must be unrestricted airflow in an arc of at least 270° around the sampler except for street canyon sites. Since the intent of the category (a) site is to measure the maximum concentrations from a road or point source, there must be no significant obstruction between a road or point source and the monitor, even though other spacing from obstruction criteria are met. The predominant direction for the season with the greatest pollutant concentration potential must be included in the 270° arc.

8.3 Spacing From Roads. Since emissions associated with the operation of motor vehicles contribute to urban area particulate matter ambient levels, spacing from roadway criteria are necessary for ensuring national consistency in PM sampler siting.

The intent is to locate category (a) NAMS sites in areas of highest concentrations whether it be from mobile or multiple stationary sources. If the area is primarily affected by mobile sources and the maximum concentration area(s) is judged to be a traffic corridor or street canyon location, then the monitors should be located near roadways with the highest traffic volume and at separation distances most likely to produce the highest concentrations. For the microscale traffic corridor station, the location must be between 5 and 15 meters from the major roadway. For the microscale street canyon site the location must be between 2 and 10 meters from the roadway. For the middle scale station, a range of acceptable distances from the roadway is shown in Figure 2. This figure also includes separation distances between a roadway and neighborhood or larger scale stations by default. Any station, 2 to 15 meters high, and further back than the middle scale requirements will generally be neighborhood, urban or regional scale. For example, according to Figure 2, if a PM sampler is primarily influenced by roadway emissions and that sampler is set back 10 meters from a 30,000 ADT road, the station should be classified as a micro scale, if the sampler height is between 2 and 7 meters. If the sampler height is between 7 and 15 meters, the station should be classified as middle scale. If the sample is 20 meters from the same road, it will be classified as middle scale; if 40 meters, neighborhood scale; and if 110 meters, an urban scale.

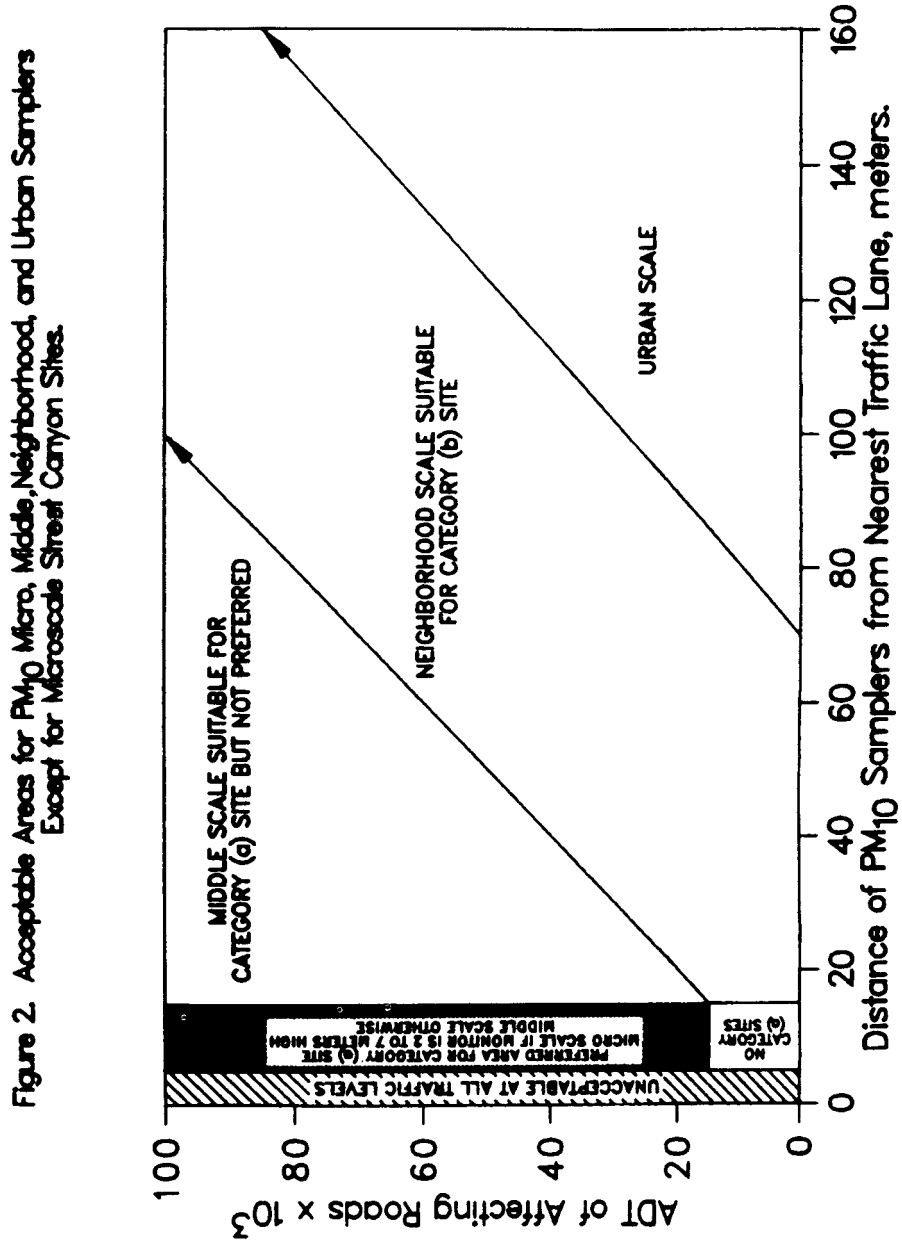


Figure 2. Acceptable Areas for PM_{10} Micro, Middle, Neighborhood, and Urban Samplers Except for Microscale Street Canyon Sites.

It is important to note that the separation distances shown in Figure 2 are measured from the edge of the nearest traffic lane of the roadway presumed to have the most influence on the site. In general, this presumption is an oversimplification of the usual urban settings which normally have several streets that impact a given site. The effects

of surrounding streets, wind speed, wind direction and topography should be considered along with Figure 2 before a final decision is made on the most appropriate spatial scale assigned to the sampling station.

8.4 Other Considerations. For those areas that are primarily influenced by stationary source emissions as opposed to roadway emissions, guidance in locating these areas may be found in the guideline document Optimum Network Design and Site Exposure Criteria for Particulate Matter.[29]

Stations should not be located in an unpaved area unless there is vegetative ground cover year round, so that the impact of wind blown dusts will be kept to a minimum.

9. *Probe Material and Pollutant Sample Residence Time*

For the reactive gases, SO_2, NO_2, and O_3, special probe material must be used for point analyzers. Studies[20–24] have been conducted to determine the suitability of materials such as polypropylene, polyethylene, polyvinyl chloride, Tygon, aluminum, brass, stainless steel, copper, Pyrex glass and Teflon for use as intake sampling lines. Of the above materials, only Pyrex glass and Teflon have been found to be acceptable for use as intake sampling lines for all the reactive gaseous pollutants. Furthermore, the EPA[25] has specified borosilicate glass or FEP Teflon as the only acceptable probe materials for delivering test atmospheres in the determination of reference or equivalent methods. Therefore, borosilicate glass, FEP Teflon, or their equivalent must be used for existing and new NAMS or SLAMS.

For VOC monitoring at those SLAMS designated as PAMS, FEP teflon is unacceptable as the probe material because of VOC adsorption and desorption reactions on the FEP teflon. Borosilicate glass, stainless steel, or its equivalent are the acceptable probe materials for VOC and carbonyl sampling. Care must be taken to ensure that the sample residence time is 20 seconds or less.

No matter how nonreactive the sampling probe material is initially, after a period of use reactive particulate matter is deposited on the probe walls. Therefore, the time it takes the gas to transfer from the probe inlet to the sampling device is also critical. Ozone in the presence of NO will show significant losses even in the most inert probe material when the residence time exceeds 20 seconds.[26] Other studies[27–28] indicate that a 10-second or less residence time is easily achievable. Therefore, sampling probes for reactive gas monitors at SLAMS or NAMS must have a sample residence time less than 20 seconds.

10. *Photochemical Assessment Monitoring Stations (PAMS)*

10.1 Horizontal and Vertical Placement. The probe or at least 80 percent of the monitoring path must be located 3 to 15 meters above ground level. This range provides a practical compromise for finding suitable sites for the multipollutant PAMS. The probe or at least 90 percent of the monitoring path must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas.

10.2 Spacing From Obstructions. The probe or at least 90 percent of the monitoring path must be located away from obstacles and buildings such that the distance between the obstacles and the probe or the monitoring path is at least twice the height that the obstacle protrudes above the probe or monitoring path. There must be unrestricted airflow in an arc of at least 270° around the probe inlet. Additionally, the predominant wind direction for the period of greatest pollutant concentration (as described for each site in section 4.2 of appendix D) must be included in the 270° arc. If the probe is located on the side of the building, 180° clearance is required. A monitoring path must be clear of all trees, brush, buildings, plumes, dust, or other optical obstructions, including potential obstructions that may move due to wind, human activity, growth of vegetation, etc. Temporary optical obstructions, such as rain, particles, fog, or snow, should be considered when siting an open path analyzer. Any of these temporary obstructions that are of sufficient density to obscure the light beam will affect the ability of the open path analyzer to continuously measure pollutant concentrations.

Special consideration must be devoted to the use of open path analyzers due to their inherent potential sensitivity to certain types of interferences, or optical obstructions. While some of these potential interferences are comparable to those to which point monitors are subject, there are additional sources of potential interferences which are altogether different in character. Transient, but significant obscuration of especially longer measurement paths could be expected to occur as a result of certain prevailing meteorological conditions (e.g., heavy fog, rain, snow) and/or aerosol levels that are of a sufficient density to prevent the open path analyzer's light transmission. If certain compensating measures are not otherwise implemented at the onset of monitoring (e.g., shorter path lengths, higher light source intensity), data recovery during periods of greatest primary pollutant potential could be compromised. For instance, if heavy fog or high particulate levels are coincident with periods of projected NAAQS-threatening pollutant potential, the representativeness of the resulting data record

[20–29] See References at end of this appendix.

in reflecting maximum pollutant concentrations may be substantially impaired despite the fact that the site may otherwise exhibit an acceptable, even exceedingly high overall valid data capture rate.

In seeking EPA approval for inclusion of a site using an open path analyzer into the formal SLAMS/NAMS or PSD network, monitoring agencies must submit an analysis which evaluates both obscuration potential for a proposed path length for the subject area and the effect this potential is projected to have on the representativeness of the data record. This analysis should include one or more of the following elements, as appropriate for the specific circumstance: climatological information, historical pollutant and aerosol information, modeling analysis results, and any related special study results.

10.3 Spacing From Roadways. It is important in the probe and monitoring path siting process to minimize destructive interferences from sources of NO since NO readily reacts with O_3. Table 4 below provides the required minimum separation distances between roadways and PAMS (excluding upper air measuring stations):

TABLE 4—SEPARATION DISTANCE BETWEEN PAMS AND ROADWAYS

[Edge of Nearest Traffic Lane]

Roadway average daily traffic, vehicles per day	Minimum separation distance between roadways and stations in meters [1]
<10,000	>10
15,000	20
20,000	30
40,000	50
70,000	100
>110,000	250

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table based on the actual traffic flow.

10.4 Spacing From Trees. Trees can provide surfaces for adsorption and/or reactions to occur and can obstruct normal wind flow patterns. To minimize these effects at PAMS, the probe or at least 90 percent of the monitoring path should be placed at least 20 meters from the drip line of trees. Since the scavenging effect of trees is greater for O_3 than for the other criteria pollutants, strong consideration of this effect must be given in locating the PAMS probe or monitoring path to avoid this problem. Therefore, the probe or at least 90 percent of the monitoring path must be at least 10 meters from the drip line of trees.

11. *Waiver Provisions*

It is believed that most sampling probes or monitors can be located so that they meet the requirements of this appendix. New stations with rare exceptions, can be located within the limits of this appendix. However, some existing stations may not meet these requirements and yet still produce useful data for some purposes. EPA will consider a written request from the State Agency to waive one or more siting criteria for some monitoring stations providing that the State can adequately demonstrate the need (purpose) for monitoring or establishing a monitoring station at that location. For establishing a new station. a waiver may be granted only if both of the following criteria are met:

The site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met.

The monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of station the necessary distance from roadways or obstructions).

However, for an existing station, a waiver may be granted if either of the above criteria are met.

Cost benefits, historical trends, and other factors may be used to add support to the above, however, they in themselves, will not be acceptable reasons for granting a waiver. Written requests for waivers must be submitted to the Regional Administrator. For those SLAMS also designated as NAMS, the request will be forwarded to the Administrator. For those SLAMS also designated as NAMS or PAMS, the request will be forwarded to the Administrator.

12. *Summary*

Table 5 presents a summary of the general requirements for probe and monitoring path siting criteria with respect to distances and heights. It is apparent from table 5 that different elevation distances above the ground are shown for the various pollutants. The discussion in the text for each of the pollutants described reasons for elevating the monitor, probe, or monitoring path. The differences in the specified range of heights are based on the vertical concentration gradients. For CO, the gradients in the vertical direction are very large for the microscale, so a small range of heights has been used. The upper limit of 15 meters was specified for consistency between pollutants and to allow the use of a single manifold or monitoring path for monitoring more than one pollutant.

TABLE 5—SUMMARY OF PROBE AND MONITORING PATH SITING CRITERIA

Pollutant	Scale [maximum monitoring path length, meters]	Height from ground to probe or 80% of monitoring path [A] (meters)	Horizontal and vertical distance from supporting structures [B] to probe or 90% of monitoring path [A] (meters)	Distance from trees to probe or 90% of monitoring path [A] (meters)	Distance from roadways to probe or monitoring path [A] (meters)
SO_2 [C,D,E,F]	Middle [300m] Neighborhood, Urban, and Regional [1km].	3–15	>1	>10	N/A.
CO [D,E,G]	Micro Middle [300m] Neighborhood [1km].	3±0.5; 3–15	>1	>10	2–10; See table 2 for middle and neighborhood scales.
O_3 [C,D,E]	Middle [300m] Neighborhood, Urban, and Regional [1km].	3–15	>1	>10	See table 1 for all scales.
Ozone precursors (for PAMS) [C,D,E].	Neighborhood and Urban. [1 km]	3–15	>1	>10	See table 4 for all scales.
NO_2 [C,D,E]	Middle [300m] Neighborhood and Urban [1km].	3–15	>1	>10	See table 1 for all scales.
Pb [C,D,E,F,H]	Micro; Middle, Neighborhood, Urban and Regional.	2–7 (Micro); 2–15 (All other scales).	>2 (All scales, horizontal distance only).	>10 (All scales)	5–15 (Micro); See table 3 for all other scales.
PM–10 [C,D,E,F,H]	Micro; Middle, Neighborhood, Urban and Regional.	2–7 (Micro); 2–15 (All other scales).	>2 (All scales, horizontal distance only).	>10 (All scales)	2–10 (Micro); See Figure 2 for all other scales.

N/A—Not applicable.

[A] Monitoring path for open path analyzers is applicable only to middle or neighborhood scale CO monitoring and all applicable scales for monitoring SO_2, O_3, O_3 precursors, and NO_2.

[B] When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

[C] Should be >20 meters from the dripline of tree(s) and must be 10 meters from the dripline when the tree(s) act as an obstruction.

[D] Distance from sampler, probe, or 90% of monitoring path to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler, probe, or monitoring path. Sites not meeting this criterion may be classified as middle scale (see text).

[E] Must have unrestricted airflow 270° around the probe or sampler; 180° if the probe is on the side of a building.

[F] The probe, sampler, or monitoring path should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.

[G] For microscale CO monitoring sites, the probe must be >10 meters from a street intersection and preferably at a midblock location.

[H] For collocated Pb and PM–10 samplers, a 2–4 meter separation distance between collocated samplers must be met.

13. *References*

1. Bryan, R.J., R.J. Gordon, and H. Menck. Comparison of High Volume Air Filter Samples at Varying Distances from Los Angeles Freeway. University of Southern California, School of Medicine, Los Angeles, CA. (Presented at 66th Annual Meeting of Air Pollution Control Association. Chicago, IL., June 24–28, 1973. APCA 73–158.)

2. Teer, E.H. Atmospheric Lead Concentration Above an Urban Street. Master of Science Thesis, Washington University, St. Louis, MO. January 1971.

3. Bradway, R.M., F.A. Record, and W.E. Belanger. Monitoring and Modeling of Resuspended Roadway Dust Near Urban Arterials. GCA Technology Division, Bedford, MA. (Presented at 1978 Annual Meeting of Transportation Research Board, Washington, DC. January 1978.)

4. Pace, T.G., W.P. Freas, and E.M. Afify. Quantification of Relationship Between Monitor Height and Measured Particulate Levels in Seven U.S. Urban Areas. U.S. Environmental Protection Agency, Research Triangle Park, NC. (Presented at 70th Annual Meeting of Air Pollution Control Association, Toronto, Canada, June 20–24, 1977. APCA 77–13.4.)

5. Harrison, P.R. Considerations for Siting Air Quality Monitors in Urban Areas. City of Chicago, Department of Environmental Control, Chicago, IL. (Presented at 66th Annual Meeting of Air Pollution Control Association, Chicago, IL., June 24–28, 1973. APCA 73–161.)

6. Study of Suspended Particulate Measurements at Varying Heights Above Ground.

Texas State Department of Health, Air Control Section, Austin, TX. 1970. p.7.

7. Rodes, C.E. and G.F. Evans. Summary of LACS Integrated Pollutant Data. In: Los Angeles Catalyst Study Symposium. U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–600/4–77–034. June 1977.

8. Lynn, D.A. *et. al.* National Assessment of the Urban Particulate Problem: Volume 1, National Assessment. GCA Technology Division, Bedford, MA. U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–75–024. June 1976.

9. Pace, T.G. Impact of Vehicle-Related Particulates on TSP Concentrations and Rationale for Siting Hi-Vols in the Vicinity of Roadways. OAQPS, U.S. Environmental Protection Agency, Research Triangle Park, NC. April 1978.

10. Ludwig, F.L., J.H. Kealoha, and E. Shelar. Selecting Sites for Monitoring Total Suspended Particulates. Stanford Research Institute, Menlo Park, CA. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–77–018. June 1977, revised December 1977.

11. Ball, R.J. and G.E. Anderson. Optimum Site Exposure Criteria for SO_2 Monitoring. The Center for the Environment and Man, Inc., Hartford, CT. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–77–013. April 1977.

12. Ludwig, F.L. and J.H.S. Kealoha. Selecting Sites for Carbon Monoxide Monitoring. Stanford Research Institute, Menlo Park, CA. Prepared for U.S. Environmental Protection Agency, Research Park, NC. EPA Publication No. EPA–450/3–75–077. September 1975.

13. Ludwig, F.L. and E. Shelar. Site Selection for the Monitoring of Photochemical Air Pollutants. Stanford Research Institute, Menlo Park, CA. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Publication No. EPA–450/3–78–013. April 1978.

14. Lead Analysis for Kansas City and Cincinnati, PEDCo Environmental, Inc., Cincinnati, OH. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 66–02–2515, June 1977.

15. Barltrap, D. and C. D. Strelow. Westway Nursery Testing Project. Report to the Greater London Council. August 1976.

16. Daines, R. H., H. Moto, and D. M. Chilko. Atmospheric Lead: Its Relationship to Traffic Volume and Proximity to Highways. Environ. Sci. and Technol., 4:318, 1970.

17. Johnson, D. E., *et al.* Epidemiologic Study of the Effects of Automobile Traffic on Blood Lead Levels, Southwest Research Institute, Houston, TX. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA–600/1–78–055, August 1978.

18. Air Quality Criteria for Lead. Office of Research and Development, U.S. Environmental Protection Agency, Washington, DC EPA–600/8–83–028 aF–dF, 1986, and supplements EPA–600/8–89/049F, August 1990. (NTIS document numbers PB87–142378 and PB91–138420.)

19. Lyman, D. R. The Atmospheric Diffusion of Carbon Monoxide and Lead from an Expressway, Ph.D. Dissertation, University of Cincinnati, Cincinnati, OH. 1972.

20. Wechter, S.G. Preparation of Stable Pollutant Gas Standards Using Treated Aluminum Cylinders. ASTM STP. 598:40–54, 1976.

21. Wohlers, H.C., H. Newstein and D. Daunis. Carbon Monoxide and Sulfur Dioxide Adsorption On and Description From Glass, Plastic and Metal Tubings. J. Air Poll. Con. Assoc. 17:753, 1976.

22. Elfers, L.A. Field Operating Guide for Automated Air Monitoring Equipment. U.S. NTIS. p. 202, 249, 1971.

23. Hughes, E.E. Development of Standard Reference Material for Air Quality Measurement. ISA Transactions, 14:281–291, 1975.

24. Altshuller, A.D. and A.G. Wartburg. The Interaction of Ozone with Plastic and Metallic Materials in a Dynamic Flow System. Intern. Jour. Air and Water Poll., 4:70–78, 1961.

25. CFR Title 40 part 53.22, July 1976.

26. Butcher, S.S. and R.E. Ruff. Effect of Inlet Residence Time on Analysis of Atmospheric Nitrogen Oxides and Ozone, Anal. Chem., 43:1890, 1971.

27. Slowik, A.A. and E.B. Sansone. Diffusion Losses of Sulfur Dioxide in Sampling Manifolds. J. Air. Poll. Con. Assoc., 24:245, 1974.

28. Yamada, V.M. and R.J. Charlson. Proper Sizing of the Sampling Inlet Line for a Continuous Air Monitoring Station. Environ. Sci. and Technol., 3:483, 1969.

29. Koch, R.C. and H.E. Rector. Optimum Network Design and Site Exposure Criteria for Particulate Matter, GEOMET Technologies, Inc., Rockville, MD. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Contract No. 68–02–3584. EPA 450/4–87–009. May 1987.

30. Burton, R.M. and J.C. Suggs. Philadelphia Roadway Study. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, N.C. EPA–600/4–84–070 September 1984.

31. Technical Assistance Document For Sampling and Analysis of Ozone Precursors. Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. EPA 600/8–91–215. October 1991.

32. Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV. Meteorological Measurements. Atmospheric

Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. EPA 600/4–90–0003. August 1989.

33. On-Site Meteorological Program Guidance for Regulatory Modeling Applications. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. EPA 450/4–87–013. June 1987.

[44 FR 27571, May 10, 1979; 44 FR 72592, Dec. 14, 1979, as amended at 46 FR 44170, Sept. 3, 1981; 51 FR 9598, Mar. 19, 1986; 52 FR 24744—24748, July 1, 1987; 52 FR 27286, July 20, 1987; 58 FR 8474, 8475, Feb. 12, 1993; 60 FR 52324, Oct. 6, 1995; 62 FR 38854, July 18, 1997; 64 FR 3036, Jan. 20, 1999]

APPENDIX F TO PART 58—ANNUAL SLAMS AIR QUALITY INFORMATION

1. General
2. Required Information
2.1 Sulfur Dioxide (SO_2)
2.1.1 Site and Monitoring Information
2.1.2 Annual Summary Statistics
2.2 Total Suspended Particulates (TSP)
2.2.1 Site and Monitoring Information
2.2.2 Annual Summary Statistics
2.2.3 Episode and Other Unscheduled Sampling Data
2.3 Carbon Monoxide (CO)
2.3.1 Site and Monitoring Information
2.3.2 Annual Summary Statistics
2.4 Nitrogen Dioxide (NO_2)
2.4.1 Site and Monitoring Information
2.4.2 Annual Summary Statistics
2.5 Ozone(O_3)
2.5.1 Site and Monitoring Information
2.5.2 Annual Summary Statistics
2.6 Lead (Pb)
2.6.1 Site and Monitoring Information
2.6.2 Annual Summary Statistics
2.7 Particulate Matter (PM_{10})
2.7.1 Site and Monitoring Information
2.7.2 Annual Summary Statistics
2.7.3 Annual Summary Statistics
2.7.4 Episode and Other Unscheduled Sampling Data

1. *General*

This appendix describes information to be compiled and submitted annually to EPA for each ambient monitoring station in the SLAMS Network in accordance with §58.26. The annual summary statistics that are described in section 2 below shall be construed as only the minimum necessary statistics needed by EPA to overview national air quality status. They will be used by EPA to convey information to a variety of interested parties including environmental groups, Federal agencies, the Congress, and private citizens upon request. As the need arises, EPA may issue modifications to these minimum requirements to reflect changes in EPA policy concerning the National Ambient Air Quality Standards (NAAQS).

As indicated in §58.26(c), the contents of the SLAMS annual report shall be certified by the senior air pollution control officer in the State to be accurate to the best of his knowledge. In addition, the manner in which the data were collected must be certified to have conformed to the applicable quality assurance, air monitoring methodology, and probe siting criteria given in appendices A, C, and E to this part. A certified statement to this effect must be included with the annual report. As required by §58.26(a), the report must be submitted by July 1 of each year for data collected during the period January 1 to December 31 of the previous year.

EPA recognizes that most air pollution control agencies routinely publish air quality statistical summaries and interpretive reports. EPA encourages State and local agencies to continue publication of such reports and recommends that they be expanded, where appropriate, to include analysis of air quality trends, population exposure, and pollutant distributions. At their discretion, State and local agencies may wish to integrate the SLAMS report into routine agency publications.

2. *Required Information*

This paragraph describes air quality monitoring information and summary statistics which must be included in the SLAMS annual report. The required information is itemized below by pollutant. Throughout this appendix, the time of occurrence refers to the ending hour. For example, the ending hour of an 8-hour CO average from 12:01 a.m. to 8:00 a.m. would be 8:00 a.m.

For the purposes of range assignments the following rounding convention will be used. The air quality concentration should be rounded to the number of significant digits used in specifying the concentration intervals. The digit to the right of the last significant digit determines the rounding process. If this digit is greater than or equal to 5, the last significant digit is rounded up. The insignificant digits are truncated. For example, 100.5 ug/m^3 rounds to 101 ug/m^3 and 0.1245 ppm rounds to 0.12 ppm.

2.1 Sulfur Dioxide (SO_2)

2.1.1 Site and Monitoring Information. City name (when applicable), county name and street address of site location. AIRS-AQS site code. AIRS-AQS monitoring method code. Number of hourly observations. (*1*) Number of daily observations. (*2*)

2.1.2 Annual Summary Statistics. Annual arithmetic mean (ppm). Highest and second highest 24-hour averages (*3*) (ppm) and dates of occurrence. Highest and second highest 3-hour averages (*1*, *3*) (ppm) and dates and times (*1*) (ending hour) of occurrence. Number of exceedances of the 24-hour primary

NAAQS. (*3*) Number of exceedances of the 3-hour secondary NAAQS. (*3*) Number of 24-hour average concentrations (*4*) in ranges:

Range	Number of values
0.00 to 0.04 (ppm)	
0.05 to 0.08	
0.09 to 0.12	
0.13 to 0.16	
0.17 to 0.20	
0.21 to 0.24	
0.25 to 0.28	
Greater than .28	

2.2 Total Suspended Particulates (TSP)

2.2.1 Site and Monitoring Information. City name (when applicable), county name and street address of site location. AIRS-AQS site code. Number of daily observations.

2.2.2 Annual Summary Statistics. Annual arithmetic mean (μg/m^3) as specified in appendix K of part 50. Daily TSP values exceeding the level of the 24-hour PM_{10} NAAQS and dates of occurrence. If more than 10 occurrences, list only the 10 highest daily values. Sampling schedule used such as once every six days, once every three days, etc. Number of additional sampling days beyond sampling schedule used. Number of 24-hour average concentrations in ranges:

Range	Number of values
0 to 50 (μg/m^3)	
51 to 100	
101 to 150	
151 to 200	
201 to 250	
251 to 300	
301 to 400	
Greater than 400	

2.2.3 Episode and Other Unscheduled Sampling Data. List episode measurements, other unscheduled sampling data, and dates of occurrence. List the regularly scheduled sample measurements and date of occurrence that preceded the episode or unscheduled measurement.

2.3 Carbon Monoxide (CO)

2.3.1 Site and Monitoring Information. City name (when applicable), county name and street address of site location. AIRS-AQS site code. AIRS-AQS monitoring method code. Number of hourly observations.

2.3.2 Annual Summary Statistics. Highest and second highest 1-hour values (ppm) and date and time of occurrence. Highest and second highest 8-hour averages (*3*) (ppm) and date and time of occurrence (ending hour). Number of exceedances of the 1-hour primary NAAQS. Number of exceedances of the 8-hour average primary NAAQS. (*3*) Number of 8-hour average concentrations (*4*) in ranges:

Range	Number of values
0 to 4 (ppm)	
5 to 8 (ppm)	
9 to 12	
13 to 16	
17 to 20	
21 to 24	
25 to 28	
Greater than 28	

2.4 Nitrogen Dioxide (NO_2)

2.4.1 Site and Monitoring Information. City name (when applicable), county name, and street address of site location. AIRS-AQS site code. AIRS-AQS monitoring method code. Number of hourly observations. (*1*) Number of daily observations. (*2*)

2.4.2 Annual Summary Statistics. Annual arithmetic mean (ppm). Highest and second highest hourly averages (*3*) (ppm) and their dates and time of occurrence. Highest and second highest 24-hour averages (*2*) and their date of occurrence (ppm). Number of hourly average concentrations in ranges. (*1*)

Range	Number of values
.0 to .04 (ppm)	
.05 to .08	
.09 to .12	
.13 to .16	
.17 to .20	
.21 to .24	
.25 to .28	
Greater than 0.28	

2.5 Ozone (O_3)

2.5.1 Site and Monitoring Information. City name (when applicable), county name and street address of site location. AIRS-AQS site code. AIRS-AQS monitoring method code. Number of hourly observations.

2.5.2 Annual Summary Statistics. Four highest daily maximum hour values (ppm) and their dates and time of occurrence. Number of exceedances of the daily maximum 1-hour primary NAAQS. Number of daily maximum hour concentrations in ranges:

Range	Number of values
0 to .04 (ppm)	
.05 to .08	
.09 to .12	
.13 to .16	
.17 to .20	
.21 to .24	
.25 to .28	
Greater than .28	

2.6 Lead (Pb).

2.6.1 Site and Monitoring Information. City name (when applicable), county name, and street address of site location, AIRS-AQS site code. AIRS-AQS monitoring method code. Sampling interval of submitted data, e.g., twenty-four hour or quarterly composites.

2.6.2 Annual Summary Statistics. The four quarterly arithmetic averages given to two decimal places for the year together with the

number of twenty-four hour samples included in the average, as in the following format:

Quarter	Number of 24-hour samples	Quarterly arithmetic average (μg/m³)
Jan.–March		
April–June		
July–Sept		
Oct.–Dec		

2.7 Particulate Matter (PM_{10})

2.7.1 Site and Monitoring Information. City name (when applicable), county name, and street address of site location. AIRS-AQS site code. Number of daily observations.

2.7.2 Annual Summary Statistics. Annual arithmetic mean (μg/m³) as specified in appendix K of part 50. All daily PM_{10} values above the level of the 24-hour PM_{10} NAAQS and dates of occurrence. Sampling schedule used such as once every six days, once every three days, etc. Number of additional sampling days beyond sampling schedule used. Number of 24-hour average concentrations in ranges:

Range	Number of values
0 to 25 (μg/m³)	
26 to 50	
51 to 75	
76 to 100	
101 to 125	
126 to 150	
151 to 175	
176 to 200	
Greater than 200	

2.7.3 Annual Summary Statistics. Annual arithmetic mean (μg/m³) as specified in 40 CFR part 50, appendix N. All daily PM-fine values above the level of the 24-hour PM-fine NAAQS and dates of occurrence. Sampling schedule used such as once every 6 days, everyday, etc. Number of 24-hour average concentrations in ranges:

Range	Number of Values
0 to 15 (μg/m³)	
16 to 30	
31 to 50	
51 to 70	
71 to 90	
91 to 110	
Greater than 110	

2.7.4 Episode and Other Unscheduled Sampling Data. List episode measurements, other unscheduled sampling data, and dates of occurrence. List the regularly scheduled sample measurements and date of occurrence that preceded the episode or unscheduled measurement.

Footnotes

1. Continuous methods only.
2. Manual or intermittent methods only.
3. Based on nonoverlapping values computed according to procedures described in reference (1) or on individual intermittent measurements.
4. Based on overlapping running averages for continuous measurements as described in reference (1) or on individual measurement for intermittent methods.

Reference

1. ''Guidelines for the Interpretation of Air Quality Standards'' U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. OAQPS No. 1.2–008, February, 1977.

[44 FR 27571, May 10, 1979, as amended at 46 FR 44171, Sept. 3, 1981; 51 FR 9600, Mar. 19, 1986; 52 FR 24748, 24749, July 1, 1987; 59 FR 41628, Aug. 12, 1994; 62 FR 38854, July 18, 1997]

Appendix G to Part 58—Uniform Air Quality Index (AQI) and Daily Reporting

General Requirements

1. What is the AQI?
2. Why report the AQI?
3. Must I report the AQI?
4. What goes into my AQI report?
5. Is my AQI report for my MSA only?
6. How do I get my AQI report to the public?
7. How often must I report the AQI?
8. May I make exceptions to these reporting requirements?

Calculation

9. How does the AQI relate to air pollution levels?
10. Where do I get the pollutant concentrations to calculate the AQI?
11. Do I have to forecast the AQI?
12. How do I calculate the AQI?

Background and Reference Materials

13. What additional information should I know?

General Requirements

1. What Is the AQI?

The AQI is a tool that simplifies reporting air quality to the general public. The AQI incorporates into a single index concentrations of 5 criteria pollutants: ozone (O_3), particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). The scale of the index is divided into general categories that are associated with health messages.

2. Why Report the AQI?

The AQI offers various advantages:

a. It is simple to create and understand.

b. It conveys the health implications of air quality.

c. It promotes uniform use throughout the country.

3. Must I Report the AQI?

You must report the AQI daily if yours is a metropolitan statistical area (MSA) with a population over 350,000.

4. What Goes Into My AQI Report?

i. Your AQI report must contain the following:

a. The reporting area(s) (the MSA or subdivision of the MSA).

b. The reporting period (the day for which the AQI is reported).

c. The critical pollutant (the pollutant with the highest index value).

d. The AQI (the highest index value).

e. The category descriptor and index value associated with the AQI and, if you choose to report in a color format, the associated color. Use only the following descriptors and colors for the six AQI categories:

TABLE 1.—AQI CATEGORIES

For this AQI	Use this descriptor	And this color [1]
0 to 50	"Good"	Green.
51 to 100	"Moderate"	Yellow.
101 to 150	"Unhealthy for Sensitive Groups".	Orange.
151 to 200	"Unhealthy"	Red.
201 to 300	"Very Unhealthy"	Purple.
301 and above	"Hazardous"	Maroon.[1]

[1] Specific colors can be found in the most recent reporting guidance (Guideline for Public Reporting of Daily Air Quality—Air Quality Index (AQI)).

f. The pollutant specific sensitive groups for any reported index value greater than 100. Use the following sensitive groups for each pollutant:

When this pollutant has an index value above 100 * * *	Report these sensitive groups * * *
Ozone	Children and people with asthma are the groups most at risk.
$PM_{2.5}$	People with respiratory or heart disease, the elderly and children are the groups most at risk.
PM_{10}	People with respiratory disease are the group most at risk.
CO	People with heart disease are the group most at risk.
SO_2	People with asthma are the group most at risk.
NO_2	Children and people with respiratory disease are the groups most at risk.

ii. When appropriate, your AQI report may also contain the following:

a. Appropriate health and cautionary statements.

b. The name and index value for other pollutants, particularly those with an index value greater than 100.

c. The index values for sub-areas of your MSA.

d. Causes for unusual AQI values.

e. Actual pollutant concentrations.

5. Is My AQI Report for My MSA Only?

Generally, your AQI report applies to your MSA only. However, if a significant air quality problem exists (AQI greater than 100) in areas significantly impacted by your MSA but not in it (for example, O_3 concentrations are often highest downwind and outside an urban area), you should identify these areas and report the AQI for these areas as well.

6. How Do I Get My AQI Report to the Public?

You must furnish the daily report to the appropriate news media (radio, television, and newspapers). You must make the daily report publicly available at one or more places of public access, or by any other means, including a recorded phone message, a public Internet site, or facsimile transmission. When the AQI value is greater than 100, it is particularly critical that the reporting to the various news media be as extensive as possible. At a minimum, it should include notification to the media with the largest market coverages for the area in question.

7. How Often Must I Report the AQI?

You must report the AQI at least 5 days per week. Exceptions to this requirement are in section 8 of this appendix.

8. May I Make Exceptions to These Reporting Requirements?

i. If the index value for a particular pollutant remains below 50 for a season or year, then you may exclude the pollutant from your calculation of the AQI in section 12.

ii. If all index values remain below 50 for a year, then you may report the AQI at your discretion. In subsequent years, if pollutant

levels rise to where the AQI would be above 50, then the AQI must be reported as required in sections 3, 4, 6, and 7 of this appendix.

CALCULATION

9. How Does the AQI Relate to Air Pollution Levels?

For each pollutant, the AQI transforms ambient concentrations to a scale from 0 to 500. The AQI is keyed as appropriate to the national ambient air quality standards (NAAQS) for each pollutant. In most cases, the index value of 100 is associated with the numerical level of the short-term standard (i.e., averaging time of 24-hours or less) for each pollutant. Different approaches are taken for NO_2, for which no short-term standard has been established, and for $PM_{2.5}$, for which the annual standard is the principal vehicle for protecting against short-term concentrations. The index value of 50 is associated with the numerical level of the annual standard for a pollutant, if there is one, at one-half the level of the short-term standard for the pollutant, or at the level at which it is appropriate to begin to provide guidance on cautionary language. Higher categories of the index are based on increasingly serious health effects and increasing proportions of the population that are likely to be affected. The index is related to other air pollution concentrations through linear interpolation based on these levels. The AQI is equal to the highest of the numbers corresponding to each pollutant. For the purposes of reporting the AQI, the sub-indexes for PM_{10} and $PM_{2.5}$ are to be considered separately. The pollutant responsible for the highest index value (the reported AQI) is called the ''critical'' pollutant.

10. Where Do I Get the Pollutant Concentrations To Calculate the AQI?

You must use concentration data from population-oriented State/Local Air Monitoring Station (SLAMS) or parts of the SLAMS required under 40 CFR 58.20 for each pollutant except PM. For PM, you need only calculate and report the AQI on days for which you have measured air quality data (e.g., particulate monitors often report values only every sixth day). You may use particulate measurements from monitors that are not reference or equivalent methods (for example, continuous PM_{10} or $PM_{2.5}$ monitors) if you can relate these measurements by statistical linear regression to reference or equivalent method measurements.

11. Do I Have to Forecast the AQI?

You should forecast the AQI to provide timely air quality information to the public, but this is not required. If you choose to forecast the AQI, then you may consider both long-term and short-term forecasts. You can forecast the AQI at least 24-hours in advance using the most accurate and reasonable procedures considering meteorology, topography, availability of data, and forecasting expertise. The document ''Guideline for Developing an Ozone Forecasting Program'' (the Forecasting Guidance) will help you start a forecasting program. You can also issue short-term forecasts by predicting 8-hour ozone values from 1-hour ozone values using methods suggested in the Reporting Guidance, ''Guideline for Public Reporting of Daily Air Quality.''

12. How Do I Calculate the AQI?

i. The AQI is the highest value calculated for each pollutant as follows:

a. Identify the highest concentration among all of the monitors within each reporting area and truncate the pollutant concentration to one more than the significant digits used to express the level of the NAAQS for that pollutant. This is equivalent to the rounding conventions used in the NAAQS.

b. Using Table 2, find the two breakpoints that contain the concentration.

c. Using Equation 1, calculate the index.

d. Round the index to the nearest integer.

TABLE 2—BREAKPOINTS FOR THE AQI

These breakpoints						Equal these AQIs * * *		Category
O_3 (ppm) 8-hour	O_3 (ppm) 1-hour [1]	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	CO (ppm)	SO_2 (ppm)	NO_2 (ppm)	AQI	
0.000–0.064		0.0–15.4	0–54	0.0–4.4	0.000–0.034	([2])	0–50	Good.
0.065–0.084		15.5–40.4	55–154	4.5–9.4	0.035–0.144	([2])	51–100	Moderate.
0.085–0.104	0.125–0.164	40.5–65.4	155–254	9.5–12.4	0.145–0.224	([2])	101–150	Unhealthy for sensitive groups.
0.105–0.124	0.165–0.204	4 65.5-150.4	255–354	12.5–15.4	0.225–0.304	([2])	151–200	Unhealthy.
0.125–0.374	0.205–0.404	4 150.5-250.4	355–424	15.5–30.4	0.305–0.604	0.65–1.24	201–300	Very unhealthy.
([3])	0.405–0.504	4 250.5-350.4	425–504	30.5–40.4	0.605–0.804	1.25–1.64	301–400	
([3])	0.505–0.604	4 350.5-500.4	505–604	40.5–50.4	0.805–1.004	1.65–2.04	401–500	Hazardous.

[1] Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated, and the maximum of the two values reported.

[2] NO_2 has no short-term NAAQS and can generate an AQI only above an AQI value of 200.

[3] 8-hour O_3 values do not define higher AQI values ($\geq$ 301). AQI values of 301 or higher are calculated with 1-hour O_3 concentrations.

[4] If a different SHL for $PM_{2.5}$ is promulgated, these numbers will change accordingly.

ii. If the concentration is equal to a breakpoint, then the index is equal to the corresponding index value in Table 2. However, Equation 1 can still be used. The results will be equal. If the concentration is between two breakpoints, then calculate the index of that pollutant with Equation 1. You must also note that in some areas, the AQI based on 1-hour O_3 will be more precautionary than using 8-hour values (see footnote 1 to Table 2). In these cases, you may use 1-hour values as well as 8-hour values to calculate index values and then use the maximum index value as the AQI for O_3.

$$I_p = \frac{I_{Hi} - I_{Lo}}{BP_{HI} - BP_{Lo}}\left(C_p - BP_{Lo}\right) + I_{Lo} \qquad \text{(Equation 1)}$$

Where:

I_p = the index value for $pollutant_p$

C_p = the truncated concentration of $pollutant_p$

BP_{Hi} = the breakpoint that is greater than or equal to C_p

BP_{Lo} = the breakpoint that is less than or equal to C_p

I_{Hi} = the AQI value corresponding to BP_{Hi}

I_{lo} = the AQI value corresponding to BP_{Lo}.

iii. If the concentration is larger than the highest breakpoint in Table 2 then you may use the last two breakpoints in Table 2 when you apply Equation 1.

EXAMPLE

iv. Using Table 2 and Equation 1, calculate the index value for each of the pollutants measured and select the one that produces the highest index value for the AQI. For example, if you observe a PM_{10} value of 210 μg/m³, a 1-hour O_3 value of 0.156 ppm, and an 8-hour O_3 value of 0.130 ppm, then do this:

a. Find the breakpoints for PM_{10} at 210 μg/m³ as 155 μg/m³ and 254 μg/m³, corresponding to index values 101 and 150;

b. Find the breakpoints for 1-hour O_3 at 0.156 ppm as 0.125 ppm and 0.164 ppm, corresponding to index values 101 and 150;

c. Find the breakpoints for 8-hour O_3 at 0.130 ppm as 0.125 ppm and 0.374 ppm, corresponding to index values 201 and 300;

d. Apply Equation 1 for 210 μg/m³, PM_{10}:

$$\frac{150-101}{254-155}(210-155)+101=128.$$

e. Apply Equation 1 for 0.156 ppm, 1-hour O_3:

$$\frac{150-101}{0.164-0.125}(0.156-0.125)+101=140$$

f. Apply Equation 1 for 0.130 ppm, 8-hour O_3:

$$\frac{300-201}{0.374-0.125}(0.130-0.125)+201=203$$

g. Find the maximum, 203. This is the AQI. The minimal AQI report would read:

v. Today, the AQI for my city is 203 which is very unhealthy, due to ozone. Children and people with asthma are the groups most at risk.

BACKGROUND AND REFERENCE MATERIALS

13. What Additional Information Should I Know?

The EPA has developed a computer program to calculate the AQI for you. The program works with Windows 95, it prompts for inputs, and it displays all the pertinent information for the AQI (the index value, color, category, sensitive group, health effects, and cautionary language). The EPA has also prepared a brochure on the AQI that explains the index in detail (The Air Quality Index), Reporting Guidance (Guideline for Public Reporting of Daily Air Quality) that provides associated health effects and cautionary statements, and Forecasting Guidance (Guideline for Developing an Ozone Forecasting Program) that explains the steps necessary to start an air pollution forecasting program. You can download the program and the guidance documents at www.epa.gov/airnow.

[64 FR 42547, Aug. 4, 1999]

PART 59—NATIONAL VOLATILE ORGANIC COMPOUND EMISSION STANDARDS FOR CONSUMER AND COMMERCIAL PRODUCTS

Sec.

Subpart A [Reserved]

Subpart B—National Volatile Organic Compound Emission Standards for Automobile Refinish Coatings

59.100 Applicability and designation of regulated entity.
59.101 Definitions.
59.102 Standards.
59.103 Container labeling requirements.
59.104 Compliance provisions.
59.105 Reporting requirements.
59.106 Variance.
59.107 Addresses of EPA Regional offices.
59.108 State authority.
59.109 Circumvention.
59.110 Incorporations by reference.
59.111 Availability of information and confidentiality.

TABLE 1 TO SUBPART B—VOLATILE ORGANIC COMPOUND (VOC) CONTENT LIMITS FOR AUTOMOBILE REFINISH COATINGS

Subpart C—National Volatile Organic Compound Emission Standards for Consumer Products

59.201 Applicability and designation of regulated entity.
59.202 Definitions.
59.203 Standards for consumer products.
59.204 Innovative product provisions.
59.205 Labeling.
59.206 Variances.
59.207 Test methods.
59.208 Charcoal lighter material testing protocol.
59.209 Recordkeeping and reporting requirements.
59.210 Addresses of EPA Regional Offices.
59.211 State authority.
59.212 Circumvention.
59.213 Incorporations by reference.
59.214 Availability of information and confidentiality.
TABLE 1 TO SUBPART C—VOC CONTENT LIMITS BY PRODUCT CATEGORY
TABLE 2 TO SUBPART C—HVOC CONTENT LIMITS FOR UNDERARM DEODORANTS AND UNDERARM ANTIPERSPIRANTS
APPENDIX A TO SUBPART C OF PART 59—FIGURES

Subpart D—National Volatile Organic Compound Emission Standards for Architectural Coatings

59.400 Applicability and compliance dates.
59.401 Definitions.
59.402 VOC content limits.
59.403 Exceedance fees.
59.404 Tonnage exemption.
59.405 Container labeling requirements.
59.406 Compliance provisions.
59.407 Recordkeeping requirements.
59.408 Reporting requirements.
59.409 Addresses of EPA Offices.
59.410 State authority.
59.411 Circumvention.
59.412 Incorporations by reference.
59.413 Availability of information and confidentiality.
APPENDIX A TO SUBPART D OF PART 59—DETERMINATION OF VOLATILE MATTER CONTENT OF METHACRYLATE MULTICOMPONENT COATINGS USED AS TRAFFIC MARKING COATINGS
TABLE 1 TO SUBPART D—VOLATILE ORGANIC COMPOUND (VOC) CONTENT LIMITS FOR ARCHITECTURAL COATINGS

AUTHORITY: 42 U.S.C. 7511b(e).

SOURCE: 64 FR 48815, Sept. 11, 1998, unless otherwise noted..

Subpart A—[Reserved]

Subpart B—National Volatile Organic Compound Emission Standards for Automobile Refinish Coatings

§ 59.100 Applicability and designation of regulated entity.

(a) The provisions of this subpart apply to automobile refinish coatings and coating components manufactured on or after January 11, 1999 for sale or distribution in the United States.

(b) Regulated entities are manufacturers and importers of automobile refinish coatings or coating components that sell or distribute these coatings or coating components in the United States.

(c) The provisions of this subpart do not apply to automobile refinish coatings or coating components meeting the criteria in paragraphs (c)(1) through (c)(6) of this section.

(1) Coatings or coating components that are manufactured (in or outside the United States) exclusively for sale outside the United States.

(2) Coatings or coating components that are manufactured (in or outside the United States) before January 11, 1999.

(3) Coatings or coating components that are manufactured (in or outside the United States) for use by original equipment manufacturers.

(4) Coatings that are sold in nonrefillable aerosol containers.

(5) Lacquer topcoats or their components.

(6) Touch-up coatings.

§ 59.101 Definitions.

Adhesion promoter means a coating designed to facilitate the bonding of a primer or topcoat on surfaces such as trim moldings, door locks, and door sills, where sanding is impracticable, and on plastic parts and the edges of sanded areas.

Administrator means the Administrator of the United States Environmental Protection Agency (U.S. EPA) or an authorized representative.

Automobile means passenger cars, vans, motorcycles, trucks, and all other mobile equipment.

Automobile refinish coating component means any portion of a coating, such as

a reducer or thinner, hardener, additive, etc., recommended (by its manufacturer or importer) to distributors or end-users for automobile refinishing. The raw materials used to produce the components that are mixed by the end-user to prepare a coating for application are not considered automobile refinish coating components. Any reference to automobile refinishing made by a manufacturer or importer on a container or in product literature constitutes a recommendation for automobile refinishing.

Automobile refinish coating or coating component importer, or importer, means any company, group, or individual that brings automobile refinish coatings or coating components from a location outside the United States into the United States for sale or distribution in the United States.

Automobile refinish coating or coating component manufacturer, or manufacturer, means any company, group, or individual that produces or packages automobile refinish coatings or coating components for sale or distribution in the United States, including an entity which produces or packages such coatings or coating components under a private label for another party.

Automobile refinishing means the process of coating automobiles or their parts, including partial body collision repairs, that is subsequent to the original coating applied at an automobile original equipment manufacturing plant.

Container means the individual receptacle that holds a coating or coating component for storage and distribution.

Cut-in, or jambing, clearcoat means a fast-drying, ready-to-spray clearcoat applied to surfaces such as door jambs and trunk and hood edges to allow for quick closure.

Elastomeric coating means a coating designed for application over flexible parts, such as elastomeric bumpers.

Exempt compounds means specific organic compounds that are not considered volatile organic compounds due to negligible photochemical reactivity. The exempt compounds are specified in § 51.100(s) of this chapter.

Hardener means a coating component specifically designed to promote a faster cure of an enamel finish.

Impact-resistant coating means a coating designed to resist chipping caused by road debris.

Label means any written, printed, or graphic matter affixed to or appearing upon any automobile refinish coating or coating component container or package for purposes of identifying or giving information on the product, use of the product, or contents of the container or package.

Lacquer means a thermoplastic coating which dries primarily by solvent evaporation, and which is resoluble in its original solvent.

Low-gloss coating means a coating which exhibits a gloss reading less than or equal to 25 on a 60° glossmeter.

Mixing instructions means the coating or coating component manufacturer's or importer's specification of the quantities of coating components for mixing a coating.

Mobile equipment means any equipment that is physically capable of being driven or drawn upon a highway including, but not limited to, the following types of equipment: construction vehicles (such as mobile cranes, bulldozers, concrete mixers); farming equipment (wheel tractor, plow, pesticide sprayer); hauling equipment (truck trailers, utility bodies, camper shells); and miscellaneous equipment (street cleaners, golf carts).

Multi-colored topcoat means a topcoat that exhibits more than one color, is packaged in a single container, and camouflages surface defects on areas of heavy use, such as cargo beds and other surfaces of trucks and other utility vehicles.

Pretreatment wash primer means a primer that contains a minimum of 0.5 percent acid, by weight, that is applied directly to bare metal surfaces to provide corrosion resistance and to promote adhesion of subsequent coatings.

Primer means any coating applied prior to the application of a topcoat for the purpose of corrosion resistance and/or adhesion.

Primer-sealer means any coating applied prior to the application of a topcoat for the purpose of corrosion resistance, adhesion of the topcoat, and/or

color uniformity and to promote the ability of an undercoat to resist penetration by the topcoat.

Primer-surfacer means any coating applied prior to the application of a topcoat for the purpose of filling surface imperfections in the substrate, corrosion resistance, and/or adhesion of the topcoat.

Reducer means any solvent used to thin enamels.

Underbody coating means a coating designed for protection and sound deadening that is typically applied to the wheel wells and underbody of an automobile.

Single-stage topcoat means a topcoat consisting of only one coating.

Specialty coatings means adhesion promoters, low-gloss coatings, bright metal trim repair coatings, jambing (cut-in) clearcoats, elastomeric coatings, impact resistant coatings, underbody coatings, uniform finish blenders, and weld-through primers.

Thinner means any solvent used to reduce the viscosity or solids content of a coating.

Three-stage topcoat means a topcoat composed of a pigmented basecoat, a midcoat, and a transparent clearcoat.

Topcoat means any coating or series of coatings applied over a primer or an existing finish for the purpose of protection or beautification.

Touch-up coating means a coating applied by brush, air-brush, or nonrefillable aerosol can to cover minor surface damage.

Two-stage topcoat means a topcoat consisting of a pigmented basecoat and a transparent clearcoat.

Uniform finish blender means a coating designed to blend a repaired topcoat into an existing topcoat.

United States means the United States of America, including the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and Commonwealth of the Northern Mariana Islands.

Volatile organic compounds or *VOC* means any compound of carbon, other than those organic compounds that the Administrator has excluded in 40 CFR part 51, § 51.100 from this definition.

VOC content means the weight of VOC per volume of coating, calculated according to the procedures in § 59.104(a) of this subpart.

Water hold-out coating means a coating applied to the interior cavity areas of doors, quarter panels and rocker panels for the purpose of corrosion resistance to prolonged water exposure.

Weld-through primer means a primer that is applied to an area before welding is performed, and that provides corrosion resistance to the surface after welding has been performed.

§ 59.102 Standards.

(a) Except as provided in § 59.106 of this subpart, any coating resulting from the mixing instructions of a regulated entity must meet the VOC content limit given in table 1 of this subpart. VOC content is determined according to § 59.104(a).

(b) Different combinations or mixing ratios of coating components constitute different coatings. For example, coating components may be mixed one way to make a primer, and mixed another way to make a primer sealer. Each of these coatings must meet its corresponding VOC content limit in table 1 of this subpart. If the same combination and mixing ratio of coating components is recommended by a regulated entity for use in more than one category in table 1 of this subpart, then the most restrictive VOC content limit shall apply.

§ 59.103 Container labeling requirements.

Each regulated entity subject to this subpart must clearly display on each automobile refinish coating or coating component container or package, the day, month, and year on which the product was manufactured, or a code indicating such date.

§ 59.104 Compliance provisions.

(a) For the purpose of determining compliance with the VOC content limits in § 59.102(a) of this subpart, each regulated entity shall determine the VOC content of a coating using the procedures described in paragraph (a)(1) or (a)(2) of this section, as appropriate.

(1) Determine the VOC content in grams of VOC per liter of coating prepared for application according to its

mixing instructions, excluding the volume of any water or exempt compounds. VOC content shall be calculated using the following equation:

$$VOC = \frac{(W_v - W_w - W_{ec})}{(V - V_w - V_{ec})}$$

Where:

VOC content = grams of VOC per liter of coating;
W_v = mass of total volatiles, in grams;
W_w = mass of water, in grams;
W_{ec} = mass of exempt compounds, in grams;
V = volume of coating, in liters;
V_w = volume of water, in liters; and
V_{ec} = volume of exempt compounds, in liters.

(2) The VOC content of a multi-stage topcoat shall be calculated using the following equation:

$$VOC_{multi} = \frac{VOC_{bc} + \sum_{i=0}^{M} VOC_{mci} + 2\,(VOC_{cc})}{M + 3}$$

Where:

VOC_{multi} = VOC content of a multi-stage topcoat, in grams of VOC per liter of coating;
VOC_{bc} = VOC content of the basecoat, as determined in paragraph (a)(1) or (f) of this section;
VOC_{mci} = VOC content of midcoat i, as determined in paragraph (a)(1) or (f) of this section;
VOC_{cc} = VOC content of the clearcoat, as determined in paragraph (a)(1) or (f) of this section; and
M = Number of midcoats.

(b) To determine the composition of a coating in order to perform the calculations in paragraph (a) of this section, the reference method for VOC content is Method 24 of appendix A of 40 CFR part 60, except as provided in paragraph (f) of this section. To determine the VOC content of a coating, the regulated entity may use Method 24 of appendix A of 40 CFR part 60, an alternative method as provided in paragraph (f) of this section, or any other reasonable means for predicting that the coating has been formulated as intended (e.g., quality assurance checks, recordkeeping). However, if there are any inconsistencies between the results of a Method 24 test and any other means for determining VOC content, the Method 24 test results will govern. The Administrator may require the regulated to conduct a Method 24 analysis.

(c) If a regulated entity recommends that its coating component(s) be combined with coating components of another regulated entity, and if the coating resulting from such a combination does not comply with the VOC content limit in § 59.102 (a) of this subpart, then the former regulated entity is out of compliance, unless the entity submits Method 24 data to the Administrator demonstrating that its recommended combination of coating components meets the VOC content limit in § 59.102(a). If the latter regulated entity does not make the recommendation of such use of the coating components, then that entity is not out of compliance for purposes of that resulting coating.

(d) Pretreatment wash primers: Except as provided in paragraph (f) of this section, the acid weight percent of pretreatment wash primers must be determined using the American Society for Testing and Materials Test Method D 1613–96 (incorporated by reference in § 59.110). If the pigment in a pretreatment wash primer prevents the use of this test method for determining the acid weight percent of the coating, then the test method shall be used for the nonpigmented component of the coating, and the acid weight percent shall be calculated based on the acid content of the nonpigmented component and the mixing ratio of the nonpigmented component to the remaining components recommended by the regulated entity.

(e) Low-gloss coatings: Except as provided in paragraph (f) of this section, the gloss reading of low-gloss coatings must be determined using the American Society for Testing and Materials Test Method D 523–89 (incorporated by reference in § 59.110).

(f) The Administrator may approve, on a case-by-case basis, a regulated entity's use of an alternative method in lieu of Method 24 for determining the VOC content of coatings if the alternative method is demonstrated to the Administrator's satisfaction to provide results that are acceptable for purposes

of determining compliance with this subpart.

(g) The Administrator may determine a regulated entity's compliance with the provisions of this subpart based on information required by this subpart or any other information available to the Administrator.

[63 FR 48815, Sept. 11, 1998; 63 FR 64761, Nov. 23, 1998]

§ 59.105 Reporting requirements.

(a) Each regulated entity must submit an initial report no later than January 11, 1999 or within 180 days of the date that the regulated entity first manufactures or imports automobile refinish coatings or coating components, whichever is later. The initial report must include the information in paragraphs (a)(1) through (a)(4) of this section.

(1) The name and mailing address of the regulated entity.

(2) An explanation of each date code, if such codes are used to represent the date of manufacture, as provided in § 59.103.

(3) The street address of each of the regulated entity's facilities in the United States that is producing, packaging, or importing automobile refinish coatings or coating components subject to the provisions of this subpart.

(4) A list of the categories from table 1 of this subpart for which the regulated entity recommends the use of automobile refinish coatings or coating components.

(b) Each regulated entity must submit an explanation of any new date codes used by the regulated entity no later than 30 days after products bearing the new date code are first introduced into commerce.

§ 59.106 Variance.

(a) Any regulated entity that cannot comply with the requirements of this subpart because of circumstances beyond its reasonable control may apply in writing to the Administrator for a temporary variance. The variance application must include the information specified in paragraphs (a)(1) through (a)(3).

(1) The specific grounds upon which the variance is sought.

(2) The proposed date(s) by which the regulated entity will achieve compliance with the provisions of this subpart. This date must be no later than 5 years after the issuance of a variance.

(3) A compliance plan detailing the method(s) by which the regulated entity will achieve compliance with the provisions of this subpart.

(b) Upon receipt of a variance application containing the information required in paragraph (a) of this section, the Administrator will publish a notice of such application in the FEDERAL REGISTER and, if requested by any party, will hold a public hearing to determine whether, under what conditions, and to what extent, a variance from the requirements of this subpart is necessary and will be granted. If requested, a hearing will be held no later than 75 days after receipt of a variance application. Notice of the time and place of the hearing will be sent to the applicant by certified mail not less than 30 days prior to the hearing. At least 30 days prior to the hearing, the variance application will be made available to the public for inspection. Information submitted to the Administrator by a variance applicant may be claimed as confidential. The Administrator may consider such confidential information in reaching a decision on a variance application. Interested members of the public will be allowed a reasonable opportunity to testify at the hearing.

(c) The Administrator will issue a variance if the criteria specified in paragraphs (c)(1) and (c)(2) are met to the satisfaction of the Administrator.

(1) If complying with the provisions of this subpart would not be technologically or economically feasible, and

(2) The compliance plan proposed by the applicant can reasonably be implemented and will achieve compliance as expeditiously as possible.

(d) Any variance will specify dates by which the regulated entity will achieve increments of progress towards compliance, and will specify a final compliance date by which the regulated entity will achieve compliance with this subpart.

(e) A variance will cease to be effective upon failure of the party to whom

the variance was issued to comply with any term or condition of the variance.

(f) Upon the application of any party, the Administrator may review and, for good cause, modify or revoke a variance after holding a public hearing in accordance with the provisions of paragraph (b) of this section.

§ 59.107 Addresses of EPA Regional Offices.

All requests, reports, submittals, and other communications to the Administrator pursuant to this regulation shall be submitted to the Regional Office of the EPA which serves the State or territory in which the corporate headquarters of the regulated entity resides. These areas are indicated in the following list of EPA Regional Offices.

EPA Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont), Director, Office of Environmental Stewardship, Mailcode: SAA, JFK Building, Boston, MA 02203.

EPA Region II (New Jersey, New York, Puerto Rico, Virgin Islands), Director, Division of Enforcement and Compliance Assistance, 290 Broadway, New York, NY 10007–1866.

EPA Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia), Air Protection Division, 1650 Arch Street, Philadelphia, PA 19103.

EPA Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), Director, Air, Pesticides and Toxics, Management Division, 345 Courtland Street, NE., Atlanta, GA 30365.

EPA Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin), Director, Air and Radiation Division, 77 West Jackson Blvd., Chicago, IL 60604–3507.

EPA Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, Texas), Director, Air, Pesticides and Toxics Division, 1445 Ross Avenue, Dallas, TX 75202–2733.

EPA Region VII (Iowa, Kansas, Missouri, Nebraska), Director, Air and Toxics Division, 726 Minnesota Avenue, Kansas City, KS 66101.

EPA Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming), Director, Air and Toxics Division, 999 18th Street, 1 Denver Place, Suite 500, Denver, Colorado 80202–2405.

EPA Region IX (American Samoa, Arizona, California, Guam, Hawaii, Nevada), Director, Air and Toxics Division, 75 Hawthorne Street, San Francisco, CA 94105.

EPA Region X (Alaska, Oregon, Idaho, Washington), Director, Air and Toxics Division, 1200 Sixth Avenue, Seattle, WA 98101.

§ 59.108 State Authority.

The provisions in this regulation shall not be construed in any manner to preclude any State or political subdivision thereof from:

(a) Adopting and enforcing any emission standard or limitation applicable to a manufacturer or importer of automobile refinish coatings or components in addition to the requirements of this subpart.

(b) Requiring the manufacturer or importer of automobile refinish coatings or components to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of a facility for manufacturing an automobile refinish coating component.

§ 59.109 Circumvention.

Each manufacturer and importer of any automobile refinish coating or component subject to the provisions of this subpart must not alter, destroy, or falsify any record or report, to conceal what would otherwise be noncompliance with this subpart. Such concealment includes, but is not limited to, refusing to provide the Administrator access to all required records and date-coding information, altering the VOC content of a coating or component batch, or altering the results of any required tests to determine VOC content.

§ 59.110 Incorporations by Reference.

(a) The following material is incorporated by reference in the paragraphs noted in § 59.104. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on the date of the approval, and notice of any changes in these materials will be published in the FEDERAL REGISTER.

(1) ASTM D 1613–96, Standard Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products, IBR approved for § 59.104(d).

(2) ASTM D 523–89, Standard Test Method for Specular Gloss, IBR approved for § 59.104(e).

(b) The materials are available for inspection at the Office of the Federal

Register, 800 North Capitol Street, NW, suite 700, Washington, DC; the Air and Radiation Docket and Information Center, U.S. EPA, 401 M St., SW., Washington, DC; and at the EPA Library (MD–35), U.S. EPA, Research Triangle Park, North Carolina. The materials are available for purchase from the following address: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA, 19428, telephone number (610) 832–9500.

§ 59.111 Availability of information and confidentiality.

(a) Availability of information. The availability to the public of information provided to or otherwise obtained by the Administrator under this part shall be governed by part 2 of this chapter.

(b) Confidentiality. All confidential business information entitled to protection under section 114(c) of the Act that must be submitted or maintained by each regulated entity pursuant to this section shall be treated in accordance with 40 CFR part 2, subpart B.

TABLE 1 TO SUBPART B—VOLATILE ORGANIC COMPOUND (VOC) CONTENT LIMITS FOR AUTOMOBILE REFINISH COATINGS

Coating category	Grams VOC per liter	Pounds VOC per gallon [a]
Pretreatment wash primers	780	6.5
Primers/primer surfacers	580	4.8
Primer sealers	550	4.6
Single/two-stage topcoats	600	5.0
Topcoats of more than two stages	630	5.2
Multi-colored topcoats	680	5.7
Specialty coatings	840	7.0

[a] English units are provided for information only. Compliance will be determined based on the VOC content limit, as expressed in metric units.

Subpart C—National Volatile Organic Compound Emission Standards for Consumer Products

SOURCE: 63 FR 48831, Sept. 11, 1998, unless other noted.

§ 59.201 Applicability and designation of regulated entity.

(a) The provisions of the subpart apply to consumer products manufactured or imported on or after December 10, 1998 for sale or distribution in the United States.

(b) The regulated entity is: the manufacturer or importer of the product; and any distributor that is named on the product label. The manufacturer or importer of the product is a regulated entity for purposes of compliance with the volatile organic compounds (VOC) content or emission limits in § 49.203, regardless of whether the manufacturer or importer is named on the label or not. The distributor, if named on the label, is the regulated entity for purposes of compliance with all sections of this part except for § 59.203. Distributors whose names do not appear on the label are not regulated entities. If no distributor is named on the label, then the manufacturer or importer is responsible for compliance with all sections of this part.

(c) The provisions of this subpart do not apply to consumer products that meet the criteria specified in paragraph (c)(1) through (c)(7) of this section.

(1) Any consumer product manufacturer in the United States for shipment and use outside of the United States.

(2) Insecticides and air fresheners containing at least 98-percent paradichlorobenzene or at least 98-percent naphthalene.

(3) Adhesives sold in containers of 0.03 liter (1 ounce) or less.

(4) Bait station insecticides. For the purpose of this subpart, bait station insecticides are containers enclosing an insecticidal bait that does not weigh more than 14 grams (0.5 ounce), where

bait is designed to be ingested by insects and is composed of solid material feeding stimulants with less than 5-percent by weight active ingredients.

(5) Air fresheners whose VOC constituents, as defined in §§ 59.202 and 59.203(f), consist of 100-percent fragrance.

(6) Non-aerosol moth proofing products that are principally for the protection of fabric from damage by moths and other fabric pests in adult, juvenile, or larval forms.

(7) Flooring seam sealers used to join or fill the seam between two adjoining pieces of flexible sheet flooring.

§ 59.202 Definitions.

The terms used in this subpart are defined in the Clean Air Act (Act) or in this section as follows:

Administrator means the Administrator of the United States Environmental Protection Agency (EPA) or an authorized representative.

Aerosol cooking spray means any aerosol product designed either to reduce sticking on cooking and baking surfaces or to be directly applied on food for the purpose of reducing sticking on cooking and baking surfaces, or both.

Aerosol product means a product characterized by a pressurized spray system that dispenses product ingredients in aerosol form by means of a propellant (i.e., a liquefied or compressed gas that is used in whole or in part, such as a co-solvent, to expel a liquid or any other material from the same self-pressurized container or from a separate container) or mechanically induced force. ''Aerosol product'' does not include pump sprays.

Agricultural use means the use of any pesticide or method or device for the control of pests in connection with the commercial production, storage, or processing of any animal or plant crop. ''Agricultural use'' does not include the sale or use of pesticides in properly labeled packages or containers that are intended for:

(1) Household use;

(2) Use in structural pest control; or

(3) Institutional use.

Air freshener means any consumer product including, but not limited to, sprays, wicks, powders, and crystals designed for the purpose of masking odors, or freshening, cleaning, scenting, or deodorizing the air. This does not include products that are used on the human body, products that function primarily as cleaning products, disinfectant products claiming to deodorize by killing germs on surfaces, or institutional/industrial disinfectants when offered for sale solely through institutional and industrial channels of distribution. It does include spray disinfectants and other products that are expressly represented for use as air fresheners, except institutional and industrial disinfectants when offered for sale through institutional and industrial channels of distribution. To determine whether a product is an air freshener, all verbal and visual representations regarding product use on the label or packaging and in the product's literature and advertising may be considered. The presence of, and representations about, a product's fragrance and ability to deodorize (resulting from surface application) shall not constitute a claim of air freshening.

All other forms means all consumer product forms for which no form-specific VOC standard is specified. Unless specified otherwise by the applicable VOC standard, ''all other forms'' include, but are not limited to, solids,liquids, wicks, powders, crystals, and cloth or paper wipes (towelettes).

Automotive windshield washer fluid means any liquid designed for use in a motor vehicle windshield washer system either as an antifreeze or for the purpose of cleaning, washing, or wetting the windshield. ''Automotive windshield washer fluid'' does not include fluids placed by the manufacturer in a new vehicle.

Bathroom and tile cleaner means a product designed to clean tile or surfaces in bathrooms. ''Bathroom and tile cleaner'' does not include products specifically designed to clean toilet bowls or toilet tanks.

Carburetor and choke cleaner means a product designed to remove dirt and other contaminants from a carburetor or choke. ''Carburetor and choke cleaner'' does not include products designed to be introduced directly into the fuel lines or fuel storage tank prior to introduction into the carburetor, or solvent use regulated under 40 CFR part

63, subpart T (halogenated solvent national emission standards for hazardous air pollutants (NESHAP)).

Charcoal lighter material means any combustible material designed to be applied on, incorporated in, added to, or used with charcoal to enhance ignition. ''Charcoal lighter material'' does not include any of the following:

(1) Electrical starters and probes;

(2) Metallic cylinders using paper tinder;

(3) Natural gas; and

(4) Propane.

Construction and panel adhesive means any one-component household adhesive having gap-filling capabilities that distributes stress uniformly throughout the bonded area resulting in a reduction or elimination of mechanical fasteners.

Consumer means any person who purchases or acquires any consumer product for personal, family, household, or institutional use. Persons acquiring a consumer product for resale are not ''consumers'' of that product.

Consumer product means any household or institutional product (including paints, coatings, and solvents), or substance, or article (including any container or packaging) held by any person, the use, consumption, storage, disposal, destruction, or decomposition of which may result in the release of VOC. For the purposes of this subpart, consumer product means any product listed in tables 1 or 2 of this subpart.

Contact adhesive means any household adhesive that:

(1) When applied to two substrates, forms an instantaneous, nonrepositionable bond;

(2) When dried to touch, exhibits a minimum 30-minute bonding range; and

(3) Bonds only to itself without the need for reactivation by solvents or heat.

Container or packaging means the part or parts of the consumer product that serve only to contain, enclose, incorporate, deliver, dispense, wrap, or store the chemically formulated substance or mixture of substances that is solely responsible for accomplishing the purposes for which the product was designed or intended. ''Container or packaging'' includes any article onto or into which the principal display panel is incorporated, etched, printed, or attached.

Crawling bug insecticide means any insecticide product that is designed for use against crawling arthropods including, but not limited to, ants, cockroaches, mites (but not house dust mites), silverfish, or spiders. ''Crawling bug insecticide'' does not include products for agricultural use or products designed to be used exclusively on humans or animals.

Distributor means any person to whom a consumer product is sold or supplied for the purposes of resale or distribution in commerce.

Double-phase aerosol air freshener means an aerosol air freshener with liquid contents in two or more distinct phases that requires the product container to be shaken before use to mix the phases, producing an emulsion.

Dusting aid means a product designed to assist in removing dust and other soils from floors and other surfaces without leaving a wax or silicone-based coating. ''Dusting aid'' does not include products that consist entirely of compressed gases for use in electronic or other specialty areas.

Engine degreaser means a cleaning product designed to remove grease, grime, oil, and other contaminants from the external surfaces of engines and other mechanical parts. ''Engine degreaser'' does not include any solvent used in parts washing equipment, or any solvent use regulated under 40 CFR part 63, subpart T (halogenated solvent NESHAP).

Fabric protectant means a product designed to be applied to fabric substrates to protect the surface from soiling from dirt and other impurities or to reduce absorption of water into the fabric's fibers. ''Fabric protectant'' does not include silicone-based products whose function is to provide water repellency, or products designed for use solely on fabrics that are labeled ''dry clean only.''

Flea and tick insecticide means any insecticide product that is designed for use against fleas, ticks, and their larvae, or their eggs. ''Flea and tick insecticide'' does not include products that are designed to be used exclusively on humans or animals or their bedding.

Flexible flooring material means asphalt, cork, linoleum, no-wax, rubber, seamless vinyl, and vinyl composite flooring.

Floor polish or wax means a wax, polish, or any other product designed to polish, protect, or enhance floor surfaces by leaving a protective coating that is designed to be periodically replenished. ''Floor polish or wax'' does not include ''spray buff products,'' products designed solely for the purpose of cleaning floors, floor finish strippers, products designed for unfinished wood floors, and coatings subject to 40 CFR part 59, subpart D—National Volatile Organic Compound Emission Standards for Architectural Coatings.

Floor seam sealer means any low viscosity specialty adhesive used in small quantities for the sole purpose of bonding adjoining rolls of installed flexible sheet flooring or to fill any minute gaps between and adjoining rolls.

Flying bug insecticide means any insecticide product that is designed for use against flying insects including, but not limited to, flies, mosquitoes, and gnats. ''Flying bug insecticide'' does not include ''wasp and hornet insecticide'' or products that are designed to be used exclusively on humans or animals or their bedding.

Fragrance means a substance or mixture of aroma chemicals, natural essential oils, and other functional components that is added to a consumer product to impart an order or scent, or to counteract a malodor.

Furniture maintenance product means a wax, polish, conditioner, or any other product designed for the product designed for the purpose of polishing, protecting, or enhancing finished wood surfaces other than floors. Furniture maintenance product'' does not include dusting aids, products designed solely for the purpose of cleaning, and products designed to leave a permanent finish such as stains, sanding sealers, and lacquers.

Gel means a colloid in which the dispersed phase has combined with the continuous phase to produce a semisolid material, such as jelly.

General purpose adhesive means any nonaerosol household adhesive designed for use on a variety of substrates. General purpose adhesives do not include contact adhesives or construction and panel adhesives.

General purpose cleaner means a product designed for general all-purpose cleaning, in contrast to cleaning products designed to clean specific substrates in certain situations. ''General purpose cleaner'' includes products designed for general floor cleaning, kitchen or countertop cleaning, and cleaners designed to be used on a variety of hard surfaces.

Glass cleaner means a cleaning product designed primarily for cleaning surfaces made of glass. Glass cleaner does not include products designed solely for the purpose of cleaning optical materials used in eyeglasses, photographic equipment, scientific equipment, and photocopying machines.

Hair mousse means a hairstyling foam designed to facilitate styling of a coiffure and provide limited holding power.

Hair styling gel means a high-viscosity, often gelatinous product that contains a resin and is designed for the application to hair to aid in styling and sculpting of the hair coiffure.

Hairspray means a consumer product designed primarily for the purpose of dispensing droplets of a resin on and into a hair coiffure to impart sufficient rigidity to the coiffure to establish or retain the style for a period of time.

High-volatility organic compound or HVOC means any organic compound that exerts a vapor pressure greater than 80 millimeters of mercury when measured at 20 degrees Celsius.

Household adhesive means any household product that is used to bond one surface to another by attachment. ''Household adhesive'' does not include products used on humans or animals, adhesive tape, contact paper, wallpaper shelf liners, or any other product with an adhesive incorporated onto or in an inert substrate.

Household product means any consumer product that is primarily designed to be used inside or outside of living quarters or residences, including the immediate surroundings, that are occupied or intended for occupation by individuals.

Household use means use of a product in a home or its immediate environment.

Importer means any person who brings a consumer product that was manufactured, filled, or packaged at a location outside of the United States into the United States for sale or distribution in the United States.

Industrial use means use for, or in, a manufacturing, mining, or chemical process or use in the operation of factories, processing plants, and similar sites.

Insecticide means a pesticide product that is designed for use against insects or other arthropods, excluding any product that is:

(1) For agricultural use; or

(2) A restricted use pesticide.

Insecticide fogger means any insecticide product designed to release all or most of its content as a fog or mist into indoor areas during a single application. Foggers may target a variety of pests including (but not limited to) fleas and ticks, crawling insects, lawn and garden pests, and flying insects. Foggers are not subject to the specific VOC limitations or other categories of insecticides list in table 1 of this subpart.

Institutional product means a consumer product that is designed for use in the maintenance or operation of an establishment that manufactures, transports, or sells goods or commodities, or provides services for profit; or is engaged in the nonprofit promotion of a particular public, educational, or charitable cause. ''Establishments'' include, but are not limited to, government agencies, factories, schools, hospitals, sanitariums, prisons, restaurants, hotels, stores, automobile service and parts centers, health clubs, theaters, or transportation companies. ''Institutional product'' does not include household products and products that are incorporated into or used exclusively in the manufacture or construction of the goods or commodities that are produced by the establishment.

Institutional use means use within the confines of or on property necessary for the operation of buildings' including, but not limited to, government agencies, factories, sanitariums, prisons, restaurants, hotels, stores, automobile service and parts centers, health clubs, theaters, transportation companies, hospitals, schools, libraries, auditoriums, and office complexes.

Label means any written, printed, or graphic matter affixed to, applied to, attached to, blown into, formed, molded into, embossed on, or appearing upon any consumer product package for purposes of branding, identifying, or giving information with respect to the product or to the contents of the package.

Laundry prewash means a product that is designed for application to a fabric prior to laundering and that supplements and contributes to the effectiveness of laundry detergents and/or provides specialized performance.

Laundry starch product means a product that is designed for application to a fabric, either during or after laundering, to impart and prolong a crisp look and may also facilitate ironing of the fabric. ''Laundry starch product'' includes, but it not limited to, fabric finish, sizing, and starch.

Lawn and garden insecticide means an insecticide product designed primarily to be used in household lawn and garden areas to protect plants from insects or other arthropods.

Liquid means a substance or mixture of substances that flows readily, but, unlike a gas, does not expand indefinitely (i.e., a substance with constant volume but not constant shape). ''Liquid'' does not include powders or other materials that are composed entirely of solid particles.

Manufacturer means any person who manufacturers or processes a consumer product. Manufacturers include:

(1) Processors who blend and mix consumer products,

(2) Contract fillers who develop formulas and package these formulas under a distributor's label;

(3) Contract fillers who manufacture products using formulas provided by a distributor; and

(4) Distributors who specify formulas to be used by a contract filler or processor.

Nail polish remover means a product designed to remove nail polish or coatings from fingernails or toenails.

Nonagricultural pesticide means and includes any substance or mixture of

substances that is a pesticide as defined in section 2(u) of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136–136y).

Nonresilient flooring means floor of a mineral content that is not flexible. ''Nonresilient flooring'' includes, but is not limited to, terrazzo, marble, slate, granite, brick, stone, ceramic tile, and concrete.

Oven cleaner means any cleaning product designed to clean and to remove dried food deposits from oven interiors.

Person means an individual corporation, partnership, association, State, any agency, department, or instrumentality of the United States, and any officer, agent, or employee thereof.

Principal display panel(s) means that part, or those parts, of a label that are so designed as to most likely be displayed, presented, shown, or examined under normal and customary conditions of display or purchase. Whenever a principal display panel appears more than once, all requirements pertaining to the ''principal display panel'' shall pertain to all such ''principal display panels.''

Product category means that applicable category which best describes the product as listed in tables 1 or 2 of this subpart and which appears on the product's principal display panel.

Product form means the form that most accurately describes the product's dispensing from including aerosols, gels, liquids, pump sprays, and solids.

Pump spray means a packaging system in which the product ingredients are expelled only while a pumping action is applied to a button, trigger, or other actuator. Pump spray product ingredients are not under pressure.

Representative consumer product means a consumer product that is subject to the same VOC limit in § 59.203 as the innovative product.

Restricted use pesticide means a pesticide that has been classified for restricted use under the provisions of section 3(d) of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136–136y).

Shaving cream means an aerosol product that dispenses a foam lather intended to be used with a blade or cartridge razor, or other wet-shaving system in the removal of facial or other body hair.

Single-phase aerosol air freshener means an aerosol air freshener with liquid contents in a single homogeneous phase that does not require that the product container be shaken before use.

Solid means a substance or mixture of substances that does not flow or expand readily (i.e., a substance with constant volume such as the particles constituting a powder). ''Solid'' does not include liquids or gels.

Spray buff product means a product designed to restore a worn floor finish in conjunction with a floor buffing machine and special pad.

Structural waterproof adhesive means an adhesive whose bond lines are resistant to conditions of continuous immersion in fresh or salt water, and that conforms with Federal Specification MMM–A–181 (Type 1, Grade A), and MIL–A–4605 (Type A, Grade A and Grade C).

Underarm antiperspirant means any aerosol product that is intended by the manufacturer to be used to reduce perspiration in the human axilla by at least 20 percent in at least 50 percent of a target population.

Underarm deodorant means any aerosol product that is intended by the manufacturer to be used minimize odor in the human axilla by retarding the growth of bacteria that cause the decomposition of perspiration.

United States means the United States of America, including the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

Usage directions means the text or graphics on the consumer product's label or accompanying literature that describes to the end user how and in what quantity the product is to be used.

Volatile organic compound or VOC means any compound that meets the definition of a VOC, as defined under 40 CFR part 51, subpart F, and in subsequent amendments.

Wasp and hornet insecticide means any insecticide product that is designed for

use against wasps, hornets, yellow jackets, or bees by allowing the user to spray a high-volume directed stream or burst from a safe distance at the intended pest or its hiding place.

Wax means an organic mixture or compound with low melting point and high molecular weight, which is solid at room temperature. Waxes are generally similar in composition to fats and oils except that they contain no glycerides. ''Wax'' includes, but is not limited to, substances such as carnauba wax, lanolin, and beeswax derived from the secretions of plants and animals; substances of a mineral origin such as ozocerite, montan, and paraffin; and synthetic substances such as chlorinated naphthalenes and ethylenic polymers.

Wood floor wax means wax-based products for use solely on wood floors.

[63 FR 48815, Sept. 11, 1998; 63 FR 52319, Sept. 30, 1998]

§ 59.203 Standards for consumer products.

(a) The manufacturer or importer of any consumer product subject to this subpart small ensure that the VOC content levels in table 1 of this subpart and HVOC content levels in table 2 of this subpart are not exceeded for any consumer product manufactured or imported on or after December 10, 1998, except as provided in paragraphs (b) and (c) of this section, or in §§ 59.204 or 59.206.

(b) For consumer products for which the label, packaging, or accompanying literature specifically states that the product should be diluted prior to use, the VOC content limits specified in paragraph (a) of this section shall apply to the product only after the minimum recommended dilution has taken place. For purposes of this paragraph, ''minimum recommended dilution'' shall not include recommendations for incidental use of a concentrated product to deal with limited special applications such as hard-to-remove soils or stains.

(c) For those consumer products that are registered under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. section 136–136y) (FIFRA), the compliance date of the VOC standards specified in paragraph (a) of this section is December 10, 1999.

(d) The provisions specified in paragraphs (d)(1) through (d)(4) of this section apply to charcoal lighter materials.

(1) No person shall manufacture or import any charcoal lighter material after December 10, 1998 that emits, on average, greater than 9 grams of VOC per start, as determined by the procedures specified in § 59.208.

(2) The regulated entity for a charcoal lighter material shall label the product with usage directions that specify the quantity of charcoal lighter material per pound of charcoal that was used in the testing protocol specified in § 59.208 for that product unless the provisions in either paragraph (e)(2)(i) or (e)(2)(ii) of this section apply.

(i) The charcoal lighter material is intended to be used in fixed amounts independent of the amount of charcoal used, such as paraffin cubes; or

(ii) The charcoal lighter material is already incorporated into the charcoal, such as certain ''bag light,'' ''instant light,'' or ''match light'' products.

(3) Records of emission testing results for all charcoal lighter materials must be made available upon request to the Administrator for enforcement purposes within 30 days of receipt of such requests.

(4) If a manufacturer or importer has submitted records of emission testing of a charcoal lighter material to a State or local regulatory agency, such existing records may be submitted under paragraph (d)(3) of this section in lieu of new test data, provided the product formulation is unchanged from that which was previously tested. Such previous testing must have been conducted in accordance with the test protocol described in § 59.208 or a test protocol that is approved by the Administrator as an alternate.

(e) Fragrances incorporated into a consumer product up to a combined level of 2 weight-percent shall not be included in the weight-percent VOC calculation.

(f) The VOC content limits in table 1 of this subpart shall not include any VOC that:

(1) Has a vapor pressure of less than 0.1 millimeters of mercury at 20 degrees Celsius; or

(2) Consists of more than 12 carbon atoms, if the vapor pressure is unknown; or

(3) Has a melting point higher than 20 degrees Celsius and does not sublime (i.e., does not change directly from a solid into a gas without melting), if the vapor pressure is unknown.

(g) The requirements of paragraph (a) of this Section shall not apply to those VOC in antiperspirants or deodorants that contain more than 10 carbon atoms per molecule and for which the vapor pressure is unknown, or that have a vapor pressure of 2 millimeters of mercury or less at 20 degrees Celsius.

(h) a manufacturer or importer may use the vapor pressure information provided by the raw material supplier as long as the supplier uses a method to determine vapor pressure that is generally accepted by the scientific community.

(i) For hydrocarbon solvents that are complex mixtures of many different compounds and that are supplied on a specification basis for use in a consumer product, the vapor pressure of the hydrocarbon blend may be used to demonstrate compliance with the VOC content limits of this section. Identification of the concentration and vapor pressure for each such component in the blend is not required for compliance with this subpart.

§ 59.204 Innovative product provisions.

(a) Upon notification to the Administrator, a consumer product that is subject to this subpart may exceed the applicable limit in table 1 or 2 of this subpart if the regulated entity demonstrates that, due to some characteristic of the product formulation, design, delivery systems, or other factors, the use of the product will result in equal or less VOC emissions that specified in paragraph (a)(1) or (a)(2) of this section.

(1) The VOC emissions from a representative consumer product, as described in § 59.202, that complies with the VOC standards specified in § 59.203(a); or

(2) The calculated VOC emissions from a noncomplying representative product, if the product had been reformulated to comply with the VOC standards specified in § 59.203(a). The VOC emissions shall be calculated by using Equation 1.

$$E_R = E_{NC} \times \frac{VOC_{STD}}{VOC_{NC}} \qquad \text{Equation 1}$$

Where

E_R=The VOC emissions from the noncomplying representative product, had it been reformulated.

E_{NC}=The VOC emissions from the noncomplying representative product in its current formulation.

VOC_{STD}=The VOC standard specified in § 59.203(a).

VOC_{NC}=The VOC content of the noncomplying product in its current formulation.

(b) If a regulated entity demonstrates to the satisfaction of the Administrator that the equation in paragraph (a)(2) of the this section yields inaccurate results due to some characteristic of the product formulation or other factors, an alternate method that accurately calculates emissions may be used upon approval of the Administrator.

(c) A regulated entity shall notify the Administrator in writing of its intent to enter into the market an innovative product meeting the requirements of paragraph (a) of this section. The Administrator must receive the written notification by the time the innovative product is available for sale or distribution to consumers. Notification shall include the information specified in paragraph (c)(1) and (c)(2) of this section.

(1) Supporting documentation that demonstrates the emissions from the innovate product, including the actual physical test methods used to generate the data and, if necessary, the consumer testing undertaken to document product usage;

(2) Any information necessary to enable the Administrator to establish enforceable conditions for the innovative product, including the VOC content of the innovative product expressed as a weight-percentage, and test methods for determining the VOC content.

(d) At the option of the regulated entity, the regulated entity may submit

a written request for the Administrator's written concurrence that the innovative product fulfills the requirements of paragraph (a) of this section. If such a request is made, the Administrator will respond as specified in paragraphs (d)(1) through (d)(3) of this section.

(1) The Administrator will determine within 30 days of receipt whether the documentation submitted in accordance with paragraph (d) of this section is complete.

(2) The Administrator will determine whether the innovative product shall be exempt from the requirements of § 59.203(a) within 90 days after an application has been deemed complete. The applicant and the Administrator may mutually agree to a longer time period for reaching a decision, and additional supporting documentation may be submitted by the applicant before a decision has been reached. The Administrator will notify the applicant of the decision in writing and specify such terms and conditions that are necessary to insure that emissions from the product will meet the emissions reductions specified in paragraph (a) of this section, and that such emissions reductions can be enforced.

(3) If an applicant has been granted an exemption to a State or local regulation for an innovative product by a State or local agency whose criteria for exemption meet or exceed those provided for in this section, the applicant may submit the factual basis for such an exemption as part of the documentation required under paragraph (d) of this section. In such case, the Administrator will make the determination required under this paragraph within 45 days after the applications is considered complete.

(e) In granting an exemption for a product, the Administrator will establish conditions that are enforceable. These conditions may include the VOC content of the innovative product, dispensing rates, application rates, and any other parameters determined by the Administrator to be necessary. The Administrator will also specify the test methods for determining conformance to the conditions established, including criteria for reproducibility, accuracy, and sampling and laboratory procedures.

(f) For any product for which an exemption has been granted pursuant to this section, the regulated entity to whom the exemption was granted shall notify the Administrator in writing within 30 days after any change in the product formulation or recommended product usage directions, and shall also notify the Administrator within 30 days after the regulated entity learns of any information that would alter the emissions estimates submitted to the Administrator in support of the exemption application.

(g) If lower VOC content limits are promulgated for a product category through any subsequent rulemaking, all exemptions granted under this section for products in the product category shall no longer apply unless the innovative product has been demonstrated to have VOC emissions less than the applicable revised VOC content limits.

(h) If the Administrator determines that a consumer product for which an exemption has been granted no longer meets the VOC emissions criteria specified in paragraph (a) of this section for an innovative product, the Administrator may modify or revoke the exemption as necessary to assure that the product will meet these criteria. The Administrator will not modify or revoke an exemption without first affording the applicant an opportunity for a public hearing to determine if the exemption should be modified or revoked.

[63 FR 48815, Sept. 11, 1998; 63 FR 52319, Sept. 30, 1998]

§ 59.205 Labeling.

(a) The container or package of each consumer product that is subject to this subpart shall clearly display the day, month, and year on which the product was manufactured, or a code indicating such date. The requirements of this provision shall not apply to products that are offered to consumers free of charge for the purposes of sampling the product.

(b) In addition, the container or package for each charcoal lighter material that is subject to this subpart

shall be labeled according to the provisions of § 59.203(d)(2).

§ 59.206 Variances.

(a) Any regulated entity who cannot comply with the requirements of this subpart because of extraordinary circumstances beyond reasonable control may apply in writing to the Administrator for a variance. The variance application shall include the information specified in paragraph (a)(1) through (a)(3) of this section.

(1) The specific grounds up on which the variance is sought,

(2) The proposed date(s) by which compliance with the provisions of this subpart will be achieved. Such date(s) shall be no later than 5 years after the issuance of a variance; and

(3) A compliance plan detailing the method(s) by which compliance will be achieved.

(b) Upon receipt of a variance application containing the information required in paragraph (a) of this section, the Administrator will publish a notice of such application in the FEDERAL REGISTER and, if requested by any party, will hold a public hearing to determine whether, under what conditions, and to what extent, a variance from the requirements of this subpart is necessary and will be granted. If requested, a hearing will be held no later than 75 days after receipt of a variance application. Notice of the time and place of the hearing will be sent to the applicant by certified mail not less than 30 days prior to the hearing. At least 30 days prior to the hearing, the variance application will be made available to the public for inspection. Information submitted to the Administrator by a variance applicant may be claimed as confidential. The Administrator may consider such confidential information in reaching a decision on a variance application. Interested members of the public will be allowed a reasonable opportunity to testify at the hearing.

(c) The Administrator will grant a variance if the criteria specified in paragraphs (c)(1) and (c)(2) of this section are met.

(1) If there are circumstances beyond the reasonable control of the applicant so that complying with the provisions of this subpart by the compliance date would not be technologically or economically feasible, and

(2) The compliance plan proposed by the applicant can be implemented and will achieve compliance as expeditiously as possible.

(d) Any variance order will specify a final compliance date by which the requirements of this subpart will be achieved and increments of progress necessary to assure timely compliance.

(e) A variance shall cease to be effective upon failure of the regulated entity to comply with any term or condition of the variance.

(f) Upon the application of any party, the Administrator may review, and for good cause, modify or revoke a variance after holding a public hearing in accordance with the procedures described in paragraph (b) of this section.

§ 59.207 Test methods.

Each manufacturer or importer subject to the provisions of § 59.203(a) shall demonstrate compliance with the requirements of this subpart through calculation of the VOC content using records of the amounts of constituents used to manufacture the product.

§ 59.208 Charcoal lighter material testing protocol.

(a) Each manufacturer or importer of charcoal lighter material subject to this subpart shall demonstrate compliance with the applicable requirements of § 59.203(d) using the procedures specified in this section. Any lighter material that has received certification from California South Coast Air Quality Management District (SCAQMD) under their Rule 1174, Ignition Method Compliance Certification Testing Protocol, will be considered as having demonstrated compliance with the applicable requirements of this subpart using the procedures in this section.

(b) The manufacturer or importer shall obtain from the testing laboratory conducting the testing, a report of findings, including all raw data sheets/charts and laboratory analytical data. The testing must demonstrate that VOC emissions resulting from the ignition of the barbecue charcoal are, on average, less than or equal to 9 grams

per start. The manufacturer or importer shall maintain the report of findings.

(c) When a charcoal lighter material does not fall within the testing guidelines of this protocol, the protocol may be modified following a determination by the Administrator that the modified protocol is an acceptable alternative to the method described in this section and written approval of the Administrator.

(d) *Meteorological and environmental criteria.* (1) Testing shall be conducted under the following conditions:

(i) Inlet combustion air temperature is 16 to 27 degrees Celsius (60 to 80 degrees Fahrenheit) with a relative humidity of 20 to 80 percent;

(ii) The charcoal and lighter material are stored 72 hours before testing in a location with a relative humidity between 45 and 65 percent, and a temperature between 18 and 24 degrees Celsuis (65 to 75 degrees Fahrenheit); and

(iii) The outside wind speed, including gusts, may be no more than 16 kilometers per hour (10 miles per hour) if the test stack is exhausted outdoors, or, if the test stack is exhausted indoors, indoor air must be stagnant.

(2) Temperature and relative humidity of the combustion air shall be continuously monitored during the test. Temperature and relative humidity of the place where the charcoal and lighter material are stored prior to the test shall be monitored and recorded during the 72 hours immediately prior to the test. If the stack is exhausted outdoors, the continuous outdoor wind speed monitor shall be observed or recorded continuously during testing. If the wind speed monitor is manually observed rather than electronically recorded, the maximum wind speed observed during the test shall be recorded.

(e) *Definitions.* For the purposes of this test protocol, the following definitions shall apply:

(1) *Baseline VOC emissions* (E_b) means the 3.6 grams (0.008 pounds) per start of subject VOC mass emissions (calculated as CH_2) resulting from the ignition of charcoal by electric probe.

(2) *Emission limit for VOC* means 9 grams per start of resultant VOC emissions (E_r), (expressed as CH_2).

(3) *Equivalent* means equipment that has been demonstrated to meet or exceed the performance, design, and operation specifications of the prescribed equipment. A demonstration that equipment or a test method is a suitable alternative requires written approval from the Administrator prior to compliance testing, based on an evaluation of comparative performance specifications and/or actual performance test data.

(4) *Ignition* means the ready-to-cook condition of the charcoal determined by the temperature above the charcoal, the organic vapor concentration measured by the continuous organic emission monitor, and percent ash.

(5) *Ignition VOC emissions* (e_I)—means the grams (pounds) per start of total subject VOC mass emissions (expressed as CH_2) resulting from the ignition of charcoal by the lighter material undergoing evaluation, including both charcoal and lighter material emissions.

(6) *labeled directions* means those directions affixed to the charcoal lighter material which specify:

(1) The amount of lighter material to use per kilogram (or pound) of charcoal, unless the lighter material is already impregnated or treated in the charcoal;

(2) How to use or apply the lighter material; and

(3) How and when to light the lighter material.

(7) *Percent ash* means a qualitative observation of the ratio of visible charcoal surface area ignited (grayish/white ash) to total charcoal surface area times 100.

(8) *Reference VOC emissions* (E_{ep})—means the grams (pounds) per start of subject VOC mass emissions (calculated as CH_2) resulting from the ignition of charcoal by the reference electric probe during the testing.

(9) *Resultant VOC emissions* (E_r)—means the ignition VOC emission (E_I) less the reference VOC emissions (E_ep) plus baseline emissions (E_b).

(10 *Start* means a 25-minute period commencing from the instant that emissions may be released from the lighter material, either by evaporation or combustion, and further characterized such that by the end of said 25-minute period, ignition is achieved.

(f) *Test structure, equipment specifications, and reference materials.* (1) The test structure is to be located in a building or fabricated total enclosure (i.e., with enclosed sides and top). The enclosure shall be such that there are no constant or intermittent air flows within it that cause fluctuations in the stack velocity and/or disruptions of air flow patterns within the test chamber containing the reference grill . (WARNING: If the stack is vented into the building enclosure, caution must be taken to avoid carbon monoxide poisoning and the reduction of oxygen.)

(2) Test structure components. The following test structure components, as shown in figures 1 and 2 of Appendix A of this subpart, shall be used:

(i) Test chamber—Standard large, prefabricated fireplace manufactured by MarcoΔ,[1] Model No. C41CF, with flue damper removed; or a fabricated structure with the same dimensions. Spacers are required at the rear of the test chamber to ensure a constant 5-centimeter (2-inch) distance between the reference grill and the rear wall of the test chamber.

(ii) Test stack—25-centimeter (10-inch) diameter galvanized steel ducting with velocity traverse port holes located approximately 8 diameters downstream from the stack outlet of the fireplace chamber and sampling ports located approximately 2½ diameters downstream of the velocity traverse ports.

(iii) Fan—25-centimeter (10-inch) diameter axial fan (duct fan) capable of maintaining an air velocity of 140 ± 9 meters per minute (450 ± 30 feet per minute) and located in the stack approximately 3 diameters downstream of the sampling ports.

(iv) Test stack insulation—The stack shall be insulated with fiberglass blanket insulation (or equivalent) with a minimum R-value of 6.4, that totally surrounds the stack from the top of the fireplace to the level of the blower which minimizes temperature gradients in the stack and prevents hydrocarbons from condensing on the stack wall.

(v) Stack mounts—Supports for fixing in position the stack velocity measurement device for measuring reference point velocity readings and the continuous organic emission monitor probe/meter.

(vi) Blower speed control—A rheostat for controlling voltage to the fan.

(3) Test equipment and materials. The following test equipment and materials shall be used:

(i) Continuous recording device—A YEWΔ model 4088 dot matrix, roster scanning chart recorder, Omega strip recorder with a Strawberry Tree Data Acquisition System, or equivalent, shall be used to continuously (6-second cycle) record temperatures, velocity, and continuous organic emission monitor output signals. The recording may be done manually, recording temperature using a digital potentiometer (20-second intervals), reference point velocity with a Pitot tube (20-second intervals), and continuous organic emission monitor readings with the analyzer's meter (10-second intervals).

(ii) Grill temperature probe—A type ''K'' thermocouple silver soldered to a 7.6 centimeter (3-inch) square brass plate 0.083-centimeter (0.033 inches) thick painted flat black using high temperature (> 370 degrees Celsius [> 700 degrees Fahrenheit]) paint; set on an adjustable stand to maintain 11 centimeters (4.5 inches) above the maximum height of the briquette pile and made such that it can be removed and replaced within the chamber.

(iii) Stack temperature probe—The KurzΔ digital air velocity meter or a type ''K'' thermocouple shall be used.

(iv) Stack velocity measurement device—The velocity in meters (feet) per minute for the reference point using a KurzΔ digital air velocity meter, DavisΔ DTA 4000 vane anemometer, or equivalent to method 1A of 40 CFR part 60, appendix A.

(v) Continuous organic emissions monitor—CenturyΔ Model 128 Organic Vapor Analyzer, RatfischΔ RS55 total hydrocarbon analyzer, or equivalent, with response in parts per million (ranges 0 to 10 parts per million, 0 to 100 parts per million, 0 to 1,000 parts per million).

[1]NOTE: Mention of trade names or specific products does not constitute endorsement by the EPA.

(vi) Temperature and humidity monitor—A chart recorder type with humidity accuracy of ± 3 percent from 15 to 85 percent.

(vii) Wind speed and direction monitor—A wind speed and direction device meeting a tolerance of ± 10 percent.

(viii) Analytical balance—An electronic scale with a resolution of a ± 2 grams.

(ix) Charcoal stacking ring—Rigid metal cylinder 21.6 centimeters (8.5 inches) in diameter with indicators to determine that the pile of briquettes does not exceed 12.7 centimeters (5 inches) in height.

(x) Camera—To document ignition condition of charcoal at the end of each start.

(xi) Particulate filter—NuproΔ inline filter, Catalog Number SS–4FW–2 with 0.64 centimeter (¼-inch) Swagelok inlet and outlet or equivalent.

(xii) Barbecue Grill—The charcoal shall be ignited in a WeberΔ ''Go Anywhere'' barbecue grill (Model Number #121001), 39.4 centimeters × 24 centimeters × 12.7 centimeters (15.5 inch × 9.5 inch × 5.0 inch) with the grate 4.4 centimeters (1.75 inches) above the bottom of the grill, or another grill that meets these specifications. The grill shall be set on its bottom when placed in the test chamber and all grill air vents shall be in full open position.

(xiii) Electric probe—A 600-watt electric probe shall be used for electric probe ignition tests.

(xiv) Untreated charcoal—The laboratory conducting the testing shall purchase ''off the shelf'' untreated charcoal from a retail outlet. Charcoal shall not be provided by the manufacturer of the charcoal lighter material to be tested or by the charcoal manufacturer. The charcoal to be used is KingsfordΔ ''Original Charcoal Briquets.'' All untreated charcoal used in the certification testing of a single ignition source is to come from the same lot as indicated by the number printed on the bag.

(xv) Treated or impregnated charcoal—If the charcoal lighter material to be tested is a substance used to treat or impregnate charcoal, the regulated entity shall provide to the laboratory conducting the tests a sample of impregnated charcoal. The sample shall be impregnated or treated barbecue charcoal that is ignited either outside of package or ignited by the package. If commercially available, the independent testing laboratory conducting the test shall purchase ''off the shelf'' from a retail outlet.

(g) *Sampling and analytical methods.* (1) Gas volumetric flow rate. Conduct a full velocity traverse using the stack velocity measurement device as shown in figure 3 of this Appendix A to this Subpart, or use Method 1A of 40 CFR part 60, appendix A. Continuously record a velocity reference point reading during each test run using a chart recorder or once every 20 seconds if using Method 1A. Calculate the volumetric flow rate using the gas velocity, moisture content, and the stack cross-sectional area. For the purposes of this protocol, the static pressure shall be assumed to be atmospheric, the molar density correction factor in the stack to be 1.0, and the moisture content to be 2 percent.

(2) Integrated VOC sample. Collect integrated VOC gas samples at the sampling port in the exhaust stack using a 40 CFR part 60, appendix A, Method 25 Total Combustion Analysis (TCA) sampling apparatus consisting of two evacuated 9-liter tanks, each equipped with flow controllers, vacuum gauges, and probes, as shown in figure 4 of Appendix A of this Subpart. Use 40 CFR part 60, appendix A, Method 25, SCAQMD Method 25.1 (incorporated by reference—§ 59.213 of this subpart), or equivalent, for analysis. Carbon monoxide, carbon dioxide, methane, and non-methane organic carbon are analyzed by the TCA and TCA/Flame Ionization Detector (FID) methods. Oxygen content is determined by gas chromatography using a thermal conductivity detector. Clean particulate filters between use by heating to 760 degrees Celsius (1400 degrees Fahrenheit) while using compressed air as a carrier for cleaning and purging.

(3) Continuous organic emissions monitor. A continuous organic emissions monitor which uses a continuous FID shall be used for each test run to measure the real time organic concentration of the exhaust as methane. Record the emission monitor response

in parts per million continuously during the sampling period using a chart recorder or at least once every 10 seconds. The VOC analyzer shall be operated as prescribed in the manufacturer's directions unless otherwise noted in this protocol.

(h) *Pretest procedure.* (1) Charcoal lighter material—charcoal. Before each test run, remove charcoal from a sealed bag that has been stored for at least 72 hours in a humidity and temperature controlled room which satisfies the requirements of paragraph (d)(1) of this section and weight out 0.9 kilograms (2 pounds) of charcoal briquettes, to the nearest whole briquette over 0.9 kilograms (2 pounds), of uniform shape with no broken pieces using an analytical balance. Reseal the bag. Charcoal must be ignited within 10 minutes after removal from bag. A sealed or resealed bag of charcoal cannot be stored at the test site for greater than 45 minutes. It must be returned to a humidity and temperature controlled room from 72 hours. The lighter material must be purchased, stored, weighed, and handled the same as the barbecue charcoal.

(i) For the reference VOC emission tests using an electric probe, place a single layer of charcoal, slightly larger than the area/circle of the electric probe heating element, onto the grate. Place the heating element on top of this first layer and cover the heating element with the remaining charcoal briquettes.

(ii) For the ignition VOC emissions tests, arrange the briquettes on the barbecue grate in the manner specified by the ignition manufacturer's directions. If these manufacturer's directions do not specify a stacking arrangement for the briquettes, randomly stack the briquettes in a pile using the stacking ring described in paragraph (f)(3)(ix) of this section.

(2) Charcoal lighter material—or impregnated charcoal. Store, handle, weigh, and stack barbecue charcoal that is designed to be lit without the packaging, the same as in paragraph (h)(1) of this section. For those products which require both the package and charcoal be lit, weigh the whole package—do not remove charcoal. Weigh an empty package (not the same one to be used during the test). Subtract the package weight from the overall weight of the package and charcoal. The full package and empty package must be stored, handled, and weighed the same as in paragraph (h)(1) of this section. If the difference (the charcoal weight) is between 0.7 to 1.4 kilograms (1.5 to 3.0 pounds), the test may proceed. The emissions measured (E) in Equation 5 of paragraph (k)(7) of this section must be adjusted to a 0.9 kilogram (2-pound) charge. Place packaged barbecue charcoal on the grate in the manner specified by the manufacturer's directions.

(3) Initial meteorological and environmental criteria in paragraph (d) shall be complied with.

(4) The stack velocity must be set before each day of testing at 140 ± 9 meters per minute (450 ± 30 feet per minute) by performing a velocity traverse as specified in paragraph (g)(1) of this section. The velocity will be attained by adjusting the axial fan speed using a rheostat.

(5) The fireplace shall be conditioned at the start of each day before sampling tests by using a grill ignited by the electric probe. If a time period of over 60 minutes between sampling test runs occur, the condition step must be repeated.

(6) Before each test run, leak check the continuous organic emissions monitor by blocking the flow to the probe. Allow the instrument to warm up for the duration specified by the manufacturer's directions. Select the 0 to 100 parts per million range. Check the battery level and hydrogen pressure. Zero with hydrocarbon-free air (<0.1 parts per million hydrocarbons as methane) span with 90 parts per million methane in ultra pure air. Zero and span another instrument selection range if needed for test purposes.

(7) Before the testing program begins, establish a point of average concentration of organics in the stack by using a continuous organic emissions monitor and a grill with charcoal ignited by the electric probe 40 minutes after initial release of emissions. Record the continuous organic emissions monitor traverse data.

(8) Prepare the integrated VOC sampling equipment and perform the required leak checks. Fit the probes with

nozzles housing two micron particulate filters. Insert the probes and nozzles into the sampling port to draw a sample of the exhaust gas from the point of average organic concentration as determined from the continuous organic emissions monitor sample traverse described in paragraph (h)(4) of this section. Also, position the nozzles such that they point downstream in the stack. Obtain the samples concurrently and continuously over the test run.

(9) Insert the continuous organic emissions monitor probe into the sampling port to draw a sample of the exhaust gas from the point of average organic concentration as determined from the continuous organic emissions monitor sample traverse described in paragraph (h)(7) of this section.

(i) *Test procedure.* The labeled directions, as defined in paragraph (e) of this section, shall be followed throughout the course of the testing. In cases where the directions are incompatible with this protocol, circumvent the intent of this protocol, or are unclear (subject to different interpretations) and inadequate, the Administrator must be informed in writing of the nature of the conflict, as well as the proposed resolution, prior to commencing testing. When the labeled directions for a charcoal lighter material do not fall within the testing guidelines of this protocol, the protocol may only be modified upon written approval of the Administrator.

(1) Place the bottom of the barbecue grill on the floor of the fireplace, 5 centimeters (2 inches) from the rear wall. Ignite charcoal as specified by manufacturer's labeled directions.

(2) For electric probe ignition, carefully remove probe without disturbing charcoal after 10 minutes of operation.

(3) For fluid ignition, simultaneously match light fluid on charcoal and fluid that has fallen to the bottom of the grill.

(4) Place the grill temperature probe 11 centimeters (4.5 inches) above the top of the charcoal immediately after the charcoal lighter material flame goes out, or before, if the lighter material does not flame.

(5) Conduct at least six test runs for both the electric probe ignition and for the lighter material being evaluated. Alternate these lighter material for all 12 runs. All runs must be conducted over 3 consecutive days or less. Alternatively, baseline emissions testing (using the electric probe) may be applied to other test runs provided the test runs occur within 4 months of the baseline testing. Integrated VOC sampling and continuous organic emissions monitoring begin for each test run when the charcoal lighter material and/or materials start to generate/release organics (this will be the time of pouring for lighter fluids and the time of ignition for most other ignition sources). Option: Because the manufacturer of treated or impregnated charcoal supplies both the lighter material and barbecue charcoal, they may apply the 9 grams VOC per start emission limit as an absolute value without an adjustment for the VOC emissions from an electric probe.

(6) Sampling ends for each test run when all the following conditions are met:

(i) The temperature 11 centimeters (4.5 inches) above the maximum height of the briquette pile, using the grill temperature probe described in paragraph (d)(3)(ii) of this section, is at least 93 degrees Celsius (200 degrees Fahrenheit);

(ii) The continuous organic emissions monitor is reading below 30 parts per million for at least 2 minutes;

(iii) The test sampling has continued for 25 minutes (but not more) and

(iv) The charcoal surface is 70 percent covered with ash (to be documented with photograph on top and 60 degrees above the horizon).

(7) During the sampling test runs, temperatures (excluding ambient) and continuous organic emission monitor readings shall be recorded and shall comply with the requirements in paragraph (b) of this section. Humidity, wind speed, and ambient temperature readings shall be monitored and shall comply with the requirements in paragraph (b) of this section.

(8) Collect one blank sample for VOC and one ambient air sample during one run of each day per paragraph (k) of this section.

(j) *Post-run procedure.* (1) Record temperatures (including ambient), humidity, wind speed, and continuous organic emissions monitor reading.

(2) Record the drift using zero and span gases. Leak check and span the continuous organic emissions monitor as described in paragraph (h)(6) of this section for the next run.

(3) Leak check and disassemble the integrated VOC sampling equipment as described in Method 25 of 40 CFR part 60, appendix A or SCAQMD Method 25.1 (incorporated by reference—see § 59.213 of this subpart), or equivalent.

(4) Thoroughly clean grill surfaces of all residue before conducting next ignition run.

(k) *Calculations.* Calculations shall be carried out to at least one significant digit beyond that of the acquired data, and then rounded off after final calculation to two significant digits for each run. All rounding off of numbers should be in accordance with the American Society for Testing and Materials (ASTM) E 380–93, Standard Practice for Use of the SI International System of Units, procedures (incorporated by reference—see § 59.213 of this subpart).

(1) Calculate the average stack reference point temperature during sampling (t_{sr}).

(2) Calculate the average measured velocities (in meters per minute [feet per minute]): Traverse (u_t), traverse reference point (u_{tr}), and reference point during sampling (u_{sr}).

(3) Calculate the corrected average sampling velocity (u_s) by applying Equation 2:

$$u_s = u_{sr}\frac{u_t}{u_{tr}} \qquad \text{Equation 2}$$

(4) Calculate the average flow rate (Q_s) in cubic meters per minute (cubic feet per minute) by applying Equation 3:

$$Q_s = u_s A \qquad \text{Equation 3}$$

Where

A=Duct cross-sectional area, (square meters [square feet]

(5) Correct the flow rate to dry standard conditions (Q_{ds}) by applying Equation 4. Assume the static pressure to be atmospheric and the molar density correction factor to be 1.0

$$Q_{ds} = \frac{T_s}{\left(T_S + t_{sr}\right)}(1-H)\,Q_s \qquad \text{Equation 4}$$

Where

T_s=289 K (520 R)

T_S=273 K (460 R)

H=Percent moisture-100

=0.02

(6) Calculate the average total gaseous non-methane organic carbon for each duplicate sample run analyzed.

(7) Calculate the grams (pounds) of VOC as CH_2 emitted per start (normalized to 0.9 kilograms [2 pounds] of charcoal) for each run using Equation 5:

$$E = \frac{A}{B} * \frac{C}{10^6} * D * d * \frac{N}{M} Q_{ds} \qquad \text{Equation 5}$$

Where

E=Emissions of VOC per start for each test run (grams VOC/start [pounds VOC/start])

A=Hydrocarbon molecular weight

=14.0268 grams per gram-mole (14.0268 pounds per pound-mole)

B=Carbon number

=1

C=Average concentration for each duplicate run of total gaseous non-methane organic compounds as CO_2 (parts per million, from lab analysis sheet)

D=Sampling duration

=25 minutes

d=Molar density of gas at standard conditions

=42.33 gram-mole per cubic meter (0.0026353 pound-mole per cubic foot)

N=Normalized mass (0.9 kilograms [2 pounds])

M=Mass of charge (kilograms [pounds])

(8) Calculate the average VOC emissions for each lighter material tested. Identify and discard statistical outliers. Note a minimum of five valid results are required for a determination. This procedure for eliminating an outlier may only be performed once for each lighter material tested.

(9) Using Equation 6, calculate the resultant VOC emissions per start (E_r) and determine if it is less than or equal

to the 9 grams VOC per start emission limit.

$$E_r = e_i - e_{ep} + E_b \qquad \text{Equation 6}$$

Where

e_i=Average emissions of VOC per start from the charcoal lighter material being evaluated (grams VOC/start [pounds VOC/start] expressed as CH_2)

e_{ep}=Average reference VOC emissions per start from the ignition by electric probe (grams VOC/start [pounds VOC/start] expressed as CH_2)

=0 grams VOC/start (0 pounds VOC/start) for treated or impregnated charcoal

E_b=Standard baseline VOC emissions per start from the ignition by electric probe (expressed as CH_2)

=0 grams VOC/start (0 pounds VOC/start) for treated or impregnated charcoal

=3.6 grams VOC/start (0.008 pounds VOC/start) for all other charcoal lighter material

(l) *Recordkeeping*. A record of the following charcoal lighter material compliance test information shall be kept for at least 5 years:

(1) Real time temperature and continuous organic emissions monitor readings from continuous chart recorder and/or manual reading of temperatures and the continuous organic emissions monitor output.

(2) A description of quality assurance/quality control (QA/QC) procedures followed for all measuring equipment and calibration test data.

(3) A description of QA/QC procedures followed for all sampling and analysis equipment and calibration test data.

(4) Time and quantity of blanks and ambient air samples.

(5) Chain of custody for samples.

(6) Labeled directions.

(7) Field notes and data sheets.

(8) Calculation/averaging sheets/printouts.

(9) Sample (in its normal package from the same lot) of barbecue charcoal and lighter material used for testing.

(10) Formulation of lighter material tested (indicate if the information is to be handled confidentially).

(11) Photographs documenting charcoal surface ash coverage.

(m) *Quality Assurance/Quality Control (QA/QC) Requirements*. The QA/QC guidelines in the EPA's Quality Assistance Handbook (EPA 600.4–77–027b) shall be followed. In addition, the following procedures shall be used:

(1) A blank sample for VOC shall be performed once each day, during the start period of one of the lighter materials, using the integrated VOC sampling apparatus.

(2) An ambient air sample for VOC shall be taken once each day, during the start period of one of the lighter materials, using the integrated VOC sampling apparatus with Nupro∆ 2 micron filters.

(3) Traceability certificates shall be provided for all calibration gases used for the continuous organic emissions monitor and integrated VOC analysis.

(4) Grill temperature probe shall be calibrated using the procedures in ASTM Method E220–86 (incorporated by reference as specified in United States § 59.213).

(5) Supply documentation for place of purchase (or origin if experimental) and chain of custody for lighter material tested. Documentation to be included for both treated and impregnated charcoal.

(6) Supply documentation for place of purchase and chain of custody for untreated charcoal.

[63 FR 48815, Sept. 11, 1998; 63 FR 52319, Sept. 30, 1998]

§ 59.209 Recordkeeping and reporting requirements.

(a) The distributor that is named on the product label shall maintain the records specified in paragraphs (a)(1) and (a)(2) of this section, unless the manufacturer or importer has submitted to the Administrator a written certification that the manufacturer or importer will maintain the records for the distributor in accordance with paragraph (a)(3) of this section. If no distributor is named on the label, the manufacturer or importer must maintain the specified records. The records must be retained for at least 3 years and must be in a form suitable and readily available for inspection and review.

(1) Records or formulations being manufactured or imported on or after December 10, 1998 for all consumer products subject to § 59.213(a), or December 10, 1999 for all consumer products subject to § 59.203(c) and

(2) Accurate records for each batch of production, starting on December 10, 1998 for all consumer products subject to § 59.203(a) or December 10, 1999 for all consumer products subject to § 59.203(c), of the weight-percent and chemical composition of the individual product constituents.

(3) By providing this written certification to the Administrator, the certifying manufacturer accepts responsibility for compliance with the recordkeeping requirements in paragraphs (a)(1) and (a)(2) of this section with respect to any products covered by the written certification. Failure to maintain the required records may result in enforcement action by the EPA against the certifying manufacturer in accordance with the enforcement provisions applicable to violations of these provisions by regulated entities. The certifying manufacturer may revoke the written certification by sending a written statement to the Administrator and the regulated entity giving at least 90 days notice that the certifying manufacturer is rescinding acceptance of responsibility for compliance with the recordkeeping requirements listed in this paragraph. Upon expiration of the notice period, the regulated entity must assume responsibility for maintaining the records specified in this paragraph. Written certifications and revocation statements, to the Administrator from the certifying manufacturer shall be signed by the responsible official of the certifying manufacturer, provide the name and address of the certifying manufacturer, and be sent to the appropriate EPA Regional Office at the addresses listed in § 59.210 of this subpart. Such written certifications are not transferable by the manufacturer.

(b) If requested by the Administrator, product VOC content must be demonstrated to the Administrator's satisfaction to comply with the VOC content limits presented in § 59.203(a).

(c) Each manufacturer or importer subject to the provisions of § 59.203(d) shall maintain records specified in either paragraph (c)(1) or (c)(2) of this section for each charcoal lighter material.

(1) Test report from each certification test performed as specified in § 59.208(b) and all information and data specified in § 59.208(l); or

(2) Records of emission testing, which was performed by a method determined by the Administrator to be an acceptable alternative to that described in § 59.208, previously submitted to a State or local regulatory agency.

(d) The distributor that is named on the product label, or if no distributor is named on the label, the manufacturer or importer, shall submit by the applicable compliance date, or within 30 days after becoming a regulated entity, a one-time Initial Notification Report including the information specified in paragraphs (d)(1) through (d)(5) of this section.

(1) Company name;

(2) Name, title, phone number, address, and signature or certifying company official;

(3) A list of product categories and subcategories subject to § 59.203 for which the company is currently the regulated entity;

(4) A description of date coding systems, clearly explaining how the date of manufacture is marked on each sales unit of subject consumer products; and

(5) The name and location of the designated recordkeeping agent, if the records specified in paragraphs (a)(1) and (a)(2) are to be maintained by the manufacturer.

(e) If a regulated entity changes the date coding system reported according to paragraph (d)(4) of this section, the regulated entity shall notify the Administrator of such changes within 30 days following the change.

(f) If requested by the Administrator, the following information shall be made available within 30 days after receiving the request:

(1) Location of facility(ies) manufacturing, importing, or distributing subject consumer products;

(2) A list of product categories and subcategories, as found in tables 1 and 2 of this subpart, that are manufactured, imported, or distributed at each facility; and

(3) Location where VOC content records are kept for each subject consumer product.

(g) Each manufacturer or importer subject to the innovative product provisions in § 49.204 shall submit notifications as indicated in § 59.204(d) and (e).

§ 59.210 Addresses of EPA Regional Offices.

All requests, reports, submittals, and other communications to the Administrator pursuant to this regulation shall be submitted to the Regional Office of the EPA which serves the State or territory in which the corporate headquarters of the regulated entity resides. These areas are indicated in the following list of EPA Regional Offices:

EPA Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont), Director, Office of Ecosystem Protection, J.F.K. Federal Building, Boston, MA 02203–2211.

EPA Region II (New Jersey, New York, Puerto Rico, Virgin Islands), Director, Division of Environmental Planning and Protection, 290 Broadway, New York, NY 10007.

EPA Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia), Director, Air, Radiation, and Toxics Division, 841 Chestnut Building, Philadelphia, PA 19107.

EPA Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), Director, Air, Pesticides, and Toxics Management Division, 61 Forsyth Street, Atlanta, GA 30303.

EPA Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin), Director, Air and Radiation Division, 77 West Jackson Blvd., Chicago, IL 60604–3507.

EPA Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, Texas), Director, Multimedia Planning and Permitting Division, 1445 Ross Avenue, Dallas, TX 75202–2733.

EPA Region VII (Iowa, Kansas, Missouri, Nebraska), Director, Air, RCRA, and Toxics Division, 726 Minnesota Avenue, Kansas City, KS 66101.

EPA Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming), Director, Office of Pollution Prevention, State, and Tribal Assistance, 999 18th Street, Suite 500, Denver, Colorado 80202–2466.

EPA Region IX (American Samoa, Arizona, California, Guam, Hawaii, Nevada) Director, Air Divisions, 75 Hawthorne Street, San Francisco, CA 94105.

EPA Region X (Alaska, Oregon, Idaho, Washington), Director, Office of Air Quality, 1200 Sixth Avenue, Seattle, WA 98101.

§ 59.211 State authority.

(a) The provisions in this regulation shall not be construed in any manner to preclude any State or political subdivision thereof from:

(1) Adopting and enforcing any emission standard or limitation applicable to a regulated entity.

(2) Requiring the regulated entity to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of a facility for manufacturing a consumer product.

(b) [Reserved]

§ 59.212 Circumvention.

No regulated entity subject to these standards shall alter, destroy, or falsify any record or report to conceal what would otherwise be noncompliance with these standards. Such concealment includes, but is not limited to refusing to provide the Administrator access to all required records and date-coding information, altering the percent VOC content of a product batch, or altering the results of any required performance tests.

§ 59.213 Incorporations by reference.

(a) The materials listed in this section are incorporated by reference in the paragraphs noted in § 59.207. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on the date of the approval, and notice of any changes in these materials will be published in the FEDERAL REGISTER. The materials are available for purchase at the corresponding addresses noted below, and all are available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC 20408, at the Air and Radiation Docket and Information Center, U.S. EPA, 401 M St., SW., Washington, DC 20460, and at the EPA Library (MD–35), U.S. EPA, Research Triangle Park, NC 27711.

(b) The materials listed below are available for purchase from at least one of the following addresses: American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA, 19103; SCAQMD Subscription Services, P.O. Box 4932; 21865 Copley

Drive, Diamond Bar, CA 91765–0932; or University Microfilms International, 300 North Zeeb Road, Ann Arbor MI, 48106.

(1) ASTM Method E220–86 Standard Method for Calibration of Thermocouples by Comparisons Techniques, incorporation by reference (IBR) approved for § 59,208(m)(4).

(2) ASTM Method E380–82 Metric Practice, IBR approved for § 59.208(k).

(3) SCAQMD Method 25.1, March 1989 Determination of Total Gaseous Non-Methane Organic Emissions as Carbon (amended February 26, 1991) IBR approved for § 59.208(g)(2).

§ 59.214 Availability of information and confidentiality

(a) Availability of information. Specific reports or records required by this subpart are not available to the public. The Administrator will, upon request, provide information as to the compliance status of a product or regulated entity.

(b) Confidentiality. All confidential business information entitled to protection under section 114(c) of the CAA that must be submitted or maintained by a regulated entity pursuant to this section shall be treated in accordance with 40 CFR part 2, Subpart B.

TABLE 1 TO SUBPART C.—VOC CONTENT LIMITS BY PRODUCT CATEGORY

Product category	VOC content limit (weight-percent VOC)
Air fresheners:	
Single-phase	70
Double-phase	30
Liquids/pump sprays	18
Solids/gels	3
Automotive windshield washer fluid	35
Bathroom and tile cleaners:	
Aerosols	7
All other forms	5
Carburetor and choke cleaners	75
Cooking sprays—aerosol	18
Dusting aids:	
Aerosols	35
All other forms	7
Engine degreasers	75
Fabric protectants	75
Floor polishes/waxes:	
Products for flexible flooring materials	7
Products for nonresilient flooring	10
Wood floor wax	90
Furniture maintenance products-aerosol	25
General purpose cleaners	10
Glass cleaners:	
Aerosols	12
All other forms	8
Hairsprays	80
Hair mousses	16
Hair Styling gels	6
Household adhesives:	
Aerosols	75
Contact	80
Construction and panel	40
General purpose	10
Structural waterproof	15
Insecticides:	
Crawling bug	40
Flea and tick	25
Flying bug	35
Foggers	45
Lawn and Garden	20
Laundry prewash:	
Aerosols/solids	22
All other forms	5
Laundry starch products	5
Nail polish removers	85
Oven cleaners:	
Aerosols/pump	8
Liquids	5
Shaving creams	5

TABLE 2 TO SUBPART C.—HVOC [1] CONTENT LIMITS FOR UNDERARM DEODORANTS AND UNDERARM ANTIPERSPIRANTS

Product category	Percent HVOC content limit (weight-percent HVOC)
Underarm antiperspirants—aerosol	60
Underarm deodorants—aerosol	20

[1] High-volatility organic compound (HVOC) are VOC with vapor pressure greater than 80 millimeters of mercury at 20 degrees Celsius.

APPENDIX A TO SUBPART C OF PART 59—FIGURES

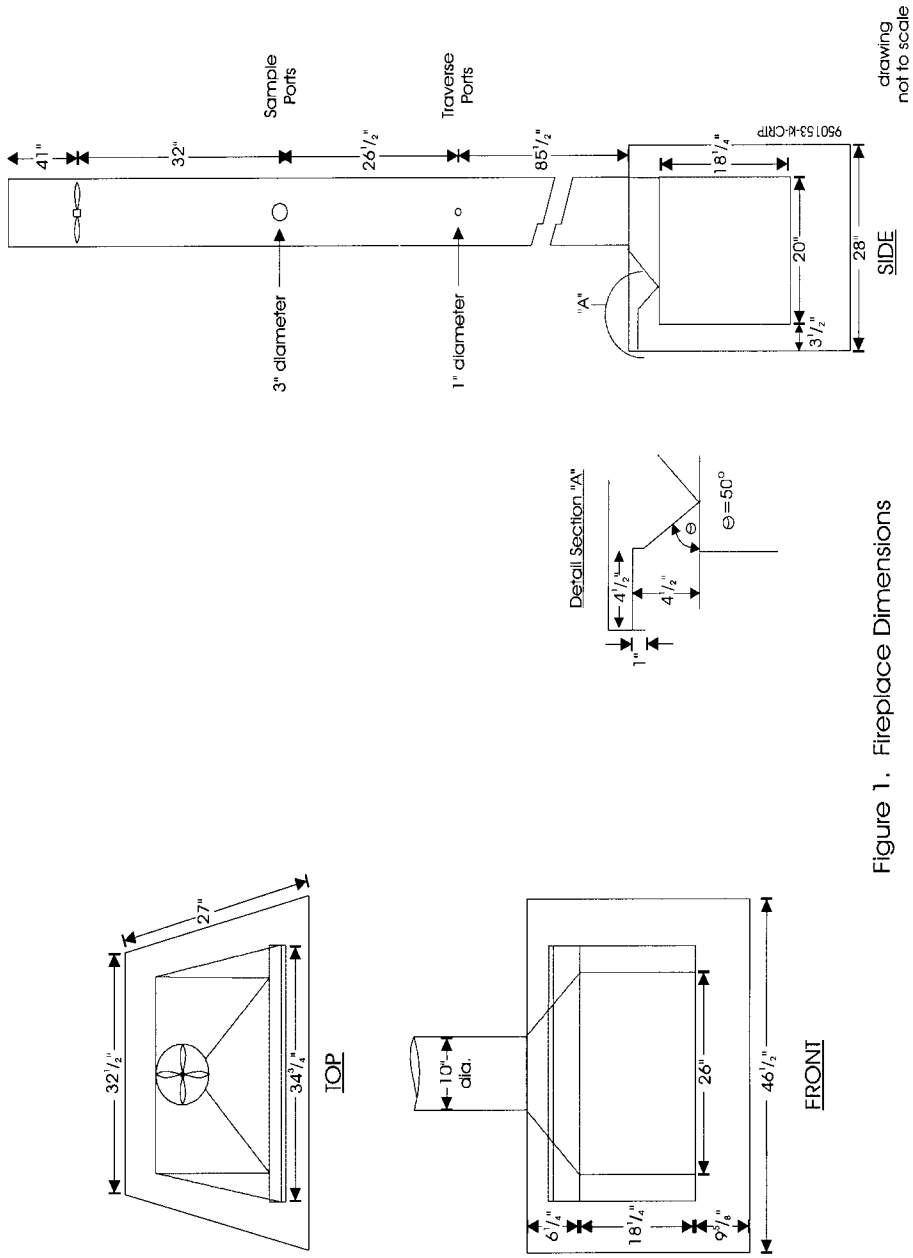
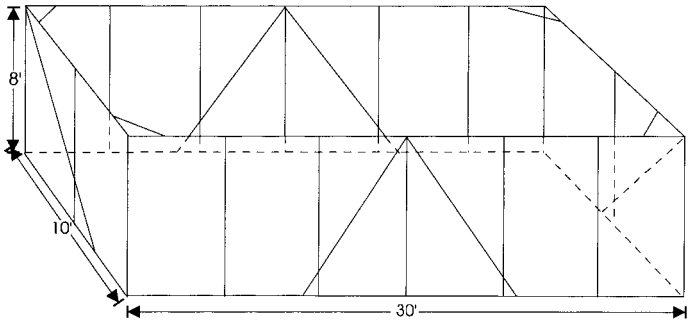
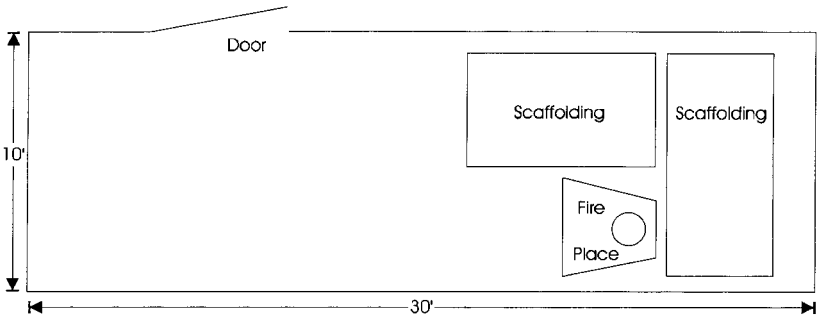


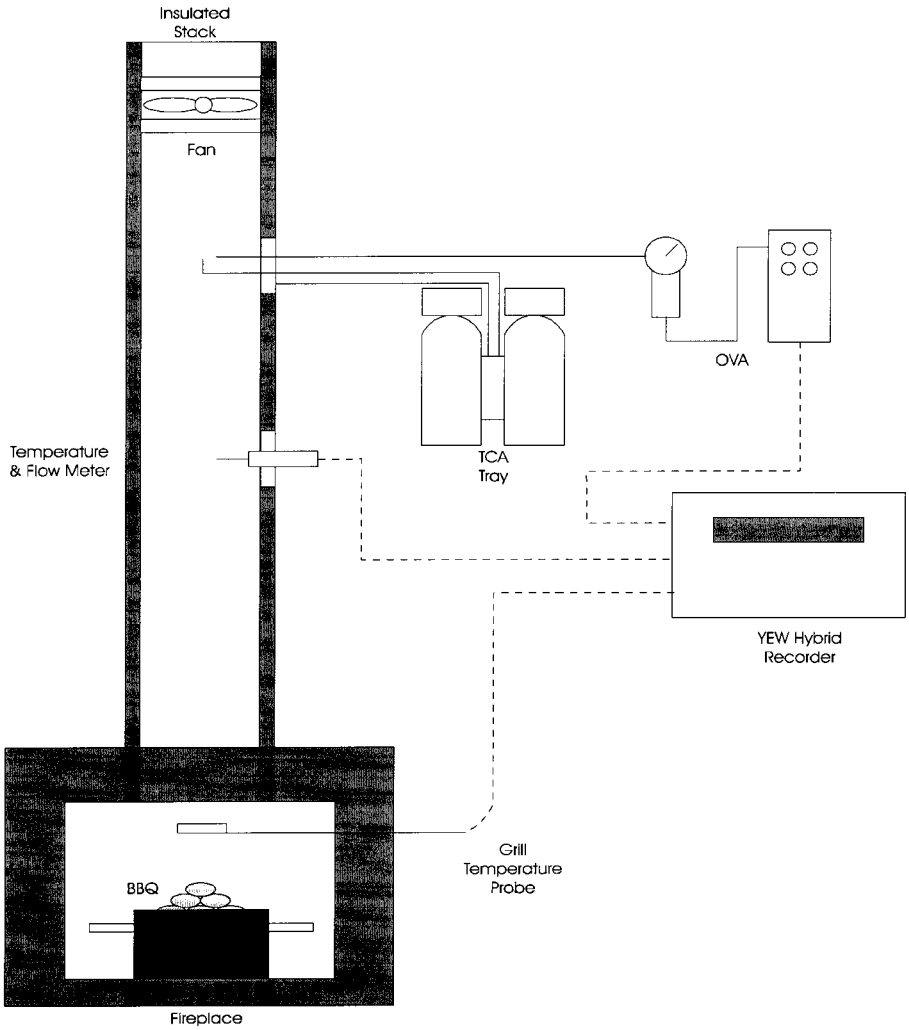
Figure 1. Fireplace Dimensions





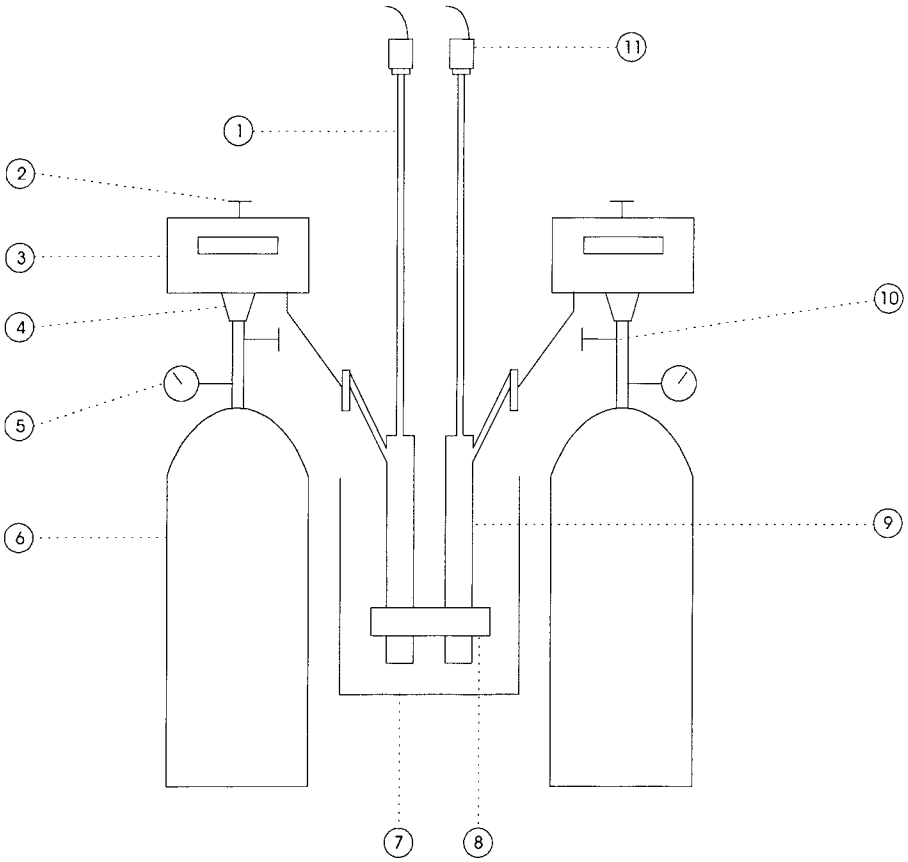
9501154-KI-CRTP

Figure 2. Suggested Enclosure Design



950155C.ja.RIP

Figure 3. Sampling Apparatus Set-up with Chart Recorder



950156C-ja-RTP

Figure 4. Sampling Apparatus for Organics

Subpart D—National Volatile Organic Compound Emission Standards for Architectural Coatings

SOURCE: 63 FR 48877, Sept. 11, 1998, unless otherwise noted.

§ 59.400 Applicability and compliance dates.

(a) Except as provided in paragraphs (b) and (c) of this section, the provisions of this subpart apply to each architectural coating manufactured on or after September 13, 1999 for sale or distribution in the United States.

(b) For any architectural coating registered under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Section 136, *et seq.*), the provisions of this subpart apply to any such coating manufactured on or after March 13, 2000 for sale or distribution in the United States.

(c) The provisions of this subpart do not apply to any architectural coating described in paragraphs (c)(1) through (c)(5) of this section:

(1) A coating that is manufactured for sale or distribution to architectural coating markets outside the United States; such a coating must not be sold or distributed within the United States as an architectural coating.

(2) A coating that is manufactured prior to September 13, 1999.

(3) A coating that is sold in a nonrefillable aerosol container.

(4) A coating that is collected and redistributed at a paint exchange.

(5) A coating that is sold in a container with a volume of one liter or less.

§ 59.401 Definitions.

Act means the Clean Air Act (42 U.S.C. 7401, *et seq.*, as amended by Pub. L. 101–549, 104 Stat. 2399).

Adhesive means any chemical substance that is applied for the purpose of bonding two surfaces together other than by mechanical means. Under this subpart, adhesives are not considered coatings.

Administrator means the Administrator of the United States Environmental Protection Agency (U.S. EPA) or an authorized representative.

Antenna coating means a coating formulated and recommended for application to equipment and associated structural appurtenances that are used to receive or transmit electromagnetic signals.

Anti-fouling coating means a coating formulated and recommended for application to submerged stationary structures and their appurtenances to prevent or reduce the attachment of marine or freshwater biological organisms, including, but not limited to, coatings registered with the EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Section 136, *et seq.*) and nontoxic foul-release coatings.

Anti-graffiti coating means a clear or opaque high performance coating formulated and recommended for application to interior and exterior walls, doors, partitions, fences, signs, and murals to deter adhesion of graffiti and to resist repeated scrubbing and exposure to harsh solvents, cleansers, or scouring agents used to remove graffiti.

Appurtenance means any accessory to a stationary structure, whether installed or detached at the proximate site of installation, including but not limited to: bathroom and kitchen fixtures; cabinets; concrete forms; doors; elevators; fences; hand railings; heating equipment, air conditioning equipment, and other fixed mechanical equipment or stationary tools; lamp posts; partitions; pipes and piping systems; rain gutters and downspouts; stairways, fixed ladders, catwalks, and fire escapes; and window screens.

Architectural coating means a coating recommended for field application to stationary structures and their appurtenances, to portable buildings, to pavements, or to curbs. This definition excludes adhesives and coatings recommended by the manufacturer or importer solely for shop applications or solely for application to non-stationary structures, such as airplanes, ships, boats, and railcars.

Below-ground wood preservative means a coating that is formulated and recommended to protect below-ground wood from decay or insect attack and that is registered with the EPA under the Federal Insecticide, Fungicide, and

Rodenticide Act (7 U.S.C. Section 136, *et seq.*).

Bituminous coating and mastic means a coating or mastic formulated and recommended for roofing, pavement sealing, or waterproofing that incorporates bitumens. Bitumens are black or brown materials including, but not limited to, asphalt, tar, pitch, and asphaltite that are soluble in carbon disulfide, consist mainly of hydrocarbons, and are obtained from natural deposits of asphalt or as residues from the distillation of crude petroleum or coal.

Bond breaker means a coating formulated and recommended for application between layers of concrete to prevent a freshly poured top layer of concrete from bonding to the layer over which it is poured.

Calcimine recoater means a flat solventborne coating formulated and recommended specifically for recoating calcimine-painted ceilings and other calcimine-painted substrates.

Chalkboard resurfacer means a coating formulated and recommended for application to chalkboards to restore a suitable surface for writing with chalk.

Clear means allowing light to pass through, so that the substrate may be distinctly seen.

Coating means a material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealants, inks, maskants, and temporary coatings. Protective, decorative, or functional materials that consist only of solvents, acids, bases, or any combination of these substances are not considered coatings for the purposes of this subpart.

Colorant means a concentrated pigment dispersion of water, solvent, and/or binder that is added to an architectural coating in a paint store or at the site of application to produce the desired color.

Concrete curing compound means a coating formulated and recommended for application to freshly placed concrete to retard the evaporation of water.

Concrete curing and sealing compound means a liquid membrane-forming compound marketed and sold solely for application to concrete surfaces to reduce the loss of water during the hardening process and to seal old and new concrete providing resistance against alkalis, acids, and ultraviolet light, and provide adhesion promotion qualities. The coating must meet the requirements of American Society for Testing and Materials (ASTM) C 1315–95, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete (incorporated by reference—see § 59.412 of this subpart).

Concrete protective coating means a high-build coating, formulated and recommended, for application in a single coat over concrete, plaster, or other cementitious surfaces. These coatings are formulated to be primerless, one-coat systems that can be applied over form oils and/or uncured concrete. These coatings prevent spalling of concrete in freezing temperatures by providing long-term protection from water and chloride ion intrusion.

Concrete surface retarder means a mixture of retarding ingredients such as extender pigments, primary pigments, resin, and solvent that interact chemically with the cement to prevent hardening on the surface where the retarder is applied, allowing the retarded mix of cement and sand at the surface to be washed away to create an exposed aggregate finish.

Container means the individual receptacle that holds the coating for storage and/or sale or distribution.

Conversion varnish means a clear acid curing coating with an alkyd or other resin blended with amino resins and supplied as a single component or two-component product. Conversion varnishes produce a hard, durable, clear finish designed for professional application to wood flooring. The film formation is the result of an acid-catalyzed condensation reaction, affecting a transetherification at the reactive ethers of the amino resins.

Dry fog coating means a coating formulated and recommended only for spray application such that overspray droplets dry before subsequent contact with incidental surfaces in the vicinity of the surface coating activity.

Exempt compounds means specific organic compounds that are not considered volatile organic compounds (VOC)

due to negligible photochemical reactivity. The exempt compounds are specified in 40 CFR 51.100.

Exterior coating means an architectural coating formulated and recommended for use in conditions exposed to the weather.

Extreme high durability coating means an air dry coating, including a fluoropolymer-based coating, that is formulated and recommended for touchup of precoated architectural aluminum extrusions and panels and to ensure the protection of architectural subsections, and that meets the weathering requirements of American Architectural Manufacturer's Association (AAMA) specification 605–98, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels, Section 7.9 (incorporated by reference—see § 59.412 of this subpart).

Faux-finishing/glazing means a coating used for wet-in-wet techniques, such as faux woodgrain, faux marble, and simulated aging, which require the finish to remain wet for an extended period of time.

Fire-retardant/resistive coating means a coating formulated and recommended to retard ignition and flame spread, or to delay melting or structural weakening due to high heat, that has been fire tested and rated by a certified laboratory for use in bringing buildings and construction materials into compliance with Federal, State, and local building code requirements.

Flat coating means a coating that is not defined under any other definition in this section and that registers gloss less than 15 on an 85-degree meter or less than 5 on a 60-degree meter according to ASTM Method D 523–89, Standard Test Method for Specular Gloss (incorporated by reference—see § 59.412 of this subpart).

Floor coating means an opaque coating with a high degree of abrasion resistance that is formulated and recommended for application to flooring including, but not limited to, decks, porches, and steps in a residential setting.

Flow coating means a coating that is used by electric power companies or their subcontractors to maintain the protective coating systems present on utility transformer units.

Form release compound means a coating formulated and recommended for application to a concrete form to prevent the freshly placed concrete from bonding to the form. The form may consist of wood, metal, or some material other than concrete.

Graphic arts coating or *sign paint* means a coating formulated and recommended for hand-application by artists using brush or roller techniques to indoor or outdoor signs (excluding structural components) and murals including lettering enamels, poster colors, copy blockers, and bulletin enamels.

Heat reactive coating means a high performance phenolic-based coating requiring a minimum temperature of 191 °C (375 °F) to 204 °C (400 °F) to obtain complete polymerization or cure. These coatings are formulated and recommended for commercial and industrial use to protect substrates from degradation and maintain product purity in which one or more of the following extreme conditions exist:

(1) Continuous or repeated immersion exposure of 90 to 98 percent sulfuric acid, or oleum;

(2) Continuous or repeated immersion exposure to strong organic solvents;

(3) Continuous or repeated immersion exposure to petroleum processing at high temperatures and pressures; and

(4) Continuous or repeated immersion exposure to food or pharmaceutical products which may or may not require high temperature sterilization.

High temperature coating means a high performance coating formulated and recommended for application to substrates exposed continuously or intermittently to temperatures above 202°C (400°F).

Impacted immersion coating means a high performance maintenance coating formulated and recommended for application to steel structures subject to immersion in turbulent, debris-laden water. These coatings are specifically resistant to high-energy impact damage caused by floating ice or debris.

Imported means that a coating manufactured outside the United States has been brought into the United States for sale or distribution.

Importer means a person that brings architectural coatings into the United States for sale or distribution within the United States. This definition does not include any person that brings a coating into the United States and repackages the coating by transferring it from one container to another, provided the coating VOC content is not altered and the coating is not sold or distributed to another party. For purposes of applying this definition, divisions of a company, subsidiaries, and parent companies are considered to be a single importer.

Industrial maintenance coating means a high performance architectural coating, including primers, sealers, undercoaters, intermediate coats, and topcoats formulated and recommended for application to substrates exposed to one or more of the following extreme environmental conditions in an industrial, commercial, or institutional setting:

(1) Immersion in water, wastewater, or chemical solutions (aqueous and nonaqueous solutions), or chronic exposure of interior surfaces to moisture condensation;

(2) Acute or chronic exposure to corrosive, caustic, or acidic agents, or to chemicals, chemical fumes, or chemical mixtures or solutions;

(3) Repeated exposure to temperatures above 120 °C (250 °F);

(4) Repeated (frequent) heavy abrasion, including mechanical wear and repeated (frequent) scrubbing with industrial solvents, cleansers, or scouring agents; or

(5) Exterior exposure of metal structures and structural components.

Interior clear wood sealer means a low viscosity coating formulated and recommended for sealing and preparing porous wood by penetrating the wood and creating a uniform smooth substrate for a finish coat of paint or varnish.

Interior coating means an architectural coating formulated and recommended for use in conditions not exposed to natural weathering.

Label means any written, printed, or graphic matter affixed to, applied to, attached to, blown into, formed, molded into, embossed on, or appearing upon any architectural coating container for purposes of branding, identifying, or giving information with respect to the product, use of the product, or contents of the container.

Lacquer means a clear or pigmented wood finish, including clear lacquer sanding sealers, formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and to provide a solid, protective film. Lacquer stains are considered stains, not lacquers.

Low solids means containing 0.12 kilogram or less of solids per liter (1 pound or less of solids per gallon) of coating material and for which at least half of the volatile component is water.

Magnesite cement coating means a coating formulated and recommended for application to magnesite cement decking to protect the magnesite cement substrate from erosion by water.

Manufactured means that coating ingredients have been combined and put into containers that have been labeled and made available for sale or distribution.

Manufacturer means a person that produces, packages, or repackages architectural coatings for sale or distribution in the United States. A person that repackages architectural coatings as part of a paint exchange, and does not produce, package, or repackage any other architectural coatings for sale or distribution in the United States, is excluded from this definition. A person that repackages a coating by transferring it from one container to another is excluded from this definition, provided the coating VOC content is not altered and the coating is not sold or distributed to another party. For purposes of applying this definition, divisions of a company, subsidiaries, and parent companies are considered to be a single manufacturer.

Mastic texture coating means a coating formulated and recommended to cover holes and minor cracks and to conceal surface irregularities, and is applied in a single coat of at least 10 mils (0.010 inch) dry film thickness.

Megagram means one million grams or 1.102 tons.

Metallic pigmented coating means a nonbituminous coating containing at least 0.048 kilogram of metallic pigment per liter of coating (0.4 pound per

gallon) including, but not limited to, zinc pigment.

Multi-colored coating means a coating that is packaged in a single container and exhibits more than one color when applied.

Nonferrous ornamental metal lacquers and surface protectant means a clear coating formulated and recommended for application to ornamental architectural metal substrates (bronze, stainless steel, copper, brass, and anodized aluminum) to prevent oxidation, corrosion, and surface degradation.

Nonflat coating means a coating that is not defined under any other definition in this section and that registers a gloss of 15 or greater on an 85-degree meter or 5 or greater on a 60-degree meter according to ASTM Method D 523–89, Standard Test Method for Specular Gloss (incorporated by reference—see § 59.412 of this subpart).

Nuclear coating means a protective coating formulated and recommended to seal porous surfaces such as steel (or concrete) that otherwise would be subject to intrusion by radioactive materials. These coatings must be resistant to long-term (service life) cumulative radiation exposure (ASTM Method D 4082–89, Standard Test Method for Effects of Gamma Radiation on Coatings for Use in Light-Water Nuclear Power Plants (incorporated by reference—see § 59.412 of this subpart)), relatively easy to decontaminate, and resistant to various chemicals to which the coatings are likely to be exposed (ASTM Method D 3912–80 (Reapproved 1989), Standard Test Method for Chemical Resistance of Coatings Used in Light-Water Nuclear Power Plants (incorporated by reference—see § 59.412 of this subpart)).

Opaque means not allowing light to pass through, so that the substrate is concealed from view.

Paint exchange means a program in which consumers, excluding architectural coating manufacturers and importers, may drop off and pick up usable post-consumer architectural coatings in order to reduce hazardous waste.

Person means an individual, corporation, partnership, association, State municipality, political subdivision of a State, and any agency, department, or instrumentality of the United States and any officer, agent, or employee thereof.

Pigmented means containing finely ground insoluble powder used to provide one or more of the following properties: color; corrosion inhibition; conductivity; fouling resistance; opacity; or improved mechanical properties.

Post-consumer coating means an architectural coating that has previously been purchased by a consumer or distributed to a consumer but not applied, and reenters the marketplace to be purchased by or distributed to a consumer. Post-consumer coatings include, but are not limited to, coatings collected during hazardous waste collection programs for repackaging or blending with virgin coating materials.

Pretreatment wash primer means a primer that contains a minimum of 0.5 percent acid, by weight, that is formulated and recommended for application directly to bare metal surfaces in thin films to provide corrosion resistance and to promote adhesion of subsequent topcoats.

Primer means a coating formulated and recommended for application to a substrate to provide a firm bond between the substrate and subsequent coatings.

Quick-dry enamel means a nonflat coating that has the following characteristics:

(1) Is capable of being applied directly from the container under normal conditions with ambient temperatures between 16 and 27°C (60 and 80°F);

(2) When tested in accordance with ASTM Method D 1640–83 (Reapproved 1989), Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature (incorporated by reference—see § 59.412), sets to touch in 2 hours or less, is tack free in 4 hours or less, and dries hard in 8 hours or less by the mechanical test method; and

(3) Has a dried film gloss of 70 or above on a 60 degree meter.

Quick-dry primer, sealer, and undercoater means a primer, sealer, or undercoater that is dry to the touch in a ½ hour and can be recoated in 2 hours when tested in accordance with ASTM Method D 1640–83 (Reapproved 1989), Standard Test Methods for Drying, Curing, or Film Formation of Organic

Coatings at Room Temperature (incorporated by reference—see § 59.412 of this subpart).

Recycled coating means an architectural coating that contains some portion of post-consumer coating. Recycled architectural coatings include, but are not limited to, post-consumer coatings that have been repackaged or blended with virgin coating materials.

Repackage means to transfer an architectural coating from one container to another.

Repair and maintenance thermoplastic coating means an industrial maintenance coating that has vinyl or chlorinated rubber as a primary resin and is recommended solely for the repair of existing vinyl or chlorinated rubber coatings without the full removal of the existing coating system.

Roof coating means a coating formulated and recommended for application to exterior roofs for the primary purpose of preventing penetration of the substrate by water or reflecting heat and reflecting ultraviolet radiation. This does not include thermoplastic rubber coatings.

Rust preventative coating means a coating formulated and recommended for use in preventing the corrosion of ferrous metal surfaces in residential situations.

Sanding sealer means a clear wood coating formulated and recommended for application to bare wood to seal the wood and to provide a coat that can be sanded to create a smooth surface. A sanding sealer that also meets the definition of a lacquer is not included in this category, but is included in the lacquer category.

Sealer means a coating formulated and recommended for application to a substrate for one or more of the following purposes: to prevent subsequent coatings from being absorbed by the substrate; to prevent harm to subsequent coatings by materials in the substrate; to block stains, odors, or efflorescence; to seal fire, smoke, or water damage; or to condition chalky surfaces.

Semitransparent means not completely concealing the surface of a substrate or its natural texture or grain pattern.

Shellac means a clear or pigmented coating formulated with natural resins (except nitrocellulose resins) soluble in alcohol (including, but not limited to, the resinous secretions of the lac beetle, *Laciffer lacca*). Shellacs dry by evaporation without chemical reaction and provide a quick-drying, solid protective film that may be used for blocking stains.

Shop application means that a coating is applied to a product or a component of a product in a factory, shop, or other structure as part of a manufacturing, production, or repairing process (e.g., original equipment manufacturing coatings).

Stain means a coating that produces a dry film with minimal coloring. This includes lacquer stains.

Stain controller means a conditioner or pretreatment coating formulated and recommended for application to wood prior to the application of a stain in order to prevent uneven penetration of the stain.

Swimming pool coating means a coating formulated and recommended to coat the interior of swimming pools and to resist swimming pool chemicals.

Thermoplastic rubber coating and mastic means a coating or mastic formulated and recommended for application to roofing or other structural surfaces and that incorporates no less than 40 percent by weight of thermoplastic rubbers in the total resin solids and may also contain other ingredients including, but not limited to, fillers, pigments, and modifying resins.

Tint base means a coating to which colorant is added in a paint store or at the site of application to produce a desired color.

Traffic marking coating means a coating formulated and recommended for marking and striping streets, highways, or other traffic surfaces including, but not limited to, curbs, berms, driveways, parking lots, sidewalks, and airport runways.

Undercoater means a coating formulated and recommended to provide a smooth surface for subsequent coatings.

United States means the United States of America, including the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands,

Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

Varnish means a clear or semi-transparent coating, excluding lacquers and shellacs, formulated and recommended to provide a durable, solid, protective film. Varnishes may contain small amounts of pigment to color a surface, or to control the final sheen or gloss of the finish.

Volatile organic compound or *VOC* means any organic compound that participates in atmospheric photochemical reactions, that is, any organic compound other than those which the Administrator designates as having negligible photochemical reactivity. For a list of compounds that the Administrator has designated as having negligible photochemical reactivity, also referred to as exempt compounds, refer to 40 CFR 51.100(s).

VOC content means the weight of VOC per volume of coating, calculated according to the procedures in § 59.406(a) of this subpart.

Waterproofing sealer and treatment means a coating formulated and recommended for application to a porous substrate for the primary purpose of preventing the penetration of water.

Wood preservative means a coating formulated and recommended to protect exposed wood from decay or insect attack, registered with the EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Section 136, *et seq.*).

Zone marking coating means a coating formulated and recommended for marking and striping driveways, parking lots, sidewalks, curbs, or airport runways, and sold or distributed in a container with a volume of 19 liters (5 gallons) or less.

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999]

§ 59.402 VOC content limits.

(a) Each manufacturer and importer of any architectural coating subject to this subpart shall ensure that the VOC content of the coating does not exceed the applicable limit in table 1 of this subpart, except as provided in §§ 59.403 and 59.404 of this subpart. Compliance with the VOC content limits will be determined based on the VOC content, as expressed in metric units.

(b) Except as provided in paragraph (c) of this section, if anywhere on the container of any architectural coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature supplied by a manufacturer or importer or anyone acting on their behalf, any representation is made that indicates that the coating meets the definition of more than one of the coating categories listed in table 1 of this subpart, then the most restrictive VOC content limit shall apply.

(c) The provision in paragraph (b) of this section does not apply to the coatings described in paragraphs (c)(1) through (c)(15) of this section.

(1) High temperature coatings that also meet the definition for metallic pigmented coatings are subject only to the VOC content limit in table 1 of this subpart for high temperature coatings.

(2) Lacquer coatings (including lacquer sanding sealers) that are also recommended for use in other architectural coating applications to wood, except as stains, are subject only to the VOC content limit in table 1 of this subpart for lacquers.

(3) Metallic pigmented coatings that also meet the definition for roof coatings, industrial maintenance coatings, or primers are subject only to the VOC content limit in table 1 of this subpart for metallic pigmented coatings.

(4) Shellacs that also meet the definition for any other architectural coating are subject only to the VOC content limit in table 1 of this subpart for shellacs.

(5) Fire-retardant/resistive coatings that also meet the definition for any other architectural coating are subject only to the VOC content limit in table 1 of this subpart for fire-retardant/resistive coatings.

(6) Pretreatment wash primers that also meet the definition for primers or that meet the definition for industrial maintenance coatings are subject only to the VOC content limit in table 1 of this subpart for pretreatment wash primers.

(7) Industrial maintenance coatings that also meet the definition for primers, sealers, undercoaters, or mastic

texture coatings are subject only to the VOC content limit in table 1 of this subpart for industrial maintenance coatings.

(8) Varnishes and conversion varnishes that also meet the definition for floor coatings are subject only to the VOC content limit in table 1 of this subpart for varnishes and conversion varnishes, respectively.

(9) Anti-graffiti coatings, high temperature coatings, impacted immersion coatings, thermoplastic rubber coatings and mastics, repair and maintenance thermoplastic coatings, and flow coatings that also meet the definition for industrial maintenance coatings are subject only to the VOC content limit in table 1 of this subpart for their respective categories (i.e., they are not subject to the industrial maintenance coatings VOC content limit in table 1 of this subpart).

(10) Waterproofing sealers and treatments that also meet the definition for quick-dry sealers are subject only to the VOC content limit in table 1 of this subpart for waterproofing sealers and treatments.

(11) Sanding sealers that also meet the definition for quick-dry sealers are subject only to the VOC content limit in table 1 of this subpart for sanding sealers.

(12) Nonferrous ornamental metal lacquers and surface protectants that also meet the definition for lacquers are subject only to the VOC content limit in table 1 of this subpart for nonferrous ornamental metal lacquers and surface protectants.

(13) Quick-dry primers, sealers, and undercoaters that also meet the definition for primers, sealers, or undercoaters are subject only to the VOC content limit in table 1 of this subpart for quick-dry primers, sealers, and undercoaters.

(14) Antenna coatings that also meet the definition for industrial maintenance coatings or primers are subject only to the VOC content limit in table 1 of this subpart for antenna coatings.

(15) Bituminous coatings and mastics that also meet the definition for any other architectural coatings are subject only to the VOC content limit in table 1 of this subpart for bituminous coatings and mastics.

(16) Zone marking coatings that also meet the definition for traffic marking coatings are subject only to the VOC content limit in table 1 of this subpart for zone marking coatings.

(17) Rust preventative coatings that also meet the definition for primers or undercoaters are subject only to the VOC content limit in table 1 of this subpart for rust preventative coatings.

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999]

§ 59.403 Exceedance fees.

(a) Except as provided in § 59.404 of this subpart, each manufacturer and importer of any architectural coating subject to the provisions of this subpart may exceed the applicable VOC content limit in table 1 of this subpart for the coating if the manufacturer or importer pays an annual exceedance fee. The exceedance fee must be calculated using the procedures in paragraphs (b) and (c) of this section.

(b) The exceedance fee paid by a manufacturer or importer, which is equal to the sum of the applicable exceedance fees for all coatings, must be calculated using equation 1 as follows:

$$\text{Annual Exceedance Fee} = \sum_{c=1}^{n} \text{Coating Fee}_c \qquad (1)$$

Where:

Annual Exceedance Fee=The total annual exceedance fee for a manufacturer or importer, in dollars.

Coating Fee_c=The annual exceedance fee for each coating (c), for which a fee applies, in dollars.

n=number of coatings to which a fee applies.

(c) The exceedance fee to be paid for each coating must be determined using equation 2 as follows:

$$\text{Coating Fee}_c = \text{Fee Rate} \times \text{Excess VOC} \times \text{Volume Manufactured or Imported} \qquad (2)$$

Where:

Fee Rate = The rate of $0.0028 per gram of excess VOC.

Excess VOC = The VOC content of the coating, or adjusted VOC content of a recycled coating (if applicable), in grams of VOC per liter of coating, minus the applicable VOC content limit from table 1 of this subpart (that is, VOC content of the coating minus VOC content limit).

Volume Manufactured or Imported = The volume of the coating manufactured or imported per year, in liters, including the volume of any water and exempt compounds and excluding the volume of any colorant added to tint bases. Any volume for which a tonnage exemption is claimed under § 59.404 of this subpart is also excluded.

(d) The exceedance fee shall be submitted to EPA by March 1 following the calendar year in which the coatings are manufactured or imported and shall be sent to the address provided in § 59.409(b).

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999, as amended at 65 FR 7737, Feb. 16, 2000]

§ 59.404 Tonnage exemption.

(a) Each manufacturer and importer of any architectural coating subject to the provisions of this subpart may designate a limited quantity of coatings to be exempt from the VOC content limits in table 1 of this subpart and the exceedance fee provisions of § 59.403 of this subpart, provided all of the requirements in paragraphs (a)(1) through (a)(4) of this section are met.

(1) The total amount of VOC contained in all the coatings selected for exemption must be equal to or less than 23 megagrams (25 tons) for the period of time from September 13, 1999 through December 31, 2000; 18 megagrams (20 tons) in the year 2001; and 9 megagams (10 tons) per year in the year 2002 and each subsequent year. The amount of VOC contained in each coating shall be calculated using the procedure in paragraph (b) of this section. Compliance with the tonnage exemption will be determined based on the amount of VOC, as expressed in metric units.

(2) The container labeling requirements of § 59.405 of this subpart.

(3) The recordkeeping requirements of § 59.407(c) of this subpart.

(4) The reporting requirements of § 59.408(b) and (e) of this subpart.

(b) Each manufacturer and importer choosing to use the exemption described in paragraph (a) of this section must use equations 3 and 4 to calculate the total amount of VOC for each time period the exemption is elected. The VOC amount shall be determined without colorant that is added after the tint base is manufactured or imported.

$$\text{Total VOC} = \sum_{c=1}^{n} \text{VOC}_c \qquad (3)$$

Where:

Total VOC = Total megagrams of VOC contained in all coatings being claimed under the exemption.

VOC_c = Megagrams of VOC, for each coating (c) claimed under the exemption, as computed by equation 4.

n = Number of coatings for which exemption is claimed.

$$\text{VOC}_c = (\text{Volume Manufactured or Imported}) * (\text{VOC Amount}) / 1 \times 10^6 \qquad (4)$$

Where:

Volume Manufactured or Imported = Volume of the coating manufactured or imported, in liters, including the volume of any water and exempt compounds and excluding the volume of any colorant added to tint bases, for the time period the exemption is claimed.

VOC Amount = Grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, including the volume of any water and exempt compounds.''

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999]

§ 59.405 Container labeling requirements.

(a) Each manufacturer and importer of any architectural coating subject to the provisions of this subpart shall provide the information listed in paragraphs (a)(1) through (a)(3) of this section on the coating container in which the coating is sold or distributed.

(1) The date the coating was manufactured, or a date code representing the date shall be indicated on the label, lid, or bottom of the container.

(2) A statement of the manufacturer's recommendation regarding thinning of the coating shall be indicated on the label or lid of the container. This requirement does not apply to the thinning of architectural coatings with water. If thinning of the coating prior to use is not necessary, the recommendation must specify that the coating is to be applied without thinning.

(3) The VOC content of the coating as described in paragraph (a)(3)(i) or (a)(3)(ii) of this section shall be indicated on the label or lid of the container.

(i) The VOC content of the coating, displayed in units of grams of VOC per liter of coating or in units of pounds of VOC per gallon of coating; or

(ii) The VOC content limit in table 1 of this subpart with which the coating is required to comply and does comply, displayed in units of grams of VOC per liter of coating or in units of pounds of VOC per gallon of coating.

(b) In addition to the information specified in paragraph (a) of this section, each manufacturer and importer of any industrial maintenance coating subject to the provisions of this subpart shall display on the label or lid of the container in which the coating is sold or distributed one or more of the descriptions listed in paragraphs (b)(1) through (b)(4) of this section.

(1) ''For industrial use only.''

(2) ''For professional use only.''

(3) ''Not for residential use'' or ''Not intended for residential use.''

(4) ''This coating is intended for use under the following condition(s):'' (Include each condition in paragraphs (b)(4)(i) through (b)(4)(v) of this section that applies to the coating.)

(i) Immersion in water, wastewater, or chemical solutions (aqueous and nonaqueous solutions), or chronic exposure of interior surfaces to moisture condensation;

(ii) Acute or chronic exposure to corrosive, caustic, or acidic agents, or to chemicals, chemical fumes, or chemical mixtures or solutions;

(iii) Repeated exposure to temperatures above 120° C (250° F);

(iv) Repeated (frequent) heavy abrasion, including mechanical wear and repeated (frequent) scrubbing with industrial solvents, cleansers, or scouring agents; or

(v) Exterior exposure of metal structures and structural components.

(c) In addition to the information specified in paragraph (a) of this section, each manufacturer and importer of any recycled coating who calculates the VOC content using equations 7 and 8 in § 59.406(a)(3) of this subpart shall include the following statement indicating the post-consumer coating content on the label or lid of the container in which the coating is sold or distributed: ''CONTAINS NOT LESS THAN X PERCENT BY VOLUME POST-CONSUMER COATING,'' where ''X'' is replaced by the percent by volume of post-consumer architectural coating.

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999]

§ 59.406 Compliance provisions.

(a) For the purpose of determining compliance with the VOC content limits in table 1 of this subpart, each manufacturer and importer shall determine the VOC content of a coating using the procedures described in paragraph

(a)(1), (a)(2), or (a)(3) of this section, as appropriate. The VOC content of a tint base shall be determined without colorant that is added after the tint base is manufactured or imported.

(1) With the exception of low solids stains and low solids wood preservatives, determine the VOC content in grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, excluding the volume of any water and exempt compounds. Calculate the VOC content using equation 5 as follows:

$$\text{VOC Content} = \frac{(W_s - W_w - W_{ec})}{(V_m - V_w - V_{ec})} \quad (5)$$

Where:

VOC content = grams of VOC per liter of coating

W_s = weight of volatiles, in grams

W_w = weight of water, in grams

W_{ec} = weight of exempt compounds, in grams

V_m = volume of coating, in liters

V_w = volume of water, in liters

V_{ec} = volume of exempt compounds, in liters

(2) For low solids stains and low solids wood preservatives, determine the VOC content in units of grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, including the volume of any water and exempt compounds. Calculate the VOC content using equation 6 as follows:

$$\text{VOC Content}_{ls} = \frac{(W_s - W_w - W_{ec})}{(V_m)} \quad (6)$$

Where:

VOC content $_{1s}$ = the VOC content of a low solids coating in grams of VOC per liter of coating

W_s = weight of volatiles, in grams

W_w = weight of water, in grams

W_{ec} = weight of exempt compounds, in grams

V_m = volume of coating, in liters

(3) For recycled coatings, the manufacturer or importer has the option of calculating an adjusted VOC content to account for the post-consumer coating content. If this option is used, the manufacturer or importer shall determine the adjusted VOC content using equations 7 and 8 as follows:

Where:

$$\text{Adjusted VOC Content} = \text{Actual VOC Content} - \left(\text{Actual VOC Content}\left(\frac{\text{Percent Post-consumer Coating}}{100}\right)\right) \quad (7)$$

Adjusted VOC content = The VOC content assigned to the recycled coating for purposes of complying with the VOC content limits in table 1 of this subpart.

Actual VOC content = The VOC content of the coating as determined using equation 5 in paragraph (a)(1) of this section.

Percent Post-consumer Coating = The volume percent of a recycled coating that is post-consumer coating materials (as determined in equation 8)

$$\text{Percent Post-consumer Coating} = \frac{\text{Volume of Post-consumer Coating}}{(\text{Volume of Post-consumer Coating} + \text{Volume of Virgin Materials})} \times 100 \text{ Percent} \quad (8)$$

Where:

Percent Post-consumer Coating = The volume percent of a recycled coating that is post-consumer coating materials.

Volume of Post-consumer Coating = The volume, in liters, of post-consumer coating materials used in the production of a recycled coating.

Volume of Virgin Materials = The volume, in liters, of virgin coating materials used in the production of a recycled coating.

(b) To determine the composition of a coating in order to perform the calculations in paragraph (a) of this section, the reference method for VOC content is Method 24 of appendix A of 40 CFR part 60, except as provided in paragraphs (c) and (d) of this section. To determine the VOC content of a coating, the manufacturer or importer may use Method 24 of appendix A of 40 CFR part 60, an alternative method as provided in paragraph (c) of this section, formulation data, or any other reasonable means for predicting that the coating has been formulated as intended (e.g., quality assurance checks, recordkeeping). However, if there are any inconsistencies between the results of a Method 24 test and any other means for determining VOC content, the Method 24 test results will govern, except as provided in paragraph (c) of this section. The Administrator may require the manufacturer or importer to conduct a Method 24 analysis.

(c) The Administrator may approve, on a case-by-case basis, a manufacturer's or importer's use of an alternative method in lieu of Method 24 for determining the VOC content of coatings if the alternative method is demonstrated to the Administrator's satisfaction to provide results that are acceptable for purposes of determining compliance with this subpart.

(d) Analysis of methacrylate multicomponent coatings used as traffic marking coatings shall be conducted according to the procedures specified in appendix A to this subpart. Appendix A to this subpart is a modification of Method 24 of appendix A of 40 CFR part 60. The modification of Method 24 provided in appendix A to this subpart has not been approved for methacrylate multicomponent coatings used for other purposes than as traffic marking coatings or for other classes of multicomponent coatings.

(e) The Administrator may determine a manufacturer's or importer's compliance with the provisions of this subpart based on information required by this subpart (including the records and reports required by §§ 59.407 and 59.408 of this subpart) or any other information available to the Administrator.

§ 59.407 Recordkeeping requirements.

(a) Each manufacturer and importer using the provisions of § 59.406(a)(3) of this subpart to determine the VOC content of a recycled coating shall maintain in written or electronic form records of the information specified in paragraphs (a)(1) through (a)(6) of this section for a period of 3 years.

(1) The minimum volume percent post-consumer coating content for each recycled coating.

(2) The volume of post-consumer coating received for recycling.

(3) The volume of post-consumer coating received that was unusable.

(4) The volume of virgin materials.

(5) The volume of the final recycled coating manufactured or imported.

(6) Calculations of the adjusted VOC content as determined using equation 7 in § 59.406(a)(3) of this subpart for each recycled coating.

(b) Each manufacturer and importer using the exceedance fee provisions in § 59.403 of this subpart, as an alternative to achieving the VOC content limits in table 1 of this subpart, shall maintain in written or electronic form the records specified in paragraphs (b)(1) through (b)(7) of this section for a period of 3 years.

(1) A list of the coatings and the associated coating categories in table 1 of this subpart for which the exceedance fee is used.

(2) Calculations of the annual fee for each coating and the total annual fee for all coatings using the procedure in § 59.403 (b) and (c) of this subpart.

(3) The VOC content of each coating in grams of VOC per liter of coating.

(4) The excess VOC content of each coating in grams of VOC per liter of coating.

(5) The total volume of each coating manufactured or imported per calendar year, in liters, including the volume of any water and exempt compounds and excluding the volume of any colorant added to tint bases.

(6) The annual fee for each coating.

(7) The total annual fee for all coatings.

(c) Each manufacturer and importer claiming the tonnage exemption in

§ 59.404 of this subpart shall maintain in written or electronic form the records specified in paragraphs (c)(1) through (c)(4) of this section for a period of 3 years.

(1) A list of all coatings and associated coating categories in table 1 of this subpart for which the exemption is claimed.

(2) The VOC amount as used in equation 4.

(3) The volume manufactured or imported, in liters, for each coating for which the exemption is claimed for the time period the exemption is claimed.

(4) The total megagrams of VOC contained in each coating for which the exemption is claimed, and for all coatings combined for which the exemption is claimed, for the time period the exemption is claimed, as calculated in § 59.404(b) of this subpart.

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999]

§ 59.408 Reporting requirements.

(a) Each manufacturer and importer of any architectural coating subject to the provisions of this subpart shall submit reports and exceedance fees specified in this section to the appropriate address as listed in § 59.409 of this subpart.

(b) Each manufacturer and importer of any architectural coating subject to the provisions of this subpart shall submit an initial notification report no later than the applicable compliance date specified in § 59.400, or within 180 days after the date that the first architectural coating is manufactured or imported, whichever is later. The initial report must include the information in paragraphs (b)(1) through (b)(3) of this section.

(1) The name and mailing address of the manufacturer or importer.

(2) The street address of each one of the manufacturer's or importer's facilities in the United States that is producing, packaging, or repackaging any architectural coating subject to the provisions of this subpart.

(3) A list of the categories from table 1 of this subpart for which the manufacturer's or importer's coatings meet the definitions in § 59.401 of this subpart.

(4) If a date code is used on a coating container to represent the date a coating was manufactured, as allowed in § 59.405(a)(1) of this subpart, the manufacturer or importer of the coating shall include an explanation of each date code in the initial notification report and shall submit an explanation of any new date code no later than 30 days after the new date code is first used on the container for a coating.

(c) Each manufacturer and importer of a recycled coating that chooses to determine the adjusted VOC content according to the provisions of § 59.406(a)(3) to demonstrate compliance with the applicable VOC content limit in table 1 of this subpart shall submit a report containing the information in paragraphs (c)(1) through (c)(5) of this section. The report must be submitted for each coating for which the adjusted VOC content is used to demonstrate compliance. This report must be submitted by March 1 of the year following any calendar year in which the adjusted VOC content provision is used.

(1) The minimum volume percent post-consumer coating content for each recycled coating.

(2) The volume of post-consumer coating received for recycling.

(3) The volume of post-consumer coating received that was unusable.

(4) The volume of virgin materials used.

(5) The volume of the final recycled coating manufactured or imported.

(d) Each manufacturer and importer that uses the exceedance fee provisions of § 59.403 of this subpart shall report the information in paragraphs (d)(1) through (d)(7) of this section for each coating for which the exceedance fee provisions are used. This report and the exceedance fee payment must be submitted by March 1 following the calendar year in which the coating is manufactured or imported.

(1) Manufacturer's or importer's name and mailing address.

(2) A list of all coatings and the associated coating categories in table 1 of this subpart for which the exceedance fee provision is being used.

(3) The VOC content of each coating that exceeds the applicable VOC content limit in table 1 of this subpart.

(4) The excess VOC content of each coating in grams of VOC per liter of coating.

(5) The total volume of each coating manufactured or imported per calendar year, in liters, including the volume of any water and exempt compounds and excluding the volume of any colorant added to tint bases.

(6) The annual fee for each coating.

(7) The total annual fee for all coatings.

(e) Each manufacturer and importer of architectural coatings for which a tonnage exemption under § 59.404 of this subpart is claimed shall submit a report no later than March 1 of the year following the calendar year in which the exemption was claimed. The report must include the information in paragraphs (f)(1) through (f)(4) of this section.

(1) A list of all coatings and the associated coating categories in table 1 of this subpart for which the exemption was claimed.

(2) The VOC amount as used in equation 4.

(3) The volume manufactured or imported, in liters, for each coating for which the exemption is claimed for the time period the exemption is claimed.

(4) The total megagrams of VOC contained in all coatings for which the exemption was claimed for the time period the exemption was claimed, as calculated in § 59.404(b) of this subpart.

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999]

§ 59.409 Addresses of EPA Offices.

(a) Except for exceedance fee payments, each manufacturer and importer of any architectural coating subject to the provisions of this subpart shall submit all requests, reports, submittals, and other communications to the Administrator pursuant to this regulation to the Regional Office of the U.S. Environmental Protection Agency that serves the State or Territory in which the corporate headquarters of the manufacturer or importer resides. These areas are indicated in the following list of EPA Regional Offices:

EPA Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont), Director, Office of Environmental Stewardship, Mailcode: SAA, One Congress Street, Boston, MA 02114–2023.

EPA Region II (New Jersey, New York, Puerto Rico, Virgin Islands), Director, Division of Enforcement and Compliance Assistance, 290 Broadway, New York, NY 10007–1866.

EPA Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia), Director, Air Protection Division, 1650 Arch Street, Philadelphia, PA 19103.

EPA Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), Director, Air, Pesticides, and Toxics Management Division, 61 Forsyth Street, Atlanta, GA 30303.

EPA Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin), Director, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, IL 60604–3507.

EPA Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, Texas), Director, Multimedia Planning and Permitting Division, 1445 Ross Avenue, Dallas, TX 75202–2733.

EPA Region VII (Iowa, Kansas, Missouri, Nebraska), Director, Air, RCRA, and Toxics Division, 901 North 5th Street, Kansas City, KS 66101.

EPA Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming), Director, Office of Partnerships and Regulatory Assistance, 999 18th Street, Suite 500, Denver, Colorado 80202–2466.

EPA Region IX (American Samoa, Arizona, California, Guam, Hawaii, Nevada), Director, Air Division, 75 Hawthorne Street, San Francisco, CA 94105.

EPA Region X (Alaska, Oregon, Idaho, Washington), Director, Office of Air Quality, 1200 Sixth Avenue, Seattle, WA 98101.

(b) Each manufacturer and importer who uses the exceedance fee provisions of § 59.403 shall submit the exceedance fee payment required by § 59.408(d) to the following address: Environmental Protection Agency, AIM Exceedance Fees, Post Office Box 371293M, Pittsburgh, PA 15251. This address is for the fee payment only; the exceedance fee report required by § 59.408(d) is to be submitted to the appropriate EPA Regional Office listed in paragraph (a) of this section. The exceedance fee payment in the form of a check or money order must be made payable to ''U.S. Environmental Protection Agency'' or ''US EPA.''

[63 FR 48877, Sept. 11, 1998; 64 FR 35001, June 30, 1999, as amended at 65 FR 7737, Feb. 16, 2000]

§ 59.410 State authority.

The provisions of this subpart must not be construed in any manner to preclude any State or political subdivision thereof from:

(a) Adopting and enforcing any emissions standard or limitation applicable to a manufacturer or importer of architectural coatings; or

(b) Requiring the manufacturer or importer of architectural coatings to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of a facility for manufacturing an architectural coating.

§ 59.411 Circumvention.

Each manufacturer and importer of any architectural coating subject to the provisions of this subpart must not alter, destroy, or falsify any record or report, to conceal what would otherwise be noncompliance with this subpart. Such concealment includes, but is not limited to, refusing to provide the Administrator access to all required records and date-coding information, altering the VOC content of a coating batch, or altering the results of any required tests to determine VOC content.

§ 59.412 Incorporations by reference.

(a) The materials listed in this section are incorporated by reference in the paragraphs noted in § 59.401. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on the date of the approval, and notice of any changes in these materials will be published in the FEDERAL REGISTER. The materials are available for purchase at the corresponding addresses noted below, and all are available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC; at the Air and Radiation Docket and Information Center, U.S. EPA, 401 M St., SW., Washington, DC 20460; and at the EPA Library (MD–35), U.S. EPA, Research Triangle Park, North Carolina.

(b) The materials listed below are available for purchase at the following address: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959.

(1) ASTM Method C 1315–95, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete, incorporation by reference approved for § 59.401, *Concrete curing and sealing compound*.

(2) ASTM Method D 523–89, Standard Test Method for Specular Gloss, incorporation by reference approved for § 59.401, *Flat coating* and *Nonflat coating*.

(3) ASTM Method D 1640–83 (Reapproved 1989), Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature, incorporation by reference approved for § 59.401, *Quick-dry enamel* and *Quick-dry primer, sealer, and undercoater*.

(4) ASTM Method D 3912–80 (Reapproved 1989), Standard Test Method for Chemical Resistance of Coatings Used in Light-Water Nuclear Power Plants, incorporation by reference approved for § 59.401, *Nuclear coating*.

(5) ASTM Method D 4082–89, Standard Test Method for Effects of Gamma Radiation on Coatings for Use in Light-Water Nuclear Power Plants, incorporation by reference approved for § 59.401, *Nuclear coating*.

(c) The following material is available from the AAMA, 1827 Walden Office Square, Suite 104, Schaumburg, IL 60173.

(1) AAMA 605–98, Voluntary Specification Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels, incorporation by reference approved for § 59.401, *Extreme high durability coating*.

(2) [Reserved]

§ 59.413 Availability of information and confidentiality.

(a) *Availability of information*. The availability to the public of information provided to or otherwise obtained by the Administrator under this part shall be governed by part 2 of this chapter.

(b) *Confidentiality*. All confidential business information entitled to protection under section 114(c) of the Act that must be submitted or maintained by each manufacturer or importer of

architectural coatings pursuant to this section shall be treated in accordance with 40 CFR part 2, subpart B.

APPENDIX A TO SUBPART D OF PART 59—DETERMINATION OF VOLATILE MATTER CONTENT OF METHACRYLATE MULTICOMPONENT COATINGS USED AS TRAFFIC MARKING COATINGS

1.0 PRINCIPLE AND APPLICABILITY

1.1 Applicability. This modification to Method 24 of appendix A of 40 CFR part 60 applies to the determination of volatile matter content of methacrylate multicomponent coatings used as traffic marking coatings.

1.2 Principle. A known amount of methacrylate multicomponent coating is dispersed in a weighing dish using a stirring device before the volatile matter is removed by heating in an oven.

2.0 PROCEDURE

2.1 Prepare about 100 milliliters (mL) of sample by mixing the components in a storage container, such as a glass jar with a screw top or a metal can with a cap. The storage container should be just large enough to hold the mixture. Combine the components (by weight or volume) in the ratio recommended by the manufacturer. Tightly close the container between additions and during mixing to prevent loss of volatile materials. Most manufacturers' mixing instructions are by volume. Because of possible error caused by expansion of the liquid when measuring the volume, it is recommended that the components be combined by weight. When weight is used to combine the components and the manufacturer's recommended ratio is by volume, the density must be determined by section 3.5 of Method 24 of appendix A of 40 CFR part 60.

2.2 Immediately after mixing, take aliquots from this 100 mL sample for determination of the total volatile content, water content, and density. To determine water content, follow section 3.4 of Method 24 of appendix A of 40 CFR part 60. To determine density, follow section 3.5 of Method 24. To determine total volatile content, use the apparatus and reagents described in section 3.8.2 of Method 24 and the following procedures:

2.2.1 Weigh and record the weight of an aluminum foil weighing dish and a metal paper clip. Using a syringe as specified in section 3.8.2.1 of Method 24, weigh to 1 milligrams (mg), by difference, a sample of coating into the weighing dish. For methacrylate multicomponent coatings used for traffic marking use 3.0 ± 0.1 g.

2.2.2 Add the specimen and use the metal paper clip to disperse the specimen over the surface of the weighing dish. If the material forms a lump that cannot be dispersed, discard the specimen and prepare a new one. Similarly, prepare a duplicate. The sample shall stand for a minimum of 1 hour, but no more than 24 hours before being oven dried at 110 ± 5 degrees Celsius for 1 hour.

2.2.3 Heat the aluminum foil dishes containing the dispersed specimens in the forced draft oven for 60 minutes at 110 ± 5 degrees Celsius. Caution—provide adequate ventilation, consistent with accepted laboratory practice, to prevent solvent vapors from accumulating to a dangerous level.

2.2.4 Remove the dishes from the oven, place immediately in a desiccator, cool to ambient temperature, and weigh to within 1 mg. After weighing, break up the film of the coating using the metal paper clip. Weigh dish to within 1 mg. Return to forced draft oven for an additional 60 minutes at 110 ± 5 degrees Celsius.

2.2.5 Remove the dishes from the oven, place immediately in a desiccator, cool to ambient temperature, and weigh to within 1 mg.

2.2.6 Run analyses in pairs (duplicate sets for each coating mixture until the criterion in section 4.3 of Method 24 of appendix A of 40 CFR part 60 is met. Calculate the weight of volatile matter for each heating period following Equation 24–2 of Method 24 and record the arithmetic average. Add the arithmetic average for the two heating periods to obtain the weight fraction of the volatile matter.

3.0 DATA VALIDATION PROCEDURE

3.1 Follow the procedures in Section 4 of Method 24 of appendix A to 40 CFR part 60.

3.2 If more than 10 percent of the sample is lost when the sample is being broken up in 2.2.4, the sample is invalid.

4.0 CALCULATIONS

Follow the calculation procedures in Section 5 of Method 24 of appendix A of 40 CFR part 60.

TABLE 1 TO SUBPART D—VOLATILE ORGANIC COMPOUND (VOC), CONTENT LIMITS FOR ARCHITECTURAL COATINGS

[Unless otherwise specified, limits are expressed in grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation excluding the volume of any water, exempt compounds, or colorant added to tint bases.]

Coating category	Grams VOC per liter	Pounds VOC per gallon [a]
Antenna coatings	530	4.4

[Unless otherwise specified, limits are expressed in grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation excluding the volume of any water, exempt compounds, or colorant added to tint bases.]

Coating category	Grams VOC per liter	Pounds VOC per gallon [a]
Anti-fouling coatings	450	3.8
Anti-graffiti coatings	600	5.0
Bituminous coatings and mastics	500	4.2
Bond breakers	600	5.0
Calcimine recoater	475	4.0
Chalkboard resurfacers	450	3.8
Concrete curing compounds	350	2.9
Concrete curing and sealing compounds	700	5.8
Concrete protective coatings	400	3.3
Concrete surface retarders	780	6.5
Conversion varnish	725	6.0
Dry fog coatings	400	3.3
Extreme high durability coatings	800	6.7
Faux finishing/glazing	700	5.8
Fire-retardant/resistive coatings:		
Clear	850	7.1
Opaque	450	3.8
Flat coatings:		
Exterior coatings	250	2.1
Interior coatings	250	2.1
Floor coatings	400	3.3
Flow coatings	650	5.4
Form release compounds	450	3.8
Graphic arts coatings (sign paints)	500	4.2
Heat reactive coatings	420	3.5
High temperature coatings	650	5.4
Impacted immersion coatings	780	6.5
Industrial maintenance coatings	450	3.8
Lacquers (including lacquer sanding sealers)	680	5.7
Magnesite cement coatings	600	5.0
Mastic texture coatings	300	2.5
Metallic pigmented coatings	500	4.2
Multi-colored coatings	580	4.8
Nonferrous ornamental metal lacquers and surface protectants	870	7.3
Nonflat coatings:		
Exterior coatings	380	3.2
Interior coatings	380	3.2
Nuclear coatings	450	3.8
Pretreatment wash primers	780	6.5
Primers and undercoaters	350	2.9
Quick-dry coatings:		
Enamels	450	3.8
Primers, sealers, and undercoaters	450	3.8
Repair and maintenance thermoplastic coatings	650	5.4
Roof coatings	250	2.1
Rust preventative coatings	400	3.3
Sanding sealers (other than lacquer sanding sealers)	550	4.6
Sealers (including interior clear wood sealers)	400	3.3
Shellacs:		
Clear	730	6.1
Opaque	550	4.6
Stains:		
Clear and semitransparent	550	4.6
Opaque	350	2.9
Low solids	[b] 120	[b] 1.0
Stain controllers	720	6.0
Swimming pool coatings	600	5.0
Thermoplastic rubber coatings and mastics	550	4.6
Traffic marking coatings	150	1.3
Varnishes	450	3.8
Waterproofing sealers and treatments	600	5.0
Wood preservatives:		
Below ground wood preservatives	550	4.6
Clear and semitransparent	550	4.6
Opaque	350	2.9
Low solids	[b] 120	[b] 1.0
Zone marking coatings	450	3.8

[a] English units are provided for information only. Compliance will be determined based on the VOC content limit, as expressed in metric units.

[b] Units are grams of VOC per liter (pounds of VOC per gallon) of coating, including water and exempt compounds, thinned to the maximum thinning recommended by the manufacturer.

[63 FR 48877, Sept. 11, 1998; 63 FR 55175, Oct. 14, 1998; 63 FR 32103, June 15, 1999; 64 FR 35002, June 30, 1999]