



# Federal Register

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**Tuesday,  
October 17, 2000**

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**Part II**

## **Environmental Protection Agency**

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**40 CFR Part 60, 61, and 63  
Amendments for Testing and Monitoring  
Provisions; Final Rule**

**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Parts 60, 61, and 63**

[FRL-6523-6]

RIN 2060-AG21

**Amendments for Testing and Monitoring Provisions**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Final rule; amendments.

**SUMMARY:** In this rule, we, the Environmental Protection Agency (EPA) are making final minor amendments to our stationary source testing and monitoring rules. These amendments include miscellaneous editorial changes and technical corrections that are needed. We are also promulgating Performance Specification 15, which contains the criteria for certifying continuous emission monitoring systems (CEMS) that use fourier transform infrared spectroscopy (FTIR). In addition, we are changing the outline of the test methods and CEMS performance specifications already listed in Parts 60, 61, and 63 to fit a new format recommended by the Environmental Monitoring Management Council (EMMC). The editorial changes and technical corrections update the rules and help maintain their original intent. Performance Specification 15 will provide the needed acceptance criteria for FTIR CEMS as they emerge as a new technology. We are reformatting the test methods and performance specifications to make them more uniform in content and interchangeable with other Agency methods. The amendments apply to a large number of industries that are already subject to the current provisions of Parts 60, 61, and 63. Therefore, we have not listed specific affected industries or their Standard Industrial Classification codes here.

**DATES:** *Effective Date.* This regulation is effective October 17, 2000. The incorporation by reference of certain

publications listed in the rule is approved by the Director of the Federal Register as of October 17, 2000.

**ADDRESSES:** *Docket.* Docket No. A-97-12, contains information relevant to this rule. You can read and copy it between 8 a.m. and 5:30 p.m., Monday through Friday, (except for Federal holidays), at our Air and Radiation Docket and Information Center, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460; telephone (202) 260-7548. Go to Room M-1500, Waterside Mall (ground floor). The docket office may charge a reasonable fee for copying.

*Summary of Comments and Responses Document.* You may obtain the Summary of Comments and Responses Document over the Internet at <http://www.epa.gov/ttn/emc>; choose the "Methods" menu, then choose the "Summary of Comments and Responses" hypertext under Category A. **FOR FURTHER INFORMATION CONTACT:** Mr. Foston Curtis, Emission Measurement Center (MD-19), Emissions, Monitoring, and Analysis Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone (919) 541-1063; facsimile number (919) 541-1039; electronic mail address "curtis.foston@epamail.epa.gov".

**SUPPLEMENTARY INFORMATION:** *Outline.* The information presented in this preamble is organized as follows:

- I. Why were these amendments made?
- II. What does the new EMMC Format for methods look like?
- III. What were the significant public comments and what resulting changes were made since proposal?
  - A. Updates to the ASTM Methods
  - B. Performance requirements for continuous instrumental methods of Part 60—Methods 3A, 6C, 7E, 10, and 20
  - C. Method 18 (Part 60)
  - D. Method 25 (Part 60)
  - E. Performance Specification 15 (Part 60)
- IV. What revisions were made that were not in the proposed rule?
- V. What are the administrative requirements for this rule?
  - A. Docket

- B. Office of Management and Budget Review
- C. Regulatory Flexibility Act Compliance
- D. Paperwork Reduction Act
- E. Unfunded Mandates Reform Act
- F. E.O. 13132—Federalism
- G. E.O. 13084—Consultation and Coordination with Indian Tribal Governments
- H. Executive Order 13084—Protection of Children from Environmental Health Risks and Safety Risks
- I. Submission to Congress and the General Accounting Office
- J. National Technology Transfer and Advancement Act
- K. Plain Language in Government Writing

**I. Why Were These Amendments Made?**

We have compiled miscellaneous errors and editions that are needed for the test methods, performance specifications, and associated regulations in 40 CFR Parts 60, 61, and 63. The corrections and revisions consist primarily of typographical errors, technical errors in equations and diagrams, and narrative that is no longer applicable or is obsolete. Some of the revisions were brought to our attention by the public. The major changes to the rule proposed on August 27, 1997 that resulted from public comments are discussed in Section III. Please note that, although numerous technical corrections were made to Parts 60, 61, and 63 rules, none affected a compliance standard or reporting or recordkeeping requirement. Revisions were only made to sections that pertain to source testing or monitoring of emissions and operations.

**II. What Does the New EMMC Format for Methods Look Like?**

The new EMMC format we have adopted for analytical methods was developed by consensus and will help integrate make consistent the test methods written by different EPA programs. The test methods and performance specifications being restructured in the new format are shown in Table 1.

TABLE 1.—TEST METHODS AND PERFORMANCE SPECIFICATIONS RESTRUCTURED IN THE EMMC FORMAT

40 CFR 60 App. A	40 CFR 60 App. B	40 CFR 61	40 CFR 63
1, 1A	PS-2	101, 101A	303, 303A
2, 2A, 2B, 2C, 2D, 2E	PS-3	102	304A, 304B
3, 3A, 3B	PS-4, PS-4A	103	305
4	PS-5	104	306, 306A, 306B
5, 5A, 5B, 5D, 5E, 5F, 5G, 5H	PS-6	105	
6, 6A, 6B, 6C		106	
7, 7A 7B, 7C, 7D, 7E		107, 107A	
8		108, 108A, 108B, 108C	
10, 10A, 10B		111	
11			
12			

TABLE 1.—TEST METHODS AND PERFORMANCE SPECIFICATIONS RESTRUCTURED IN THE EMMC FORMAT—Continued

40 CFR 60 App. A	40 CFR 60 App. B	40 CFR 61	40 CFR 63
13A, 13B 14 15, 15A 16, 16A, 16B 17 18 19 20 21 22 23 24, 24A 25, 25A, 25B, 25C, 25D, 25E 26, 26A 27 28, 28A 29			

The methods and specifications listed in Table 1 were restructured in the format shown in Table 2. Only in a few instances were there deviations from this recommended format.

TABLE 2.—EMMC FORMAT

Section No.	Section heading
1.0	Scope and Application.
2.0	Summary of the Method.
3.0	Definitions.
4.0	Interferences.
5.0	Safety.
6.0	Equipment and Supplies.
7.0	Reagents and Standards.
8.0	Sample Collection, Preservation, Storage and Transport.
9.0	Quality Control.
10.0	Calibration and Standardization.
11.0	Analytical Procedure.
12.0	Calculations and Data Analysis.
13.0	Method Performance.
14.0	Pollution Prevention.
15.0	Waste Management.
16.0	References.
17.0	Tables, Diagrams, Flowcharts, and Validation Data.

**III. What Were the Significant Public Comments and What Resulting Changes Were Made Since Proposal?**

We asked that public comments on the August 27, 1997 proposal (62 FR 45369) be submitted by October 27, 1997. On November 18, 1997, we reopened (62 FR 61483) the comment period to allow additional time for review and comment. We received comments from facility owners and operators, trade associations, State and Local air pollution control agencies, environmental consultants, and private citizens. Their comments were considered in developing this final action. A detailed discussion of all comments are contained in the Summary of Comments and Responses Document (see ADDRESSES section of this preamble). The major public comments and the Agency's responses are summarized below.

*A. Update to ASTM Methods*

Several commenters supported our updating the references to ASTM Standards to include the dates of the most recent versions. However, some were concerned that updated standards not supplant the versions previously allowed and those promulgated with the original regulation. The ASTM recommended we follow the tradition of other governmental agencies and list only the latest version of each standard. This would present the latest, most improved standard. They felt that previously approved versions would still be acceptable for future use, and this could be noted in the preamble to the final rule.

On January 14, 1998, we published a supplementary **Federal Register** notice to solicit public comments on this idea. We received three comment letters. All commenters objected to the idea of

listing only the latest version of the ASTM standard. The commenters noted problems that would be encountered with State Implementation Plans (SIP) wherein only the specific ASTM standards listed in the subparts would be allowed. They feared that listing only the latest version of the standard would change the current allowance to use earlier versions. This could potentially change the intent of the original emission standard. Most commenters didn't think a preamble explanation was sufficient assurance for continued allowance of earlier versions since preambles are not published in the Code of Federal Regulations. There were additional concerns for laboratories using currently acceptable versions who would need to upgrade their practice to reflect the latest version of a standard. The commenters were not amenable to only listing the latest standard unless

language were added to the General Provisions of each part stating that previously allowed versions of the standards were still allowed at the discretion of the source. We feel the commenters have valid concerns and have decided to continue the convention of listing all acceptable versions of the ASTM standards including the new updates. The intent of this action is to allow any of the yearly-designated versions of a specific standard to be used in the applications where cited.

#### *B. Performance Requirements for Continuous Instrumental Methods of Part 60—Methods 3A, 6C, 7E, 10, and 20*

Several commenters thought the preamble language for this proposal gave inadequate notice of the changes being made. Commenters stated that, in the proposal, we did not provide an adequate basis and purpose statement and misled the readers into thinking that the proposal contained no substantive changes to these test methods. Based on the number of substantive changes in this proposal, and in light of the Section 307(d) requirements, the commenters felt that we must address these issues in a new proposal before the revisions can go final with the rest of the package. We agree with the commenters that the preamble to the proposed rule may not have given adequate public notice for some of the revisions. The revisions to the continuous instrumental methods (Methods 3A, 6C, 7E, 10, and 20) may be considered substantive, but were not enumerated in the preamble nor was a supporting rationale given. Therefore, the revisions to Methods 3A, 6C, 7E, 10, and 20 will be repropose as a separate rule. The comments already received on the proposal of these methods will be held for consideration with any future comments that result from the reproposal.

#### *C. Method 18 (Part 60, Appendix A)*

One commenter thought Method 18 was difficult to follow. The commenter suggested that, to simplify organization of the method, we should divide the method into five categories. Each title would begin with "Measurement of Gaseous Organic Compounds by Gas Chromatography" but have the following subtitles:

- 18A—Evacuated container sampling procedure.
- 18B—Bag sampling procedure.
- 18C—Direct interface procedure.
- 18D—Dilution interface procedure.
- 18E—Adsorption tube sampling procedure.

Another commenter suggested dividing the method into two different methods, one for the direct extractive technique, and the other for sample collection into bags, flasks, or adsorbents.

The method is currently divided according to the various sampling procedures; for example, Section 8.2.2 is the Direct Interface Sampling and Analysis Procedures, Section 8.2.3 is Dilution Interface Sampling and Analysis Procedures, and so on. We do not believe that multiple sampling procedures warrant dividing Method 18 into separate methods. We feel a single method allowing different procedures offers the source greater flexibility than citing specific procedures for particular situations. One commenter noted that the proposed method requires triplicate injections for analysis of the calibration standards used for preparing the pre-test calibration curve, triplicate injections of the test samples, and triplicate injections for construction of the post-test calibration curve. The commenter questioned the additional accuracy expected for the extra hours spent in sample analysis and calibration while in the field conducting a source test compared to the current method which requires two consecutive analyses for pre- and post-test calibration and sample analyses meeting the same criteria for acceptance. We are increasing the calibration requirement to triple injections to tighten the method's quality assurance procedures. Triplicate calibration injections is the normal procedure prevalent in the analytical community, as well as in other Agency methodologies. It is difficult to establish precision and accuracy with duplicate injections. However, triplicate injections provide a reasonable measure of analytical precision without being overly burdensome. We do not feel the increase in time and costs associated with the third injection will significantly affect a typical test, considering the added benefits to data quality that are gained.

Several commenters asked us to revise and clarify various aspects of Section 10. We have made these modifications to address their concerns.

Regarding Section 13.1, one commenter noted that Method 18 is not a method in the general sense, but is more of a guideline on how to develop and document a test method. The commenter therefore felt that any prospective method should be written up and submitted to us along with the proper documentation that includes recovery study results. We disagree with this commenter. Method 18, which has been cited and used for many years, is

a specific gas chromatography method with specific sampling, analytical, and data quality requirements. The method was written to accommodate many test sites having many possible target compounds and gas matrices. The tester has been given numerous sampling, separation, and analytical system options to make the method adaptable to the needs of various compliance demonstrations.

Several commenters asked us to clarify the 5 to 10 percent relative standard deviation (RSD) requirement for calibration standards in Section 13.1.

We have added clarity to Section 13.1. The 5 to 10 percent RSD is not a precision criterion for calibration standards but a typical precision range for analyzing field samples. Five percent RSD is required for triplicate injections of calibration standards.

#### *D. Method 25 (Part 60, Appendix A)*

One commenter noted that Method 25 has limitations due to conditions that may exist in stack gas. If such conditions exist, the commenter recommends interfacing a nonmethane analyzer directly to the source or use Method 25A or 25B to measure the emissions. The commenter recommended modifying Method 25 to allow instruments that are able to determine the methane and nonmethane portions using components different from those described by Method 25 when the analyzer is directly interfaced to the source. The commenter feels that Method 25 would be more practical for determining methane/nonmethane emissions at the field site if the method could be modified to allow these other analyzers. The commenter feels that it will also be necessary that fixed performance specifications be defined in the method, such as those for Method 6C. We believe these comments address method changes that are beyond those covered in the proposal and are, therefore, beyond the scope of this action. The commenter is encouraged to pursue these method changes through other appropriate channels such as submitting a request to use them as an alternative method.

#### *E. Performance Specification 15 (Part 60, Appendix B)*

One commenter noted that the statement of applicability for the demonstration is limited to the criteria we gave. The commenter stated that, with performance based measurement systems, the focus is on data quality objectives (DQO) where the performance specifications are coupled with the DQO. We believe the purpose of reference methods and, in this case

performance specifications, is to provide standard procedures for sources to follow in order to provide quality emission data. However, we do provide latitude to sources by publishing performance-based methods and PS whenever possible. This performance specification is one such procedure; as long as an FTIR sampling system meets the requirements of the performance specifications, it can be used for any regulated pollutant.

Based on public comments and upon further deliberation, we have removed the system calibration requirement from Section 10.3 of PS-15. Since both a system calibration and the calibration transfer standard measurement basically test instrument function, having both of these requirements in the performance specifications is redundant.

One commenter felt that the number of runs should be given as "guidance" rather than made a requirement. We set the requirement for nine runs (when comparing the FTIR to a reference method) and 10 runs (when comparing the FTIR to a reference monitor) because these are standard procedures for performance specifications. We note that this performance specification also allows analyte spiking as an option; therefore, a revision on this point is not necessary.

One commenter noted that Section 11.1.1.4.3 states "if the RM is a CEM, synchronize the sampling flow rates of the RM and the FTIR CEM." The commenter noted that instrumental analyzers are currently used for reference methods. EPA Methods 6C, 7E, 3A, and 10 measure SO<sub>2</sub>, NO<sub>x</sub>, O<sub>2</sub>, CO<sub>2</sub>, and CO on a continuous basis for a short period of time and are referred to as instrumental analyzers and not CEMs. The commenter felt the statement should read "if the reference method is an instrumental analyzer, synchronize the sampling flow rates of the RM and the FTIR." We agree with the commenter and have made the noted change.

#### **IV. What Revisions Were Made That Were Not in the Proposed Rule?**

A revision was made to Section 6.6 of Method 21 of Part 60 to clarify the VOC monitoring instrument specifications. The requirement for the instrument to be intrinsically safe for Classes 1 and 2, Division 1 conditions has been amended to require them to be intrinsically safe for Class 1 and/or Class 2, Division 1 conditions, as appropriate. The performance test provisions of § 60.754(d) for determining control device efficiency when combusting landfill gas were amended to allow the use of Method 25 as an alternative to

Methods 18 and 25C. The tester has the option of using either Method 18, 25, or 25C in this case. These amendments were not published in the proposed rule.

#### **V. Administrative Requirements**

##### *A. Docket*

Docket A-97-12 is an organized and complete file of all information submitted to us or otherwise considered in the development of this final rulemaking. The principal purposes of the docket are: (1) to allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review (except for interagency review materials) [Clean Air Act Section 307(d)(7)(A), 42 U.S.C. 7607(d)(7)(A)].

##### *B. Office of Management and Budget Review*

Under Executive Order 12866 (58 FR 51735 October 4, 1993), we must determine whether the regulatory action is "significant" and therefore subject to Office of Management and Budget (OMB) review and the requirements of this Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may: (1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, Local, or Tribal governments or communities; (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

We have determined that this rule is not a "significant regulatory action" under the terms of Executive Order 12866 and is therefore not subject to OMB review. We have determined that this regulation would result in none of the economic effects set forth in Section 1 of the Order because it does not impose emission measurement requirements beyond those specified in the current regulations, nor does it change any emission standard.

##### *C. Regulatory Flexibility Act Compliance*

We have determined that it is not necessary to prepare a regulatory

flexibility analysis in connection with this final rule. We have also determined that this rule will not have a significant economic impact on a substantial number of small businesses. This rulemaking does not impose emission measurement requirements beyond those specified in the current regulations, nor does it change any emission standard.

##### *D. Paperwork Reduction Act*

This rule does not impose or change any information collection requirements. The Paperwork Reduction Act of 1980, 44 U.S.C. 3501, *et seq.*, is not required.

##### *E. Unfunded Mandates Reform Act*

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

Today's rule contains no Federal mandates (under the regulatory

provisions of Title II of the UMRA) for State, local, or tribal governments or the private sector. We have determined that today's rule does not include a Federal mandate because it imposes no enforceable duty on any State, local, and tribal governments, or the private sector. Today's rule simply makes corrections and minor revisions to current testing requirements and promulgates a monitoring specification that can be used to support future monitoring rules. For the same reason we have also determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments.

#### *F. Executive Order 13132 (Federalism)*

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government." Under Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

If EPA complies by consulting, Executive Order 13132 requires EPA to provide to the Office of Management and Budget (OMB), in a separately identified section of the preamble to the rule, a federalism summary impact statement (FSIS). The FSIS must include a description of the extent of EPA's prior consultation with State and local officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of State and local officials have been met. Also, when EPA transmits a draft final rule with

federalism implications to OMB for review pursuant to Executive Order 12866, EPA must include a certification from the agency's Federalism Official stating that EPA has met the requirements of Executive Order 13132 in a meaningful and timely manner.

This final rule will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This final rule simply makes corrections and minor revisions to current testing requirements and promulgates a monitoring specification that can be used to support future monitoring rules. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

#### *G. Executive Order 13084: Consultation and Coordination With Indian Tribal Governments*

Under Executive Order 13084, we may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or we consult with those governments. If we comply by consulting, Executive Order 13094 requires us to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of our prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires us to develop an effective process permitting elected and other representatives of Indian tribal governments "to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities." Today's rule does not significantly or uniquely affect the communities of Indian tribal governments. This rule only amends regulatory requirements that are already in effect and adds no additional requirements. Accordingly, the requirements of Section 3(b) of Executive Order 13084 do not apply to this rule.

#### *H. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks*

Executive Order 13045: "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be "economically significant" as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that we have reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives we considered.

We interpret E.O. 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5-501 of the Order has the potential to influence the regulation. This rule is not subject to E.O. 13045 because it does not establish an environmental standard intended to mitigate health or safety risks.

#### *I. Submission to Congress and the General Accounting Office*

The Congressional Review Act, 5 U.S.C. 801, *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. We will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States before it is published in the **Federal Register**. This action is not a "major rule" as defined by 5 U.S.C. 804(2). This rule will be effective October 17, 2000.

#### *J. National Technology Transfer and Advancement Act*

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), P.L. 104-113 (15 U.S.C. 272), directs us to use voluntary consensus standards (VCSs) in our regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, business practices, etc.) that are developed or adopted by VCS bodies.

The NTTAA requires us to provide Congress, through OMB, explanations when we decide not to use available and applicable VCSs.

This rulemaking involves technical standards. Specifically, this rule makes technical corrections to portions of the subparts in Parts 60, 61, and 63 pertaining to source testing or monitoring of emissions and operations. The rule does not, however, change the nature of any of the technical standards currently in use. Moreover, many of the technical standards currently in use are VCSs developed by the American Society for Testing and Materials (ASTM). In fact, we have taken the opportunity presented by this rulemaking to update the references to the ASTM standards to include the dates of the most recent versions of these standards (see Section III.A. of the preamble for a full discussion). A complete list of the ASTM standards updated by this rule can be found in Part 60.17. Thus, today's action is consistent with our obligation to use VCSs in our regulatory activities whenever practicable.

Finally, we are promulgating PS-15, which identifies certification criteria for continuous emission monitoring systems (CEMS) using fourier transform infrared spectroscopy (FTIR). PS-15 is a performance specification that is being issued as an example procedure for use by industry and regulatory agencies as appropriate. While there are no underlying national EPA standards that will require the use of this procedure at this time, we conducted a search for VCS FTIR performance specifications and found none. We plan to periodically conduct rulemaking to make minor updates to test methods and performance specifications. In these rulemakings, we will review updates to VCS incorporated by reference and consider VCSs that may be used in lieu of EPA reference methods. We plan to provide the opportunity for public comment during these update rulemakings in part to allow VCS organizations to suggest where VCSs may be available for our use.

#### K. Plain Language in Government Writing

This rule is not written in the plain language format. In most cases, the rule corrects errors and makes updates to small portions of existing regulations that are not in plain language. The new plain language format was not used to keep the language of the amended sections consistent with that of the unamended rules. Also, the test methods were reformatted and proposed before the plain language provisions were mandated. Due to their volume,

the time and costs associated with the magnitude of effort required to rewrite the final methods in plain language is prohibitive. However, this preamble is written in plain language, and we believe the amendments and reformatted test methods have been written clearly.

#### List of Subjects

##### 40 CFR Part 60

Environmental protection, Administrative practice and procedure, Air pollution control, Continuous emission monitors, Incorporation by reference.

##### 40 CFR Part 61

Environmental protection, Air pollution control, Incorporation by reference.

##### 40 CFR Part 63

Environmental protection, Administrative practice and procedure, Air pollution control, Hazardous substances, Intergovernmental relations, Incorporation by reference, Reporting and recordkeeping requirements.

Dated: January 10, 2000.

**Carol M. Browner,**  
*Administrator.*

For the reasons stated in the preamble, The Environmental Protection Agency amends title 40, chapter I of the Code of Federal Regulations as follows:

#### PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

1. The authority citation for part 60 continues to read as follows:

**Authority:** 42 U.S.C. 7401, 7411, 7413, 7414, 7416, 7601, and 7602.

##### § 60.11 [Amended]

2. Amend § 60.11 by:

a. In paragraphs (b) and (e)(1), by revising the words "Reference Method 9" to read "Method 9" wherever they occur;

b. In paragraph (e)(5), revise the words "to determine opacity compliance" in the last sentence to read "to determine compliance with the opacity standard."

##### § 60.13 [Amended]

3. Amend § 60.13 by:

a. Revising the last two sentences in paragraph (d)(1), revising paragraph (g), and revising the first sentence in paragraph (j)(2).

b. Revising the words "ng/J of pollutant" to read "ng of pollutant per J of heat input" in the sixth sentence of paragraph (h).

c. Revising the words "with the effluent gases" to read "in the effluent gases" in paragraph (i)(1).

d. Revising the words "effluent from two or more affected facilities are released" to read "effluent from two or more affected facilities is released" in paragraph (i)(9).

e. Revising the words "relative accuracy test" to read "relative accuracy (RA) test" in the paragraph (j) introductory text.

f. Revising the words "relative accuracy" to read "RA" in paragraphs (j)(1) and (2).

g. Revising the section references "section 7" and "section 10" to read "Section 8.4" and "Section 16.0," respectively, in paragraphs (j)(1) and (2).

The revisions read as follows:

##### § 60.13 Monitoring requirements.

\* \* \* \* \*

(d) \* \* \*

(1) \* \* \* For continuous monitoring systems measuring opacity of emissions not using automatic zero adjustments, the optical surfaces exposed to the effluent gases shall be cleaned prior to performing the zero and span drift adjustments. For systems using automatic zero adjustments, the optical surfaces shall be cleaned when the cumulative automatic zero compensation exceeds 4 percent opacity.

\* \* \* \* \*

(g)(1) When more than one continuous monitoring system is used to measure the emissions from only one affected facility (e.g., multiple breechings, multiple outlets), the owner or operator shall report the results as required from each continuous monitoring system. When the effluent from one affected facility is released to the atmosphere through more than one point, the owner or operator shall install an applicable continuous monitoring system on each separate effluent unless installation of fewer systems is approved by the Administrator.

(2) When the effluents from two or more affected facilities subject to the same opacity standard are combined before being released to the atmosphere, the owner or operator may either install a continuous opacity monitoring system at a location monitoring the combined effluent or install an opacity combiner system comprised of opacity and flow monitoring systems on each stream, and shall report as per § 60.7(c) on the combined effluent. When the affected facilities are not subject to the same opacity standard, the owner or operator shall report the results as per § 60.7(c) on the combined effluent against the most stringent opacity standard

applicable, except for documented periods of shutdown of the affected facility, subject to the most stringent opacity standard. During such times, the next most stringent opacity standard shall apply.

(3) When the effluents from two or more affected facilities subject to the same emissions standard, other than opacity, are combined before being released to the atmosphere, the owner or operator may install applicable continuous emission monitoring systems on each effluent or on the combined effluent. The owner or operator may report the results as required for each affected facility or for the combined effluent. When the affected facilities are not subject to the same emissions standard, separate continuous emission monitoring systems shall be installed on each effluent and the owner or operator shall report as required for each affected facility.

\* \* \* \* \*

(j) \* \* \*  
 (2) The waiver of a CEMS RA test will be reviewed and may be rescinded at such time, following successful completion of the alternative RA procedure, that the CEMS data indicate that the source emissions are approaching the level. \* \* \*

\* \* \* \* \*

**§ 60.14 [Amended]**

4. In § 60.14, paragraph (b)(1) is amended by revising the words "utilization of emission factors demonstrate" to read "utilization of emission factors demonstrates."

**§ 60.17 [Amended]**

5. Amend § 60.17 by:  
 a. Revising paragraphs (a), (i), and (j).  
 b. In paragraph (b)(1), revise the words "§§ 60.204(d)(2), 60.214(d)(2), 60.224(d)(2), 60.234(d)(2)" to read "§§ 60.204(b)(3), 60.214(b)(3), 60.224(b)(3), 60.234(b)(3)."  
 c. In paragraph (d), by revising the words "IBR approved January 27, 1983 for § 60.285(d)(4)" to read "IBR approved January 27, 1983 for § 60.285(d)(3)."

The revisions read as follows:

**§ 60.17 Incorporation by reference.**

\* \* \* \* \*

(a) The following materials 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; or University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106.

(1) ASTM A99-76, 82 (Reapproved 1987), Standard Specification for Ferromanganese, incorporation by reference (IBR) approved January 27, 1983 for § 60.261.

(2) ASTM A100-69, 74, 93, Standard Specification for Ferrosilicon, IBR approved January 27, 1983 for § 60.261.

(3) ASTM A101-73, 93, Standard Specification for Ferrochromium, IBR approved January 27, 1983 for § 60.261.

(4) ASTM A482-76, 93, Standard Specification for Ferrochromesilicon, IBR approved January 27, 1983 for § 60.261.

(5) ASTM A483-64, 74 (Reapproved 1988), Standard Specification for Silicomanganese, IBR approved January 27, 1983 for § 60.261.

(6) ASTM A495-76, 94, Standard Specification for Calcium-Silicon and Calcium Manganese-Silicon, IBR approved January 27, 1983 for § 60.261.

(7) ASTM D86-78, 82, 90, 93, 95, 96, Distillation of Petroleum Products, IBR approved for §§ 60.562-2(d), 60.593(d), and 60.633(h).

(8) ASTM D129-64, 78, 95, Standard Test Method for Sulfur in Petroleum Products (General Bomb Method), IBR approved for Appendix A: Method 19, Section 12.5.2.2.3; and § 60.106(j)(2).

(9) ASTM D240-76, 92, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter, IBR approved January 27, 1983 for §§ 60.46(c), 60.296(b), and Appendix A: Method 19, Section 12.5.2.2.3.

(10) ASTM D270-65, 75, Standard Method of Sampling Petroleum and Petroleum Products, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.2.1.

(11) ASTM D323-82, 94, Test Method for Vapor Pressure of Petroleum Products (Reid Method), IBR approved April 8, 1987 for §§ 60.111(l), 60.111a(g), 60.111b(g), and 60.116b(f)(2)(ii).

(12) ASTM D388-77, 90, 91, 95, 98, 98a, Standard Specification for Classification of Coals by Rank, IBR approved for §§ 60.41(f), 60.45(f)(4)(i), 60.45(f)(4)(ii), 60.45(f)(4)(vi), 60.41a, 60.41b, and 60.251(b) and (c).

(13) ASTM D396-78, 89, 90, 92, 95, 96, 97, 98, Standard Specification for Fuel Oils, IBR approved for §§ 60.41b, 60.41c, 60.111(b), and 60.111a(b).

(14) ASTM D975-78, 96, 98, 98a, Standard Specification for Diesel Fuel Oils, IBR approved January 27, 1983 for §§ 60.111(b) and 60.111a(b).

(15) ASTM D1072-80, 90 (Reapproved 1994), Standard Method for Total Sulfur in Fuel Gases, IBR approved July 31, 1984 for § 60.335(d).

(16) ASTM D1137-53, 75, Standard Method for Analysis of Natural Gases and Related Types of Gaseous Mixtures by the Mass Spectrometer, IBR approved January 27, 1983 for § 60.45(f)(5)(i).

(17) ASTM D1193-77, 91, Standard Specification for Reagent Water, IBR approved for Appendix A: Method 5, Section 7.1.3; Method 5E, Section 7.2.1; Method 5F, Section 7.2.1; Method 6, Section 7.1.1; Method 7, Section 7.1.1; Method 7C, Section 7.1.1; Method 7D, Section 7.1.1; Method 10A, Section 7.1.1; Method 11, Section 7.1.3; Method 12, Section 7.1.3; Method 13A, Section 7.1.2; Method 26, Section 7.1.2; Method 26A, Section 7.1.2; and Method 29, Section 7.2.2.

(18) ASTM D1266-87, 91, 98, Standard Test Method for Sulfur in Petroleum Products (Lamp Method), IBR approved August 17, 1989 for § 60.106(j)(2).

(19) ASTM D1475-60, 80, 90, Standard Test Method for Density of Paint, Varnish Lacquer, and Related Products, IBR approved January 27, 1983 for § 60.435(d)(1), Appendix A: Method 24, Section 6.1; and Method 24A, Sections 6.5 and 7.1.

(20) ASTM D1552-83, 95, Standard Test Method for Sulfur in Petroleum Products (High Temperature Method), IBR approved for Appendix A: Method 19, Section 12.5.2.2.3; and § 60.106(j)(2).

(21) ASTM D1826-77, 94, Standard Test Method for Calorific Value of Gases in Natural Gas Range by Continuous Recording Calorimeter, IBR approved January 27, 1983 for §§ 60.45(f)(5)(ii), 60.46(c)(2), 60.296(b)(3), and Appendix A: Method 19, Section 12.3.2.4.

(22) ASTM D1835-82, 86, 87, 91, 97, Standard Specification for Liquefied Petroleum (LP) Gases, approved for §§ 60.41b and 60.41c.

(23) ASTM D1945-64, 76, 91, 96, Standard Method for Analysis of Natural Gas by Gas Chromatography, IBR approved January 27, 1983 for § 60.45(f)(5)(i).

(24) ASTM D1946-77, 90 (Reapproved 1994), Standard Method for Analysis of Reformed Gas by Gas Chromatography, IBR approved for §§ 60.45(f)(5)(i), 60.18(f)(3), 60.614(e)(2)(ii), 60.614(e)(4), 60.664(e)(2)(ii), 60.664(e)(4), 60.564(f)(1), 60.704(d)(2)(ii), and 60.704(d)(4).

(25) ASTM D2013-72, 86, Standard Method of Preparing Coal Samples for Analysis, IBR approved January 27, 1983, for Appendix A: Method 19, Section 12.5.2.1.3.

(26) ASTM D2015-77 (Reapproved 1978), 96, Standard Test Method for Gross Calorific Value of Solid Fuel by the Adiabatic Bomb Calorimeter, IBR

approved January 27, 1983 for § 60.45(f)(5)(ii), 60.46(c)(2), and Appendix A: Method 19, Section 12.5.2.1.3.

(27) ASTM D2016–74, 83, Standard Test Methods for Moisture Content of Wood, IBR approved for Appendix A: Method 28, Section 16.1.1.

(28) ASTM D2234–76, 96, 97a, 97b, 98, Standard Methods for Collection of a Gross Sample of Coal, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.1.1.

(29) ASTM D2369–81, 87, 90, 92, 93, 95, Standard Test Method for Volatile Content of Coatings, IBR approved January 27, 1983 for Appendix A: Method 24, Section 6.2.

(30) ASTM D2382–76, 88, Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter (High-Precision Method), IBR approved for §§ 60.18(f)(3), 60.485(g)(6), 60.614(e)(4), 60.664(e)(4), 60.564(f)(3), and 60.704(d)(4).

(31) ASTM D2504–67, 77, 88 (Reapproved 1993), Noncondensable Gases in C<sub>3</sub> and Lighter Hydrocarbon Products by Gas Chromatography, IBR approved for § 60.485(g)(5).

(32) ASTM D2584–68 (Reapproved 1985), 94, Standard Test Method for Ignition Loss of Cured Reinforced Resins, IBR approved February 25, 1985 for § 60.685(c)(3)(i).

(33) ASTM D2622–87, 94, 98, Standard Test Method for Sulfur in Petroleum Products by X-Ray Spectrometry, IBR approved August 17, 1989 for § 60.106(j)(2).

(34) ASTM D2879–83, 96, 97, Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isotenoscope, IBR approved April 8, 1987 for §§ 60.485(e)(1), 60.111b(f)(3), 60.116b(e)(3)(ii), and 60.116b(f)(2)(i).

(35) ASTM D2880–78, 96, Standard Specification for Gas Turbine Fuel Oils, IBR approved January 27, 1983 for §§ 60.111(b), 60.111a(b), and 60.335(d).

(36) ASTM D2908–74, 91, Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography, IBR approved for § 60.564(j).

(37) ASTM D2986–71, 78, 95a, Standard Method for Evaluation of Air, Assay Media by the Monodisperse DOP (Diocetyl Phthalate) Smoke Test, IBR approved January 27, 1983 for Appendix A: Method 5, Section 7.1.1; Method 12, Section 7.1.1; and Method 13A, Section 7.1.1.2.

(38) ASTM D3031–81, Standard Test Method for Total Sulfur in Natural Gas by Hydrogenation, IBR approved July 31, 1984 for § 60.335(d).

(39) ASTM D3173–73, 87, Standard Test Method for Moisture in the Analysis Sample of Coal and Coke, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.1.3.

(40) ASTM D3176–74, 89, Standard Method for Ultimate Analysis of Coal and Coke, IBR approved January 27, 1983 for § 60.45(f)(5)(i) and Appendix A: Method 19, Section 12.3.2.3.

(41) ASTM D3177–75, 89, Standard Test Method for Total Sulfur in the Analysis Sample of Coal and Coke, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.1.3.

(42) ASTM D3178–73 (Reapproved 1979), 89, Standard Test Methods for Carbon and Hydrogen in the Analysis Sample of Coal and Coke, IBR approved January 27, 1983 for § 60.45(f)(5)(i).

(43) ASTM D3246–81, 92, 96, Standard Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry, IBR approved July 31, 1984 for § 60.335(d).

(44) ASTM D3270–73T, 80, 91, 95, Standard Test Methods for Analysis for Fluoride Content of the Atmosphere and Plant Tissues (Semiautomated Method), IBR approved for Appendix A: Method 13A, Section 16.1.

(45) ASTM D3286–85, 96, Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter, IBR approved for Appendix A: Method 19, Section 12.5.2.1.3.

(46) ASTM D3370–76, 95a, Standard Practices for Sampling Water, IBR approved for § 60.564(j).

(47) ASTM D3792–79, 91, Standard Method for Water Content of Water-Reducible Paints by Direct Injection into a Gas Chromatograph, IBR approved January 27, 1983 for Appendix A: Method 24, Section 6.3.

(48) ASTM D4017–81, 90, 96a, Standard Test Method for Water in Paints and Paint Materials by the Karl Fischer Titration Method, IBR approved January 27, 1983 for Appendix A: Method 24, Section 6.4.

(49) ASTM D4057–81, 95, Standard Practice for Manual Sampling of Petroleum and Petroleum Products, IBR approved for Appendix A: Method 19, Section 12.5.2.2.3.

(50) ASTM D4084–82, 94, Standard Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method), IBR approved July 31, 1984 for § 60.335(d).

(51) ASTM D4177–95, Standard Practice for Automatic Sampling of Petroleum and Petroleum Products, IBR approved for Appendix A: Method 19, Section 12.5.2.2.1.

(52) ASTM D4239–85, 94, 97, Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature Tube Furnace Combustion Methods, IBR approved for Appendix A: Method 19, Section 12.5.2.1.3.

(53) ASTM D4442–84, 92, Standard Test Methods for Direct Moisture Content Measurement in Wood and Wood-base Materials, IBR approved for Appendix A: Method 28, Section 16.1.1.

(54) ASTM D4444–92, Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters, IBR approved for Appendix A: Method 28, Section 16.1.1.

(55) ASTM D4457–85 (Reapproved 1991), Test Method for Determination of Dichloromethane and 1, 1, 1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph, IBR approved for Appendix A: Method 24, Section 6.5.

(56) ASTM D4809–95, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method), IBR approved for §§ 60.18(f)(3), 60.485(g)(6), 60.564(f)(3), 60.614(d)(4), 60.664(e)(4), and 60.704(d)(4).

(57) ASTM D5403–93, Standard Test Methods for Volatile Content of Radiation Curable Materials. IBR approved September 11, 1995 for Appendix A: Method 24, Section 6.6.

(58) ASTM D5865–98, Standard Test Method for Gross Calorific Value of Coal and Coke. IBR approved for § 60.45(f)(5)(ii), 60.46(c)(2), and Appendix A: Method 19, Section 12.5.2.1.3.

(59) ASTM E168–67, 77, 92, General Techniques of Infrared Quantitative Analysis, IBR approved for §§ 60.593(b)(2) and 60.632(f).

(60) ASTM E169–63, 77, 93, General Techniques of Ultraviolet Quantitative Analysis, IBR approved for §§ 60.593(b)(2) and 60.632(f).

(61) ASTM E260–73, 91, 96, General Gas Chromatography Procedures, IBR approved for §§ 60.593(b)(2) and 60.632(f).

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(i) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” EPA Publication SW–846 Third Edition (November 1986), as amended by Updates I (July 1992), II (September 1994), IIA (August, 1993), IIB (January 1995), and III (December 1996). This document may be obtained from the U.S. EPA, Office of Solid Waste and Emergency Response, Waste Characterization Branch, Washington, DC 20460, and is incorporated by reference for Appendix A to Part 60,

Method 29, Sections 7.5.34; 9.2.1; 9.2.3; 10.2; 10.3; 11.1.1; 11.1.3; 13.2.1; 13.2.2; 13.3.1; and Table 29-3.

(j) "Standard Methods for the Examination of Water and Wastewater," 16th edition, 1985. Method 303F: "Determination of Mercury by the Cold Vapor Technique." This document may be obtained from the American Public Health Association, 1015 18th Street, NW., Washington, DC 20036, and is incorporated by reference for Appendix A to Part 60, Method 29, Sections 9.2.3; 10.3; and 11.1.3.

\* \* \* \* \*

#### § 60.18 [Amended]

6. Amend § 60.18 as follows:

a. In paragraph (f)(1), the first sentence is amended by revising "Reference Method 22" to read "Method 22 of Appendix A to this part."

b. In paragraph (f)(3), the definition of "C<sub>i</sub>" is amended by revising "ASTM D1946-77" to read "ASTM D1946-77 or 90 (Reapproved 1994)."

c. In paragraph (f)(3), the definition of "H<sub>i</sub>" is amended by revising "ASTM D2382-76" to read "ASTM D2382-76 or 88 or D4809-95."

#### § 60.41 [Amended]

7. In § 60.41, paragraph (f) is amended by revising the words "the American Society and Testing and Materials, Designation D388-77" to read "ASTM D388-77, 90, 91, 95, or 98a."

#### § 60.42 [Amended]

8. In § 60.42, paragraphs (b)(1) and (b)(2), are amended by removing the symbol "%" wherever it appears, and adding "percent" in its place.

#### § 60.45 [Amended]

9. Amend § 60.45 as follows:

a. In paragraph (b)(2) by removing the words "under paragraph (d) of this section."

b. In paragraphs (f)(4)(i), (f)(4)(ii), and (f)(4)(vi) by revising the words "ASTM D388-77" to read "ASTM D388-77, 90, 91, 95, or 98a."

c. In paragraph (f)(5)(i) by revising the words "ASTM method D1137-53, (75), D1945-64(76), or D1946-77" to read "ASTM D1137-53 or 75, D1945-64, 76, 91, or 96 or D1946-77 or 90 (Reapproved 1994)."

d. In paragraph (f)(5)(i) by revising the words "ASTM method D3178-74 or D3176" to read "ASTM D3178-73 (Reapproved 1979), 89, or D3176-74 or 89."

e. In paragraph (f)(5)(ii) by revising the words "ASTM D1826-77" to read "ASTM D1826-77 or 94."

f. In paragraph (f)(5)(ii) by revising the words "ASTM D2015-77" to read

"ASTM D2015-77 (Reapproved 1978), 96, or D5865-98."

#### § 60.46 [Amended]

10. Amend § 60.46 as follows:

a. In paragraph (b)(2)(i), the second sentence is amended by revising the words "in the sampling train may be set to provide a gas temperature no greater than" to read "in the sampling train shall be set to provide an average gas temperature of."

b. In paragraph (b)(2)(ii), the third sentence is amended by revising the words "the arithmetic mean of all the individual O<sub>2</sub> sample concentrations at each traverse point" to read "the arithmetic mean of the sample O<sub>2</sub> concentrations at all traverse points."

c. Paragraph (c)(2) is amended by revising the words "D2015-77" to read "D2015-77 (Reapproved 1978), 96, or D5865-98".

d. Paragraph (c)(2) is further amended by revising the words "D240-76" to read "D240-76 or 92."

e. In paragraph (c)(2) is further amended by revising the words "D1826-77" to read "D1826-77 or 94."

#### § 60.41a [Amended]

11. Amend § 60.41a as follows:

a. In the definitions for "subbituminous coal" and "lignite," by revising "D388-77" to read "D388-77, 90, 91, 95, or 98a."

b. In paragraph (a)(2) of the definition of "potential combustion concentration" by revising "75 ng/J" to read "73 ng/J."

#### § 60.43a [Amended]

12. In § 60.43a, paragraph (d)(2), revising the words "resource recovery facility" to read "resource recovery unit."

#### § 60.47a [Amended]

13. Amend § 60.47a as follows:

a. In paragraph (b)(3) by removing the words "(appendix A)."

b. In the first sentence of paragraph (g) by revising the words "lbs/million Btu" to read "lb/million Btu."

c. In the second sentence of paragraph (h)(3) by revising the words "309 minutes in each hour" to read "30 minutes in each hour."

d. In paragraph (i)(1) by revising the words "6, 7, and 3B, as applicable, shall be used to determine O<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub> concentrations" to read "3B, 6, and 7 shall be used to determine O<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub> concentrations, respectively."

#### § 60.48a [Amended]

14. Amend § 60.48a as follows:

a. In paragraph (b)(2)(ii), in the fourth sentence by revising the words "the arithmetic mean of all the individual O<sub>2</sub>

concentrations at each traverse point." to read "the arithmetic mean of the sample O<sub>2</sub> concentrations at all traverse points."

b. In paragraph (c)(3), in the first sentence by adding a closing parenthesis after the abbreviation "(%R<sub>g</sub>)" so that it now reads "(%R<sub>g</sub>)".

c. In paragraph (f), in the first and second sentences by removing the words "(appendix A)."

#### § 60.40b [Amended]

15. § 60.40b is amended by adding paragraph (j) as follows:

#### § 60.40b Applicability and delegation of authority.

\* \* \* \* \*

(j) Any affected facility meeting the applicability requirements under paragraph (a) of this section and commencing construction, modification, or reconstruction after June 19, 1986 is not subject to Subpart D (Standards of Performance for Fossil-Fuel-Fired Steam Generators, § 60.40).

\* \* \* \* \*

#### § 60.41b [Amended]

16. Amend § 60.41b as follows:

a. In the definition for "coal" by revising "ASTM D388-77" to read "ASTM D388-77, 90, 91, 95, or 98a."

b. In the definition for "distillate oil" by revising "ASTM D396-78" to read "ASTM D396-78, 89, 90, 92, 96, or 98."

c. In the definition for "lignite" by revising "ASTM D388-77" to read "ASTM D388-77, 90, 91, 95, or 98a."

d. In the definition for "natural gas" by revising "ASTM D1835-82" to read "ASTM D1835-82, 86, 87, 91, or 97."

#### § 60.42b [Amended]

17. In § 60.42b, paragraph (d), the second sentence is amended by revising the words "facilities under this paragraph" to read "facilities under paragraphs (d)(1), (2), or (3)."

#### § 60.43b [Amended]

18. In § 60.43b, paragraph (a)(1) is amended by revising the words "22 ng/J (0.05 lb/million Btu)" to read "22 ng/J (0.051 lb/million Btu)."

#### § 60.46b [Amended]

19. Amend § 60.46b as follows:

a. In paragraph (d)(4) by revising the words "160 °C (320 °F)" to read "160±14 °C (320±25 °F)."

b. In paragraph (d)(6)(iii) by removing the words "(appendix A)."

#### § 60.41c [Amended]

20. Amend § 60.41c as follows:

a. In the definition for "natural gas" by revising "D1835-86" to read "D1835-86, 87, 91, or 97."

b. In the definitions for "distillate oil" and "residual oil" by revising "D396-78" to read "D396-78, 89, 90, 92, 96, or 98."

**§ 60.42c [Amended]**

21. Amend § 60.42c as follows:

a. In paragraph (a), in the first sentence by revising the words "the owner the operator" to read "the owner or operator."

b. In paragraph (c), in the second sentence by revising the words "facilities under this paragraph" to read "facilities under paragraphs (c)(1), (2), (3), or (4)."

**§ 60.43c [Amended]**

22. In § 60.43c, paragraph (a)(1) is amended by revising the words "22 ng/J (0.05 lb/million Btu)" to read "22 ng/J (0.051 lb/million Btu)."

**§ 60.44c [Amended]**

23. In § 60.44c, paragraph (i), the third sentence is amended by revising the words "24-hour averaged" to read "24-hour average."

**§ 60.45c [Amended]**

24. Amend § 60.45c as follows:

a. Redesignate paragraphs (a)(5) through (a)(7) as paragraphs (a)(6) through (a)(8), respectively.

b. Revise paragraphs (a)(1) through (a)(4) and add paragraph (a)(5).

The redesignation, revisions and addition read as follows:

**§ 60.45c Compliance and performance test methods and procedures for particulate matter.**

(a) \* \* \*

(1) Method 1 shall be used to select the sampling site and the number of traverse sampling points.

(2) Method 3 shall be used for gas analysis when applying Method 5, Method 5B, or Method 17.

(3) Method 5, Method 5B, or Method 17 shall be used to measure the concentration of PM as follows:

(i) Method 5 may be used only at affected facilities without wet scrubber systems.

(ii) Method 17 may be used at affected facilities with or without wet scrubber systems provided the stack gas temperature does not exceed a temperature of 160 °C (320 °F). The procedures of Sections 8.1 and 11.1 of Method 5B may be used in Method 17 only if Method 17 is used in conjunction with a wet scrubber system. Method 17 shall not be used in conjunction with a wet scrubber system if the effluent is saturated or laden with water droplets.

(iii) Method 5B may be used in conjunction with a wet scrubber system.

(4) The sampling time for each run shall be at least 120 minutes and the minimum sampling volume shall be 1.7 dry standard cubic meters (dscm) [60 dry standard cubic feet (dscf)] except that smaller sampling times or volumes may be approved by the Administrator when necessitated by process variables or other factors.

(5) For Method 5 or Method 5B, the temperature of the sample gas in the probe and filter holder shall be monitored and maintained at 160±14 °C (320±25 °F).

\* \* \* \* \*

**§ 60.46c [Amended]**

25. In § 60.46c, paragraphs (b) and (d) are amended by revising the abbreviation "CEM" to read "CEMS" wherever it appears.

**§ 60.47c [Amended]**

26. In § 60.47c, paragraphs (a) and (b) are amended by revising the abbreviation "CEMS" to read "COMS" wherever it appears.

**§ 60.48c [Amended]**

27. In § 60.48c, paragraph (b) is amended by replacing the abbreviation "CEMS" with the words "CEMS and/or COMS."

**§ 60.52 [Amended]**

28. In § 60.52, paragraph (a) is amended by revising the words "the performance test required to be conducted by § 60.8 is completed" to read "the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first."

**§ 60.54 [Amended]**

29. Amend § 60.54 as follows:

a. In paragraph (b)(1) by revising the words "The emission rate ( $c_{12}$ )" to read "The concentration ( $c_{12}$ )."

b. In paragraph (b)(3)(i), in the third sentence by revising the words "the arithmetic mean of all the individual CO<sub>2</sub> sample concentrations at each traverse point" to read "the arithmetic mean of the sample CO<sub>2</sub> concentrations at all traverse points."

**§ 60.51a [Amended]**

30. Section 60.51a is amended by adding a new definition in alphabetical order to read as follows:

**§ 60.51a Definitions.**

\* \* \* \* \*

*Continuous monitoring system* means the total equipment used to sample and condition (if applicable), to analyze, and

to provide a permanent record of emissions or process parameters.

\* \* \* \* \*

**§ 60.58a [Amended]**

31. Amend § 60.58a as follows:

a. In paragraph (b)(3), in the first sentence by revising the words "particulate matter emission standard" to read "particulate matter emission limit."

b. In paragraph (b)(3), in the third sentence by revising the words "a gas temperature no greater than" to read "a gas temperature of."

c. In paragraph (b)(8) by revising the words "operate a CEMS for measuring opacity" to read "operate a continuous opacity monitoring system (COMS)."

d. In paragraph (e)(10) by revising the word "Section" to read "section."

e. In paragraph (e)(14) by revising the words "outlet to" to read "outlet of."

f. In paragraph (f)(2) by revising the words "Method 26" to read "Method 26 or 26A."

**§ 60.58b [Amended]**

32-36. Amend § 60.58b as follows:

a. In paragraph (b)(1) by revising the words "(or carbon dioxide)" to read "(or 20 percent carbon dioxide)" each place it appears.

b. In paragraph (f)(1), in the second sentence by removing the words "for Method 26."

c. In paragraph (f)(2) by removing the words "Method 26."

**§ 60.56c [Amended]**

37. Amend § 60.56c as follows:

a. In paragraph (b)(4), in the first and second sentences by revising the words "Method 3 or 3A" to read "Method 3, 3A, or 3B."

b. In paragraph (b)(10), in the first sentence by revising the words "Method 26" to read "Method 26 or 26A."

**§ 60.64 [Amended]**

38. Amend § 60.64(b)(1) as follows:

a. In the definition of the term " $c_s$ ", "(g/dscf)" is revised to read "(gr/dscf)."

b. In the definition of the term "K", "(453.6 g/lb)" is revised to read "(7000 gr/lb)."

**§ 60.84 [Amended]**

39. Amend § 60.84 as follows:

a. In paragraph (d), in the third sentence by revising the words "monitoring of" to read "monitoring systems for measuring."

b. In paragraph (d), in the fourth sentence by revising the words "this SO<sub>2</sub>" to read "the SO<sub>2</sub>."

**§ 60.102 [Amended]**

40. In § 60.102, paragraph (a)(1) is amended by revising the words "1.0 kg/

1000 kg (1.0 lb/1000 lb)” to read “1.0 kg/Mg (2.0 lb/ton).

**§ 60.104 [Amended]**

41. In § 60.104, paragraph (b)(2) is amended by revising the words “9.8 kg/1,000 kg” to read “9.8 kg/Mg (20 lb/ton).”

**§ 60.105 [Amended]**

42. Amend § 60.105 by:
- a. In paragraphs (a)(3)(iii) and (a)(5)(ii), the words “Methods 6 and 3” in the second sentence are revised to read “Methods 6 or 6C and 3 or 3A.”
  - b. In paragraph (a)(4)(iii), the words “Method 11 shall be used for conducting the relative accuracy evaluations” are revised to read “Method 11, 15, 15A, or 16 shall be used for conducting the relative accuracy evaluations.”
  - c. In paragraphs (a)(3)(i), (a)(5)(i), (a)(6)(i), and (a)(7)(i), “10” is revised to read “25.”
  - d. In paragraph (a)(6)(ii), the first sentence and paragraphs (a)(8), (a)(9), and (a)(12) are revised.
  - e. In paragraph (a)(10), the abbreviation “vppm” is revised to read “ppmv”.
  - f. In paragraph (c), “(thousands of kilograms per hour)” is revised to read “(Mg (tons) per hour).”
  - g. In paragraph (d), the words “(liters/hr or kg/hr)” are removed.
- The revisions read as follows:

**§ 60.105 Monitoring of emissions and operations.**

- (a) \* \* \*
- (6) \* \* \*
- (ii) The performance evaluations for this reduced sulfur (and O<sub>2</sub>) monitor under § 60.13(c) shall use Performance Specification 5 of Appendix B of this Part (and Performance Specification 3 of Appendix B of this Part for the O<sub>2</sub> analyzer). \* \* \*

(8) An instrument for continuously monitoring and recording concentrations of SO<sub>2</sub> in the gases at both the inlet and outlet of the SO<sub>2</sub> control device from any fluid catalytic cracking unit catalyst regenerator for which the owner or operator seeks to comply with § 60.104 (b)(1).

(i) The span value of the inlet monitor shall be set 125 percent of the maximum estimated hourly potential SO<sub>2</sub> emission

concentration entering the control device, and the span value of the outlet monitor shall be set at 50 percent of the maximum estimated hourly potential sulfur dioxide emission concentration entering the control device.

(ii) The performance evaluations for these SO<sub>2</sub> monitors under § 60.13(c) shall use Performance Specification 2. Methods 6 or 6C and 3 or 3A shall be used for conducting the relative accuracy evaluations.

(9) An instrument for continuously monitoring and recording concentrations of SO<sub>2</sub> in the gases discharged into the atmosphere from any fluid catalytic cracking unit catalyst regenerator for which the owner or operator seeks to comply specifically with the 50 ppmv emission limit under § 60.104 (b)(1).

(i) The span value of the monitor shall be set at 50 percent of the maximum hourly potential SO<sub>2</sub> emission concentration of the control device.

(ii) The performance evaluations for this SO<sub>2</sub> monitor under § 60.13 (c) shall use Performance Specification 2. Methods 6 or 6C and 3 or 3A shall be used for conducting the relative accuracy evaluations.

(12) The owner or operator shall use the following procedures to evaluate the continuous monitoring systems under paragraphs (a)(8), (a)(9), and (a)(10) of this section.

(i) Method 3 or 3A and Method 6 or 6C for the relative accuracy evaluations under the § 60.13(e) performance evaluation.

(ii) Appendix F, Procedure 1, including quarterly accuracy determinations and daily calibration drift tests.

**§ 60.106 [Amended]**

43. Amend § 60.106 by:
- a. In paragraphs (b)(1), (b)(3), (c)(1), (i)(9) by revising the equations and definitions.
  - b. In paragraph (b)(3)(ii) by revising the words “Method 3” to read “Method 3B.”
  - c. Revising paragraph (e).
  - d. Revising paragraph (f)(1).
  - e. In paragraph (f)(3) by revising the words “Method 3” to read “Method 3 or 3A” and by revising “(h)(3)” to read “(h)(6).”

d. In paragraph (g), in the first sentence by revising the words “the applicable test methods and procedures specified in this section” to read “Method 6 or 6C and Method 3 or 3A.”

e. In paragraphs (h)(1), (h)(3), and (h)(4) by revising the abbreviation “vppm” to read “ppmv” wherever it occurs.

f. In paragraph (i)(2)(i) by revising the words “for the concentration of sulfur oxides calculated as sulfur dioxide and moisture content” to read “for moisture content and for the concentration of sulfur oxides calculated as sulfur dioxide.”

g. Revising paragraph (i)(9) following the introductory text and paragraph (i)(10).

h. In paragraph (i)(11) by revising the words “per 1,000 kg of coke burn-off” to read “per Mg (ton) of coke burn-off.”

i. In paragraph (j)(2) by revising the words “ASTM D129–64 (Reapproved 1978)” to read “ASTM D129–64, 78, or 95.”

j. In paragraph (j)(2) by revising the words “ASTM D1552–83” to read “ASTM D1552–83 or 95.”

k. In paragraph (j)(2) by revising the words “ASTM D2622–87” to read “ASTM D2622–87, 94, or 98.”

l. In paragraph (j)(2) by revising the words “ASTM D1266–87” to read “ASTM D1266–87, 91, or 98.”

The revisions read as follows:

**§ 60.106 Test methods and procedures.**

- (b) \* \* \*
- (1) \* \* \*

$$E = \frac{c_s Q_{sd}}{KR_c}$$

Where:

- E = Emission rate of PM, kg/Mg (lb/ton) of coke burn-off.
- c<sub>s</sub> = Concentration of PM, g/dscm (gr/dscf).
- Q<sub>sd</sub> = Volumetric flow rate of effluent gas, dscm/hr (dscf/hr).
- R<sub>c</sub> = Coke burn-off rate, Mg/hr (ton/hr) coke.
- K = Conversion factor, 1,000 g/kg (7,000 gr/lb).

- (3) \* \* \*

$$R_c = K_1 Q_r (\% CO_2 + \% CO) - (K_2 Q_a - K_3 Q_r) ((\% CO / 2) + (\% CO_2 + \% O_2))$$

Where:

R<sub>c</sub> = Coke burn-off rate, Mg/hr (ton/hr).

Q<sub>r</sub> = Volumetric flow rate of exhaust gas from catalyst regenerator before

entering the emission control system, dscm/min (dscf/min).

$Q_a$  = Volumetric flow rate of air to FCCU regenerator, as determined from the fluid catalytic cracking unit control room instrumentation, dscm/min (dscf/min).

%CO<sub>2</sub> = Carbon dioxide concentration, percent by volume (dry basis).

%CO = Carbon monoxide concentration, percent by volume (dry basis).

%O<sub>2</sub> = Oxygen concentration, percent by volume (dry basis).

$K_1$  = Material balance and conversion factor,  $2.982 \times 10^{-4}$  (Mg-min)/(hr-dscm-%) [ $9.31 \times 10^{-6}$  (ton-min)/(hr-dscf-%)].

$K_2$  = Material balance and conversion factor,  $2.088 \times 10^{-3}$  (Mg-min)/(hr-dscm-%) [ $6.52 \times 10^{-5}$  (ton-min)/(hr-dscf-%)].

$K_3$  = Material balance and conversion factor,  $9.94 \times 10^{-5}$  (Mg-min)/(hr-dscm-%) [ $3.1 \times 10^{-6}$  (ton-min)/(hr-dscf-%)].

\* \* \* \* \*

(c) \* \* \*

(1) \* \* \*

$$E_s = F + A (H/R_c)$$

Where:

$E_s$  = Emission rate of PM allowed, kg/Mg (lb/ton) of coke burn-off in catalyst regenerator.

F = Emission standard, 1.0 kg/Mg (2.0 lb/ton) of coke burn-off in catalyst regenerator.

A = Allowable incremental rate of PM emissions,  $7.5 \times 10^{-4}$  kg/million J (0.10 lb/million Btu).

H = Heat input rate from solid or liquid fossil fuel, million J/hr (million Btu/hr).

$R_c$  = Coke burn-off rate, Mg coke/hr (ton coke/hr).

\* \* \* \* \*

(e)(1) The owner or operator shall determine compliance with the H<sub>2</sub>S standard in § 60.104(a)(1) as follows: Method 11, 15, 15A, or 16 shall be used to determine the H<sub>2</sub>S concentration. The gases entering the sampling train should be at about atmospheric pressure. If the pressure in the refinery fuel gas lines is relatively high, a flow control valve may be used to reduce the pressure. If the line pressure is high enough to operate the sampling train without a vacuum pump, the pump may be eliminated from the sampling train. The sample shall be drawn from a point near the centroid of the fuel gas line.

(j) For Method 11, the sampling time and sample volume shall be at least 10 minutes and 0.010 dscm (0.35 dscf). Two samples of equal sampling times shall be taken at about 1-hour intervals. The arithmetic average of these two samples shall constitute a run. For most

fuel gases, sampling times exceeding 20 minutes may result in depletion of the collection solution, although fuel gases containing low concentrations of H<sub>2</sub>S may necessitate sampling for longer periods of time.

(ii) For Method 15 or 16, at least three injects over a 1-hour period shall constitute a run.

(iii) For Method 15A, a 1-hour sample shall constitute a run.

(2) Where emissions are monitored by § 60.105(a)(3), compliance with § 60.105(a)(1) shall be determined using Method 6 or 6C and Method 3 or 3A. A 1-hour sample shall constitute a run. Method 6 samples shall be taken at a rate of approximately 2 liters/min. The ppm correction factor (Method 6) and the sampling location in paragraph (f)(1) of this section apply. Method 4 shall be used to determine the moisture content of the gases. The sampling point for Method 4 shall be adjacent to the sampling point for Method 6 or 6C.

(f) \* \* \*  
 (1) Method 6 shall be used to determine the SO<sub>2</sub> concentration. The concentration in mg/dscm obtained by Method 6 or 6C is multiplied by 0.3754 to obtain the concentration in ppm. The sampling point in the duct shall be the centroid of the cross section if the cross-sectional area is less than 5.00 m<sup>2</sup> (53.8 ft<sup>2</sup>) or at a point no closer to the walls than 1.00 m (39.4 in.) if the cross-sectional area is 5.00 m<sup>2</sup> or more and the centroid is more than 1 m from the wall. The sampling time and sample volume shall be at least 10 minutes and 0.010 dscm (0.35 dscf) for each sample. Eight samples of equal sampling times shall be taken at about 30-minute intervals. The arithmetic average of these eight samples shall constitute a run. For Method 6C, a run shall consist of the arithmetic average of four 1-hour samples. Method 4 shall be used to determine the moisture content of the gases. The sampling point for Method 4 shall be adjacent to the sampling point for Method 6 or 6C. The sampling time for each sample shall be equal to the time it takes for two Method 6 samples. The moisture content from this sample shall be used to correct the corresponding Method 6 samples for moisture. For documenting the oxidation efficiency of the control device for reduced sulfur compounds, Method 15 shall be used following the procedures of paragraph (f)(2) of this section.

\* \* \* \* \*

(i) \* \* \*

(9) \* \* \*

$$E_{so_x} = C_{so_x} Q_{sd}/K$$

Where:

$E_{SO_x}$  = sulfur oxides emission rate calculated as sulfur dioxide, kg/hr (lb/hr)

$C_{SO_x}$  = sulfur oxides emission concentration calculated as sulfur dioxide, g/dscm (gr/dscf)

$Q_{sd}$  = dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr)

K = 1,000 g/kg (7,000 gr/lb)

(10) Sulfur oxides emissions calculated as sulfur dioxide shall be determined for each test run by the following equation:

$$R_{so_x} = (E_{so_x} / R_c)$$

Where:

$R_{SO_x}$  = Sulfur oxides emissions calculated as kg sulfur dioxide per Mg (lb/ton) coke burn-off.

$E_{SO_x}$  = Sulfur oxides emission rate calculated as sulfur dioxide, kg/hr (lb/hr).

$R_c$  = Coke burn-off rate, Mg/hr (ton/hr).

\* \* \* \* \*

**§ 60.107 [Amended]**

44. Section 60.107 is amended by revising paragraphs (c)(5) and (c)(6) as follows:

**§ 60.107 Reporting and recordkeeping requirements.**

\* \* \* \* \*

(c) \* \* \*

(5) If subject to § 60.104(b)(2), for each day in which a Method 8 sample result required by § 60.106(i) was not obtained, the date for which and brief explanation as to why a Method 8 sample result was not obtained, for approval by the Administrator.

(6) If subject to § 60.104(b)(3), for each 8-hour period in which a feed sulfur measurement required by § 60.106(j) was not obtained, the date for which and brief explanation as to why a feed sulfur measurement was not obtained, for approval by the Administrator.

\* \* \* \* \*

**§ 60.111 [Amended]**

45. Section 60.111 is amended as follows:

a. In paragraph (b) by revising “ASTM D396–78” to read “ASTM D396–78, 89, 90, 92, 96, or 98.”

b. In paragraph (b) by revising “ASTM D2880–78” to read “ASTM D2880–78 or 96.”

c. In paragraph (b) by revising “ASTM D975–78” to read “ASTM D975–78, 96, or 98a.”

d. In paragraph (l) by revising “ASTM D323–82” to read “ASTM D323–82 or 94.”

**§ 60.111a [Amended]**

46. Section 60.111a is amended as follows:  
 a. In paragraph (b) by revising "ASTM D396-78" to read "D396-78, 89, 90, 92, 96, or 98."  
 b. In paragraph (b) by revising "ASTM D2880-78" to read "ASTM D2880-78 or 96"; and by revising "ASTM D975-78" to read "ASTM D975-78, 96, or 98a."  
 c. In paragraph (g) by revising "ASTM D323-82" to read "ASTM D323-82 or 94."

**§ 60.111b [Amended]**

47. Section 60.111b is amended as follows:  
 a. In paragraph (f)(3) by revising "ASTM Method D2879-83" to read "ASTM D2879-83, 96, or 97."  
 b. In paragraph (g) by revising "ASTM D323-82" to read "ASTM D323-82 or 94."

**§ 60.116b [Amended]**

48. Section 60.116b is amended as follows:  
 a. In paragraph (e)(3)(ii) by revising "ASTM Method D2879-83" to read "ASTM D2879-83, 96, or 97."  
 b. In paragraph (f)(2)(i) by revising "ASTM Method D2879-83" to read "ASTM D2879-83, 96, or 97."  
 c. In paragraph (f)(2)(ii) by revising "ASTM Method D323-82" to read "ASTM D323-82 or 94."

**§ 60.121 [Amended]**

49. In § 60.121, paragraph (d) is added as follows:

**§ 60.121 Definitions.**

(d) *Blast furnace* means any furnace used to recover metal from slag.

**§ 60.133 [Amended]**

50. In § 60.133, paragraph (b)(1), the first sentence is amended by revising the words "pouring of the heat" to read "pouring of part of the production cycle."

**§ 60.144 [Amended]**

51. In § 60.144, paragraph (c) is revised to read as follows:

**§ 60.144 Test methods and procedures.**

(c) The owner or operator shall use the monitoring devices of § 60.143(b)(1) and (2) for the duration of the particulate matter runs. The arithmetic average of all measurements taken during these runs shall be used to determine compliance with § 60.143(c).

**§ 60.143a [Amended]**

52. Amend § 60.143a, paragraph (c) as follows:  
 a. The words "All monitoring devices" in the first sentence are revised to read "All monitoring devices required by paragraph (a) of this section."  
 b. The words "EPA Reference Method 2" in the first sentence are revised to read "Method 2 of Appendix A of this part."  
 c. The words "EPA Reference Method 2" in the second sentence are revised to read "Method 2."

**§ 60.144a [Amended]**

53. In § 60.144a, paragraph (d) is amended by revising it to read as follows:

**§ 60.144a Test methods and procedures.**

(d) To comply with § 60.143a(d) or (e), the owner or operator shall use the monitoring device of § 60.143a(a) to determine the exhaust ventilation rates or levels during the particulate matter runs. Each owner or operator shall then use these rates or levels to determine the 3-hour averages required by § 60.143a(d) and (e).

**§ 60.145a [Amended]**

54. In § 60.145a, paragraph (f), in the first sentence by revising the words "Reference Method 5" to read "Method 5."

**§ 60.153 [Amended]**

55. Amend § 60.153 as follows:  
 a. In paragraph (b)(3) by revising the word "thermocouple" or "thermocouples" to read "temperature measuring device" or "temperature measuring devices" wherever it occurs.  
 b. In paragraph (b)(5), in the second sentence by revising the words "with the method specified under § 60.154(c)(2)" to read "with the method specified under § 60.154(b)(5)."

**§ 60.154 [Amended]**

56. In § 60.154, paragraphs (b)(1) and (b)(3) are revised, and in paragraph (b)(4), the equations and definitions are revised as follows:

**§ 60.154 Test methods and procedures.**

(b) (1) The emission rate (E) of particulate matter for each run shall be computed using the following equation:

$$E = \frac{c_s Q_{sd}}{KS}$$

Where:

E = Emission rate of particulate matter, g/kg (lb/ton) of dry sludge input.  
 c<sub>s</sub> = Concentration of particulate matter, g/dscm (gr/dscf).  
 Q<sub>sd</sub> = Volumetric flow rate of effluent gas, dscm/hr (dscf/hr).  
 S = Charging rate of dry sludge during the run, kg/hr (ton/hr).  
 K = Conversion factor, 1.0 g/g (7,000 gr/lb).

(3) The dry sludge charging rate (S) for each run shall be computed using either of the following equations:

$$S = S_m R_{dm} / \theta$$

$$S = S_v R_{dv} / K_v \theta$$

Where:

S = Charging rate of dry sludge, kg/hr (ton/hr).  
 S<sub>m</sub> = Total mass of sludge charge, kg (ton).  
 R<sub>dm</sub> = Average mass of dry sludge per unit mass of sludge charged, kg/kg (ton/ton).  
 θ = Duration of run, hr.  
 S<sub>v</sub> = Total volume of sludge charged, m<sup>3</sup> (gal).  
 R<sub>dv</sub> = Average mass of dry sludge per unit volume of sludge charged, kg/m<sup>3</sup> (lb/gal).  
 K<sub>v</sub> = Conversion factor, 1 g/g (2,000 lb/ton).

(4) \* \* \*

$$S_m = \sum_{i=1}^n Q_{mi} \theta_i$$

$$S_v = \sum_{i=1}^n \frac{Q_{vi}}{\theta_i}$$

Where:

S<sub>m</sub> = Total mass of sludge charged to the incinerator during the test run.  
 S<sub>v</sub> = Total volume of sludge charged to the incinerator during the test run.  
 Q<sub>mi</sub> = Average mass flow rate calculated by averaging the flow rates at the beginning and end of each interval "i," kg/hr (ton/hr).  
 Q<sub>vi</sub> = Average volume flow rate calculated by averaging the flow rates at the beginning and end of each interval "i," m<sup>3</sup>/hr (gal/hr).  
 θ<sub>i</sub> = Duration of interval "i," hr.

57. Paragraph (b)(5)(iii) is amended by revising the words "mg/liter (lb/ft<sup>3</sup>) or mg/mg (lb/lb)" to read "kg/m<sup>3</sup> (lb/gal) or kg/kg (ton/ton)."

**§ 60.165 [Amended]**

58. In § 60.165, paragraph (d)(2) is amended by revising the words

“installed under § 60.163” to read “installed under paragraph (b) of this section.”

**§ 60.192 [Amended]**

59. In § 60.192, paragraph (a) is amended by revising the words “according to § 60.8 above” to read “according to § 60.195.”

**§ 60.195 [Amended]**

60. Amend § 60.195 as follows:

a. In paragraph (b)(1) by revising the words “(mg/dscf)” in the definition of the term “c<sub>s</sub>” to read “(gr/dscf)”; and revising the words “(453,600 mg/lb)” in the definition of the term “K” to read “(7,000 gr/lb).”

b. In paragraph (b)(2) by revising the words “(mg/dscf)” in the definition of the symbol “c<sub>s</sub>” to read “(gr/dscf)”; and revising the words “(453,600 mg/lb)” in the definition of the symbol “K” to read “(7,000 gr/lb).”

**§ 60.201 [Amended]**

61. In § 60.201 by revising paragraph (c) to read as follows:

**§ 60.201 Definitions.**

\* \* \* \* \*

(c) *Equivalent P<sub>2</sub>O<sub>5</sub> feed* means the quantity of phosphorus, expressed as phosphorus pentoxide, fed to the process.

\* \* \* \* \*

**§ 60.202 [Amended]**

62. In § 60.202, paragraph (a) is amended by revising the words “metric ton” to read “Mg.”

**§ 60.203 [Amended]**

63. In § 60.203, paragraph (b) is amended by revising the words “metric ton” to read “Mg.”

**§ 60.204 [Amended]**

64. Amend § 60.204 as follows:

a. In paragraph (b)(1) by revising the words “metric ton” in the definition of the term “E” to read “Mg”; revising the words “(mg/dscf)” in the definition of the term “c<sub>si</sub>” to read “(gr/dscf)”; revising the words “metric ton” in the definition of the term “P” to read “Mg”; and revising the words “(453,600 mg/lb)” in the definition of the term “K” to read “(7,000 gr/lb).”

b. In paragraph (b)(3) by revising the words “metric ton” in the definition of the term “M<sub>p</sub>” to read “Mg.”

**§ 60.211 [Amended]**

65. In § 60.211 by revising paragraph (c) to read as follows:

**§ 60.211 Definitions.**

\* \* \* \* \*

(c) *Equivalent P<sub>2</sub>O<sub>5</sub> feed* means the quantity of phosphorus, expressed as phosphorus pentoxide, fed to the process.

\* \* \* \* \*

**§ 60.212 [Amended]**

66. In § 60.212, paragraph (a) is amended by revising the words “metric ton” to read “megagram (Mg).”

**§ 60.213 [Amended]**

67. In § 60.213, paragraph (b) is amended by revising the words “metric ton” to read “Mg.”

**§ 60.214 [Amended]**

68. Amend § 60.214 as follows:

a. In paragraph (b)(1) by revising the words “metric ton” in the definition of the term “E” to read “Mg”; revising the words “(mg/dscf)” in the definition of the term “c<sub>si</sub>” to read “(gr/dscf)”; revising the words “metric ton” in the definition of the term “P” to read “Mg”; and revising the words “(453,600 mg/lb)” in the definition of the term “K” to read “(7,000 gr/lb).”

b. In paragraph (b)(3) by revising the words “metric ton” in the definition of the term “M<sub>p</sub>” to read “Mg.”

**§ 60.222 [Amended]**

69. In § 60.222, paragraph (a) is amended by revising the words “metric ton” to read “megagram (Mg).”

**§ 60.223 [Amended]**

70. Amend § 60.223 as follows:

a. In paragraph (b) by revising the words “metric ton” to read “Mg.”

b. In paragraph (c), in the first sentence by revising the word “part” to read “subpart.”

**§ 60.224 [Amended]**

71. Amend § 60.224 as follows:

a. In paragraph (b)(1) by revising the words “metric ton” in the definition of the term “E” to read “Mg”; revising the words “(mg/dscf)” in the definition of the term “c<sub>si</sub>” to read “(gr/dscf)”; revising the words “metric ton” in the definition of the term “P” to read “Mg”; and revising the words “(453,600 mg/lb)” in the definition of the term “K” to read “(7,000 gr/lb).”

b. In paragraph (b)(3) by revising the words “metric ton” in the definition of the term “M<sub>p</sub>” to read “Mg.”

**§ 60.232 [Amended]**

72. § 60.232 is amended by removing the paragraph designation and by revising the words “metric ton” to read “megagram (Mg).”

**§ 60.233 [Amended]**

73. § 60.233 is amended by removing the paragraph designation and by revising the words “metric ton” to read “Mg.”

**§ 60.234 [Amended]**

74. Amend § 60.234 as follows:

a. In paragraph (b)(1) by revising the words “metric ton” in the definition of the term “E” to read “Mg”; revising the words “(mg/dscf)” in the definition of the term “c<sub>si</sub>” to read “(gr/dscf)”; revising the words “metric ton” in the definition of the term “P” to read “Mg”; and revising the words “(453,600 mg/lb)” in the definition of the term “K” to read “(7,000 gr/lb).”

b. In paragraph (b)(3) by revising the words “metric ton” in the definition of the term “M<sub>p</sub>” to read “Mg.”

**§ 60.241 [Amended]**

75. In § 60.241, paragraph (c) is amended by italicizing the word “stored.”

**§ 60.242 [Amended]**

76–77. In § 60.242, paragraph (a) is amended by revising the words “metric ton” to read “megagram (Mg).”

**§ 60.244 [Amended]**

78. Amend § 60.244 as follows:

a. In paragraph (c)(1) by revising the words “metric ton” in the definition of the term “E” to read “Mg”; revising the words “(mg/dscf)” in the definition of the term “c<sub>si</sub>” to read “(gr/dscf)”; revising the words “metric ton” the words “(453,600 mg/lb)” in the definition of the term “K” to read “(7,000 gr/lb).”

b. In paragraph (b)(3) by revising the words “metric ton” in the definition of the term “M<sub>p</sub>” to read “Mg.”

**§ 60.250 [Amended]**

79. In § 60.250, paragraph (a) is amended by revising the words “200 tons” to read “181 Mg (200 tons).”

**§ 60.251 [Amended]**

80. In § 60.251, paragraphs (b) and (c) are amended by revising “D388–77” to read “D388–77, 90, 91, 95, or 98a.”

**§ 60.252 [Amended]**

81. In § 60.252, paragraph (b)(1) is amended by revising the words “0.040 g/dscm (0.018 gr/dscf)” to read “0.040 g/dscm (0.017 gr/dscf).”

**§ 60.253 [Amended]**

82. Amend § 60.253 as follows:

a. In paragraph (a)(1), the second sentence is amended by revising the words “±3° Fahrenheit” to read “±1.7 °C (±3 °F).”

b. In paragraph (a)(2)(i), the second sentence is amended by revising the word "gage" to read "gauge."

**§ 60.261 [Amended]**

- 83. Amend § 60.261 as follows:
a. Paragraph (n) is amended by revising "ASTM Designation A99-76" to read "ASTM Designation A99-76 or 82 (Reapproved 1987)."
b. Paragraphs (s) and (w) are amended by revising "ASTM Designation A100-69 (Reapproved 1974)" to read "ASTM Designation A100-69, 74, or 93."
c. Paragraph (q) is amended by revising "ASTM Designation A101-73" to read "ASTM Designation A101-73 or 93."
d. Paragraph (t) is amended by revising "ASTM Designation A482-76" to read "ASTM Designation A482-76 or 93."
e. Paragraph (o) is amended by revising "ASTM Designation A483-64 (Reapproved 1974)" to read "ASTM Designation A483-64 or 74 (Reapproved 1988)."
f. Paragraph (v) is amended by revising "ASTM Designation A495-76" to read "ASTM Designation A495-76 or 94."

**§ 60.266 [Amended]**

- 84. Amend § 60.266 as follows:
a. Paragraph (c)(1) is amended by revising the words "emissions is quantified" in the definition of the term "n" to read "emissions are quantified"; revising the words "(g/dscf)" in the definition of the term "c<sub>si</sub>" to read "(gr/dscf)"; and revising the words "(453.6 g/lb)" in the definition of the term "K" to read "(7000 gr/lb)."
b. Paragraph (c)(2)(ii) is amended by revising the words "5.70 dscm (200 dscf)" to read "5.66 dscm (200 dscf)."

**§ 60.274 [Amended]**

- 85. Amend § 60.274 as follows:
a-b. Paragraph (a)(4) is amended by revising the words "under paragraph (e) of this section" to read "under paragraph (f) of this section."
c. In § 60.274, paragraph (i), the first sentence is amended by revising the words "required by § 60.275(c)" to read "required by § 60.276(c)."
d. In § 60.274, by revising paragraph (i)(4) to read as follows:

**§ 60.274 Monitoring of operations.**

- (i) \* \* \*
(4) Continuous opacity monitor or Method 9 data.

**§ 60.275 [Amended]**

- 86. Amend § 60.275 as follows:

- a. Paragraph (e)(2) is amended by revising the words "more then one control" to read "more than one control."
b. Paragraph (e)(4) is amended by revising the words "the test runs shall be conducted concurrently" to read "the Method 9 test runs shall be conducted concurrently with the particulate matter test runs."
c. In paragraph (i), the fifth sentence is amended by revising the words "In the case, Reference Method 9" to read "In this case, Method 9."

**§ 60.276 [Amended]**

- 87. Amend § 60.276 by:
a. Paragraphs (a) and (c)(6)(iv) are revised.
b. In paragraph (b), the second sentence is amended by revising the words "postmarked 30 days prior" to read "postmarked at least 30 days prior."
The revisions read as follows:

**§ 60.276 Recordkeeping and reporting requirements.**

- (a) Operation at a furnace static pressure that exceeds the value established under § 60.274(g) and either operation of control system fan motor amperes at values exceeding ±15 percent of the value established under § 60.274(c) or operation at flow rates lower than those established under § 60.274(c) may be considered by the Administrator to be unacceptable operation and maintenance of the affected facility. Operation at such values shall be reported to the Administrator semiannually.
(c) \* \* \*
(6) \* \* \*
(iv) Continuous opacity monitor or Method 9 data.

**§ 60.274a [Amended]**

- 88. Amend § 60.274a by:
a. In paragraph (c), the first sentence is revised, and paragraph (h)(4) is revised.
b. Paragraph (f) is amended by adding the following sentence after the first sentence: "The pressure shall be recorded as 15-minute integrated averages."
c. In paragraph (h), the first sentence is amended by revising the words "required by § 60.275a(d)" to read "required by § 60.276a(f)."
The revisions read as follows:
**§ 60.274a Monitoring of operations.**
(c) When the owner or operator of an EAF is required to demonstrate

compliance with the standards under § 60.272a(a)(3), and at any other time that the Administrator may require (under section 114 of the Act, as amended), either the control system fan motor amperes and all damper positions or the volumetric flow rate through each separately ducted hood shall be determined during all periods in which a hood is operated for the purpose of capturing emissions from the affected facility subject to paragraph (b)(1) or (b)(2) of this section. \* \* \*

- (h) \* \* \*
(4) Continuous opacity monitor or Method 9 data.

**§ 60.275a [Amended]**

89. In § 60.275a, paragraph (e)(4) is amended by revising the words "the test runs shall be conducted concurrently" to read "the Method 9 test runs shall be conducted concurrently with the particulate matter test runs."

**§ 60.276a [Amended]**

- 90. Amend § 60.276a as follows:
a. In paragraph (e), the second sentence is amended by revising the words "postmarked 30 days prior" to read "postmarked at least 30 days prior."
b. Paragraph (f)(6)(iv) is amended by revising as follows:

**§ 60.276a Recordkeeping and reporting requirements.**

- (f) \* \* \*
(iv) Continuous opacity monitor or Method 9 data.

**§ 60.281 [Amended]**

- 91. Amend § 60.281 as follows:
a. In paragraph (c) by revising the words "Reference Method 16" to read "Method 16."
b. In paragraph (d) by revising the words "below tank(s)" to read "blow tank(s)."
c. In paragraph (e) by revising the words "digestion system" to read "digester system."

**§ 60.282 [Amended]**

92. In § 60.282, paragraph (a)(3)(i) is amended by revising the words "0.15 g/dscm (0.067 gr/dscf)" to read "0.15 g/dscm (0.066 gr/dscf)."

**§ 60.283 [Amended]**

- 93. Amend § 60.283 as follows:
a. In paragraph (a)(1)(iii) by revising the words "1200°F." to read "650 °C (1200 °F)."

b. In paragraph (a)(1)(v), in the second sentence by revising the words "5 ppm by volume on a dry basis, corrected to the actual oxygen content of the untreated gas stream" to read "5 ppm by volume on a dry basis, uncorrected for oxygen content."

c. In paragraph (a)(1)(vi) by revising the words "0.005 g/kg ADP" to read "0.005 g/kg air dried pulp (ADP)."

#### § 60.284 [Amended]

94. Amend § 60.284 by:

a. In paragraph (a)(2)(ii) by revising the words "20 percent" to read "25 percent"

b. Revising paragraph (c) introductory text.

c. In paragraph (c)(3) by revising the words "Correct all 12-hour average TRS concentrations to 10 volume percent oxygen, except that all 12-hour average TRS concentration from a recovery furnace shall be corrected to 8 volume percent using the following equation:" to read "Using the following equation, correct all 12-hour average TRS concentrations to 10 volume percent oxygen, except that all 12-hour average TRS concentrations from a recovery furnace shall be corrected to 8 volume percent oxygen instead of 10 percent, and all 12-hour average TRS concentrations from a facility to which the provisions of § 60.283(a)(1)(v) apply shall not be corrected for oxygen content:"

d. Paragraph (d)(3)(ii) is amended by revising the words "1200°F" to read "650 °C (1200 °F)."

e. Adding paragraph (f).

The revisions and addition read as follows:

#### § 60.284 Monitoring of emissions and operations.

\* \* \* \* \*

(c) Any owner or operator subject to the provisions of this subpart shall, except where the provisions of § 60.283(a)(1)(iii) or (iv) apply, perform the following:

\* \* \* \* \*

(f) The procedures under § 60.13 shall be followed for installation, evaluation, and operation of the continuous monitoring systems required under this section.

(1) All continuous monitoring systems shall be operated in accordance with the applicable procedures under Performance Specifications 1, 3, and 5 of appendix B to this part.

(2) Quarterly accuracy determinations and daily calibration drift tests shall be performed in accordance with Procedure 1 of appendix F to this part.

#### § 60.285 [Amended]

95. Amend § 60.285 as follows:

a. In paragraph (c)(1) by revising the definition of the term "c<sub>s</sub>" to read "c<sub>s</sub> = Concentration of particulate matter, g/dscm (lb/dscf)."

b. In paragraph (d)(3) by revising the equation used to calculate "GLS" as follows:

$$GLS = 100 C_{Na_2S} (C_{Na_2S} C_{NaOH} C_{Na_2CO_3})$$

c. In paragraph (e)(1) by revising the definition of "F" to read "F = conversion factor, 0.001417 g H<sub>2</sub>S/m<sup>3</sup>-ppm (8.846 × 10<sup>-8</sup> lb H<sub>2</sub>S/ft<sup>3</sup>-ppm)."

d. In paragraph (f)(1) by revising the words "205 °C (400 °F)" to read "204 °C (400 °F)."

e. Revising paragraph (f)(2).

The revisions read as follows:

#### § 60.285 Test methods and procedures.

\* \* \* \* \*

(f) \* \* \*

(2) In place of Method 16, Method 16A or 16B may be used.

\* \* \* \* \*

#### § 60.290 [Amended]

96. In § 60.290, paragraph (c) is amended by revising the words "4,550 kilograms" to read "4.55 Mg (5 tons)."

#### § 60.291 [Amended]

97. Amend § 60.291 as follows:

a. The second sentence of the definition of the term "Glass melting furnace" is amended by revising the word "appendaees" to read "appendages."

b. The definition of the term "lead recipe" is amended by revising the chemical formula "Na<sub>2</sub>M" to read "Na<sub>2</sub>O."

c. The second sentence of the definition of the term "rebricking" is amended by revising the word "replacment" to read "replacement."

#### § 60.292 [Amended]

98. In § 60.292, paragraph (a)(2), the definition of the term STD is amended by revising the words "g of particulate/kg" to read "g of particulate/kg (lb of particulate/ton)."

#### § 60.293 [Amended]

99. Amend § 60.293 as follows:

a. In paragraph (d)(1) by revising the words "specified in paragraph (b)(1) of this section" to read "specified in paragraph (b) of this section."

b. Paragraph (e) is redesignated as paragraph (f).

c. Paragraph (d)(3) introductory text is redesignated as paragraph (e); paragraphs (d)(3)(i), (ii), and (iii) are

redesignated as paragraphs (e)(1), (2), and (3).

d. Newly designated paragraph (f) is amended by revising the words "120±14°C" to read "120±14°C (248±25°F).

#### § 60.296 [Amended]

100. Amend § 60.296 as follows:

In paragraph (b)(3) by revising the words "American Society of Testing and Materials (ASTM) Method D240-76" to read "ASTM Method D240-76 or 92" and by revising "D1826-77" to read "D1826-77 or 94."

#### § 60.301 [Amended]

101. In § 60.301, the first paragraph is amended by revising the words "the act" to read "the Act."

#### § 60.313 [Amended]

102. Amend § 60.313 as follows:

a. Paragraph (c)(1) is amended by revising the words "Reference Method 24" to read "Method 24" wherever they occur.

b. In paragraph (c)(1)(i)(B), the third sentence is amended by revising the words "other transfer efficiencies other than" to read "transfer efficiencies other than."

c. Paragraph (c)(2)(i) is amended by revising the words "in (c)(2)(i)(A), (B), and (C)" to read "in paragraphs (c)(2)(i)(A), (B), and (C)" wherever they occur.

#### § 60.315 [Amended]

103. In § 60.315, paragraph (a)(2) is amended by revising the words "Reference Method 24" to read "Method 24."

#### § 60.330 [Amended]

104. In § 60.330, paragraph (a) is amended by revising the words "10.7 gigajoules" to read "10.7 gigajoules (10 million Btu)."

#### § 60.331 [Amended]

105. In § 60.331, paragraph (s) is removed.

#### § 60.332 [Amended]

106. In § 60.332, paragraph (a) is amended by revising the words "the date of the performance test" to read "the date on which the performance test."

#### § 60.334 [Amended]

107. In § 60.334, paragraph (c)(3), the first sentence is amended by revising the words "provided in § 60.332(g)" to read "provided in § 60.332(f)."

#### § 60.335 [Amended]

108. Amend § 60.335 by:

a. Paragraph (c)(1) is amended by revising the words:

“NO<sub>x</sub> = emission rate of NO<sub>x</sub> at 15 percent O<sub>2</sub> and ISO standard ambient conditions, volume percent.

NO<sub>x</sub> = observed NO<sub>x</sub> concentration, ppm by volume.”

“NO<sub>x</sub> = emission rate of NO<sub>x</sub> at 15 percent O<sub>2</sub> and ISO standard ambient conditions, ppm by volume.

NO<sub>x</sub> = observed NO<sub>x</sub> concentration, ppm by volume at 15 percent O<sub>2</sub>.”

b. Paragraph (d) is revised.

c. In paragraph (f)(1), the first sentence is amended by revising the words “in paragraph (b)(1) of this section” to read “in paragraph (c)(1) of this section.”

The revisions read as follows:

**§ 60.335 Test methods and procedures.**

\* \* \* \* \*

(d) The owner or operator shall determine compliance with the sulfur content standard in § 60.333(b) as follows: ASTM D 2880–71, 78, or 96 shall be used to determine the sulfur content of liquid fuels and ASTM D 1072–80 or 90 (Reapproved 1994), D 3031–81, D 4084–82 or 94, or D 3246–81, 92, or 96 shall be used for the sulfur content of gaseous fuels (incorporated by reference—see § 60.17). The applicable ranges of some ASTM methods mentioned above are not adequate to measure the levels of sulfur in some fuel gases. Dilution of samples before analysis (with verification of the dilution ratio) may be used, subject to the approval of the Administrator.

\* \* \* \* \*

**§ 60.343 [Amended]**

109. In § 60.343, paragraph (e), the first sentence is amended by revising the words “in which the scrubber pressure drop is greater than 30 percent below the rate established during the performance test” to read “in which the scrubber pressure drop or scrubbing liquid supply pressure is greater than 30 percent below that established during the performance test.”

**§ 60.344 [Amended]**

110. Amend § 60.344 as follows:

a. In paragraph (b)(1), the definition of the term “c<sub>s</sub>” is amended by revising the words “(g/dscf)” to read “(gr/dscf).”

b. In paragraph (b)(1), the definition of the term “K” is amended by revising the words “(453.6 g/lb)” to read “(7000 gr/lb).”

c. In paragraph (b)(2), the first sentence is amended by revising the words “Method 5D shall be used as

positive-pressure fabric filters” to read “Method 5D shall be used at positive-pressure fabric filters.”

**§ 60.372 [Amended]**

111. Amend § 60.372 as follows:

a. In paragraph (a)(1) by revising the words “0.40 milligram of lead per dry standard cubic meter of exhaust (0.000176 gr/dscf)” to read “0.40 milligram of lead per dry standard cubic meter of exhaust (0.000175 gr/dscf).”

b. In paragraph (a)(2) by revising the words “1.00 milligram of lead per dry standard cubic meter of exhaust (0.00044 gr/dscf)” to read “1.00 milligram of lead per dry standard cubic meter of exhaust (0.000437 gr/dscf).”

c. In paragraph (a)(3) by revising the words “1.00 milligram of lead per dry standard cubic meter of exhaust (0.00044 gr/dscf)” to read “1.00 milligram of lead per dry standard cubic meter of exhaust (0.000437 gr/dscf).”

d. In paragraph (a)(5) by revising the words “4.50 milligrams of lead per dry standard cubic meter of exhaust (0.00198 gr/dscf)” to read “4.50 milligrams of lead per dry standard cubic meter of exhaust (0.00197 gr/dscf).”

e. In paragraph (a)(6) by revising the words “1.00 milligram per dry standard cubic meter of exhaust (0.00044 gr/dscf)” to read “1.00 milligram of lead per dry standard cubic meter of exhaust (0.000437 gr/dscf).”

**§ 60.374 [Amended]**

112. Amend § 60.374 as follows:

a. In paragraph (c)(1), in the definition of the term “C<sub>Pbi</sub>” by revising the words “mg/dscm” to read “mg/dscm (gr/dscf).”

b. In paragraph (c)(1), in the definition of the term “K” by revising the words “453,600 mg/lb” to read “7000 gr/lb).”

**§ 60.381 [Amended]**

113. In § 60.381, in the definition of the term “storage bin” by revising the words “or metallic minerals” to read “of metallic minerals.”

**§ 60.382 [Amended]**

114. In § 60.382, paragraph (a)(1) is amended by revising the words “0.05 grams per dry standard cubic meter” to read “0.05 grams per dry standard cubic meter (0.02 g/dscm).”

**§ 60.385 [Amended]**

115. In § 60.385, paragraph (c) is amended by revising the words “scrubber pressure loss (or gain) and liquid flow rate” to read “scrubber pressure loss (or gain) or liquid flow rate”.

**§ 60.386 [Amended]**

116. In § 60.386, paragraph (c) is amended by revising the words “§ 60.3284(a) and (b)” to read “§ 60.384(a) and (b).”

**§ 60.391 [Amended]**

117. Amend § 60.391 as follows:

a. In paragraph (b), the definition of “E” is amended by revising the words “destruction efficiency” to read “destruction or removal efficiency.”

b. In paragraph (b), the eleventh definition is amended by revising the words

“L<sub>ci</sub><sup>l</sup> = Volume of each coating (i) consumed by each application method (l), as received liters)”

to read

“L<sub>ci</sub> = Volume of each coating (i) consumed by each application method (l), as received (liters).”

**§ 60.393 [Amended]**

118. Amend § 60.393 as follows:

a. In paragraph (c)(1)(i) by revising the words “Reference Method 24” to read “Method 24” wherever they occur.

b. Paragraph (c)(2)(ii)(A) is amended by revising the term to read as follows:

$$\sum_{i=1}^n$$

to read as follows:

$$\sum_{i=1}^n$$

**§ 60.395 [Amended]**

119. In § 60.395, paragraph (d) is amended by revising the words “Reference Method 25” to read “Method 25.”

**§ 60.396 [Amended]**

120. In § 60.396, paragraphs (a)(1), (a)(2), (b), and (c) are amended by revising the words “Reference Method” to read “Method.”

**§ 60.401 [Amended]**

121. In § 60.401, paragraph (b) is amended by revising the words “unit including, moisture” to read “unit, including moisture.”

**§ 60.402 [Amended]**

122. In § 60.402, paragraph (a)(2)(i) is amended by revising the word “Contains” to read “Contain.”

**§ 60.424 [Amended]**

123. Amend § 60.424 to read as follows:

a. In the first paragraph (b)(3), in the first sentence by revising the words

“scales or computed from material balance shall” to read “scales, or the result of computations using a material balance, shall.”

b. The second paragraph (b)(3) is redesignated as (b)(4).

**§ 60.431 [Amended]**

124. In § 60.431, paragraph (b), the definition of the term “L<sub>di</sub>” is amended by adding the words “the subject facility (or facilities)” to the end of the definition.

**§ 60.433 [Amended]**

125. Amend § 60.433 as follows:

a. In paragraph (a)(5), the first sentence is amended by revising the words “material or on at least” to read “material on at least.”

b. Paragraph (a)(5)(ii) is amended by revising the punctuation at the end of the paragraph. The words “according to § 60.435.” are revised to read “according to § 60.435;”

c. Paragraphs (b)(1), (b)(2), (b)(3), (b)(5), (c)(2)(ii), and (c)(2)(iii) are amended by adding an “=” between the “i” and the “1” under the summation sign.

d. Paragraph (c)(2)(v) is amended by replacing the “e” subscript with “a” wherever it occurs.

e. Paragraph (e)(5)(ii) is amended by replacing the “a” subscript with “e” wherever it occurs.

**§ 60.435 [Amended]**

126. Amend § 60.435 as follows:

a. Paragraphs (a)(1), (a)(2), and (b) are amended by revising the words “Reference Method” to read “Method” wherever they occur.

b. Paragraph (d)(1) is amended by revising the words “ASTM D1475–60 (Reapproved 1980)” to read “ASTM D1475–60, 80, or 90.”

**§ 60.440 [Amended]**

127. In § 60.440, paragraph (b) is amended by revising the words “45 Mg” to read “45 Mg (50 tons)” wherever they occur.

**§ 60.441 [Amended]**

128. In § 60.441, paragraphs (a) and (b) are amended by revising the words “Reference Method” to read “Method” wherever they occur.

**§ 60.443 [Amended]**

129. Amend § 60.443 as follows:

a. In paragraph (b) by revising the words “R<sub>q</sub> less” to read “R<sub>q</sub> is less.”

b. In paragraph (d) by revising the words “in paragraph (b)(1) of this section” to read “in paragraph (b) of this section.”

c. In paragraph (e), in the third sentence by revising the words “38°C (50°F)” to read “28°C (50°F).”

d. In paragraph (i) by revising the word “devices” to read “device(s).”

**§ 60.446 [Amended]**

130. In § 60.446, paragraphs (a) and (b) are amended by revising the words “Reference Method” to read “Method” wherever they occur.

**§ 60.453 [Amended]**

131. Amend § 60.453 as follows:

a. In paragraph (b) by revising the words “performance text” to read “performance test.”

b. In paragraph (b)(1) by revising the words “Reference Method” to read “Method” wherever they occur.

c. In paragraph (b)(1)(i)(B) by revising the word “coatings” to read “coating.”

d. In paragraph (b)(1)(i)(C) by revising equation (3).

e. In paragraphs (b)(2)(i)(A) and (b)(2)(i)(B) by revising Equations (6) and (7).

f. In paragraph (b)(2)(i)(B) by removing Equation (7) and its nomenclature, adding them to the end of paragraph (b)(2)(i)(A), and redesignating the equation as Equation (6).

g. In paragraph (b)(3)(i) by revising the word “assumed” to read “consumed.” The revisions reads as follows:

**§ 60.453 Test methods and procedures.**

- \* \* \* \* \*
- (b) \* \* \*
- (1) \* \* \*
- (i) \* \* \*
- (C) \* \* \*

$$T = \frac{\sum_{i=1}^n \sum_{k=1}^m L_{cik} V_{sik} T_k}{L_s} \quad (3)$$

- \* \* \* \* \*
- (2) \* \* \*
- (i) \* \* \*
- (A) \* \* \*

$$F = \frac{\sum_{i=1}^n Q_{bi} C_{bi}}{\sum_{i=1}^n Q_{bi} C_{bi} + \sum_{k=1}^p Q_{fk} C_{fk}} \quad (6)$$

- \* \* \* \* \*
- (B) \* \* \*

$$E = \frac{\sum_{i=1}^n Q_{bi} C_{bi} - \sum_{j=1}^m Q_{aj} C_{aj}}{\sum_{i=1}^n Q_{bi}}$$

- \* \* \* \* \*

**§ 60.454 [Amended]**

132. In § 60.454, paragraph (a)(2) is amended by revising the words “of the greater of 0.75 percent of the temperature being measured expressed in degrees Celsius or ±2.5°C” to read “of 0.75 percent of the temperature being measured, expressed in degrees Celsius, or ±2.5 °C, whichever is greater.”

**§ 60.455 [Amended]**

133. Amend § 60.455 as follows:

a. Paragraphs (c)(1) and (c)(2) are amended by revising the words “28 °C” to read “28 °C” (50 °F)” wherever they occur.

b. In paragraph (d), the first sentence is amended by revising the word “opreator” to read “operator.”

**§ 60.456 [Amended]**

134. Amend § 60.456 as follows:

a. In paragraph (a)(1), the second sentence is amended by revising the words “Reference Method 24” to read “Method 24.”

b. In paragraph (a)(1), the third sentence is amended by revising the words “subsection 4.4 of Method 24” to read “Section 12.6 of Method 24.”

c. Paragraph (a)(4) is amended by revising the word “volocity” to read “velocity.”

d. Paragraph (c) is amended by revising the words “0.003 dscm” to read “0.003 dscm (0.1 dscf).”

**§ 60.463 [Amended]**

135. Amend § 60.463 as follows:

a. Paragraph (c)(1) is amended by revising the words “Reference Method 24” to read “Method 24” wherever they occur.

b. Paragraph (c)(3)(iii) is amended by revising the word “computation” to read “computations.”

c. Paragraph (c)(4)(ii) is amended by revising the defined term “m” to read “n.”

**§ 60.464 [Amended]**

136. In § 60.464, paragraph (c), the second sentence is amended by revising the words “which is greater” to read “whichever is greater.”

**§ 60.465 [Amended]**

137. Amend § 60.465 as follows:

a. In paragraph (c), the first sentence is amended by revising the reference “§ 69.462” to read “§ 60.462.”

b. In paragraph (d), the first sentence is amended by revising the reference “§ 69.464” to read “§ 60.464.”

**§ 60.466 [Amended]**

138. Amend § 60.466 as follows:

a. Paragraphs (a)(1) and (a)(2) are amended by revising the words

“Reference Method” to read “Method” wherever they occur.

b. In paragraph (a)(1), the first sentence is amended by revising the words “coating for determining the VOC content” to read “coating, shall be used for determining the VOC content.”

c. In paragraph (a)(1), the third sentence is amended by revising the words “section 4.4” to read “Section 12.6.”

d. Paragraph (c) is amended by revising the words “0.003 dry standard cubic meter (DSCM)” to read “0.003 dscm (0.11 dscf).”

**§ 60.471 [Amended]**

139. In § 60.471, the definition of the term “Catalyst” is amended by revising the words “means means” to read “means.”

**§ 60.472 [Amended]**

140. Amend § 60.472 as follows:  
 a. Paragraph (a)(1)(i) is amended by revising the words “0.04 kilograms of particulate per megagram” to read “0.04 kg/Mg (0.08 lb/ton).”

b. Paragraph (a)(1)(ii) is amended by revising the words “0.04 kilograms per megagram” to read “0.04 kg/Mg (0.08 lb/ton).”

c. Paragraph (b)(1) is amended by revising the words “0.67 kilograms of particulate per megagram” to read “0.67 kg/Mg (1.3 lb/ton).”

d. Paragraph (b)(2) is amended by revising the words “0.71 kilograms of particulate per megagram” to read “0.71 kg/Mg (1.4 lb/ton).”

e. Paragraph (b)(3) is amended by revising the words “0.60 kilograms of particulate per megagram” to read “0.60 kg/Mg (1.2 lb/ton).”

f. Paragraph (b)(4) is amended by revising the words “0.64 kilograms of particulate per megagram” to read “0.64 kg/Mg (1.3 lb/ton).”

g. Paragraph (b)(5) is amended by revising the words “procedures in § 60.474(k)” to read “procedures in § 60.474(g).”

**§ 60.473 [Amended]**

141. Amend § 60.473 as follows:  
 a. In paragraph (a), the second sentence is amended by revising the words “±15°C” to read “±15°C (±25°F).”

b. In paragraph (b), the second sentence is amended by revising the words “±10 °C” to read “±10 °C (±18 °F).”

c. In paragraph (c), the first sentence is amended by revising the words “(a) and (b)” to read “(a) or (b)”

**§ 60.474 [Amended]**

142. Amend § 60.474 as follows:  
 a. In paragraph (c)(1), the definition of the term “E” is amended by revising the

words “kg/Mg” to read “kg/Mg (lb/ton).”

b. In paragraph (c)(1), the definition of the term “c<sub>s</sub>” is amended by revising the words “(g/dscf)” to read “(gr/dscf).”

c. In paragraph (c)(1), the definition of the term “K” is amended by revising the words “907.2/(g-Mg)/(kg-ton)” to read “7000 gr/lb.”

d. In paragraph (c)(4), the definition of the term “d” is amended by revising the words “lb/ft<sup>3</sup>” to read “lb/ft<sup>3</sup>.”

e. Paragraphs (c)(4)(ii) and (f) are revised.

The revisions read as follows:

**§ 60.474 Test methods and procedures.**

\* \* \* \* \*

(c) \* \* \*

(4) \* \* \*

(ii) The density (d) of the asphalt shall be computed using the following equation:

$$d = K_1 - K_2 T_i$$

Where:

d = Density of the asphalt, kg/m<sup>3</sup> (lb/ft<sup>3</sup>)

K<sub>1</sub> = 1056.1 kg/m<sup>3</sup> (metric units)

= 64.70 lb/ft<sup>3</sup> (English Units)

K<sub>2</sub> = 0.6176 kg/(m<sup>3</sup> °C) (metric units)

= 0.0694 lb/(ft<sup>3</sup> °F) (English Units)

T<sub>i</sub> = temperature at the start of the blow, °C (°F)

\* \* \* \* \*

(f) If at a later date the owner or operator believes that the emission limits in § 60.472(a) and (b) are being met even though one of the conditions listed in this paragraph exist, he may submit a written request to the Administrator to repeat the performance test and procedure outlined in paragraph (c) of this section.

(1) The temperature measured in accordance with § 60.473(a) is exceeding that measured during the performance test.

(2) The temperature measured in accordance with § 60.473(b) is lower than that measured during the performance test.

\* \* \* \* \*

**§ 60.480 [Amended]**

143. In § 60.480(d)(2), line 3, revise the words “1,000 Mg/yr” to read “1,000 Mg/yr (1,102 ton/yr)”

**§ 60.481 [Amended]**

144. Amend § 60.481 as follows:

a. Paragraph (a)(1) under the definition of “Capital expenditure” is amended by revising the words “repair allowance, B, as reflected” to “repair allowance, B, divided by 100 as reflected”

b. The definition for “In vacuum service” is amended by revising the

words “5 kilopascals (kPa)” to “5 kilopascals (kPa)(0.7 psia).”

c. The definition of the term “Repaired” is amended by revising the words “instrument reading or 10,000 ppm or greater” to read “instrument reading of 10,000 ppm or greater.”

**§ 60.482–2 [Amended]**

145. Amend § 60.482–2 as follows:

a. Paragraph (e) is amended by revising the words “(a), (c), and (d) if the pump” to read “(a), (c), and (d) of this section if the pump.”

b. Paragraph (e)(3) is amended by revising the words “paragraph (e)(2)” to read “paragraph (e)(2) of this section.”

c. Paragraph (f) is amended by revising the words “exempt from the paragraphs (a) through (e)” to read “exempt from paragraphs (a) through (e) of this section.”

**§ 60.482–3 [Amended]**

146. In § 60.482–3, paragraph (i)(2) is amended by revising the words “paragraph (i)(1)” to read “paragraph (i)(1) of this section.”

**§ 60.482–4 [Amended]**

147. In § 60.482–4, paragraph (c) is amended by revising the words “paragraphs (a) and (b)” to read “paragraphs (a) and (b) of this section.”

**§ 60.482–5 [Amended]**

148. In § 60.482–5, paragraph (c) is amended by revising the words “paragraphs (a) and (b).” to read “paragraphs (a) and (b) of this section.”

**§ 60.482–7 [Amended]**

149. In § 60.482–7, paragraph (f)(3) is amended by revising the words “paragraph (f)(2)” to read “paragraph (f)(2) of this section.”

**§ 60.482–10 [Amended]**

150. In § 60.482–10, paragraph (c) is amended by revising the words “temperature of 816 °C” to read “temperature of 816 °C (1500 °F).”

**§ 60.483–1 [Amended]**

151. In § 60.483–1, paragraph (b)(1) is amended by revising the words “specified in § 60.487(b)” to read “specified in § 60.487(d).”

**§ 60.483–2 [Amended]**

152. In § 60.483–2, paragraph (a)(2) is amended by revising the words “specified in § 60.487(b)” to read “specified in § 60.487(d).”

**§ 60.484 [Amended]**

153. In § 60.484, paragraph (f)(2) is amended by revising the words “paragraphs (b), (c), (d), and (e)” to read

“paragraphs (b), (c), (d), and (e) of this section.”

**§ 60.485 [Amended]**

154. Amend § 60.485 as follows:  
 a. In paragraph (c)(2), in the third sentence by revising the word “indicates” is revised to read “indicated.”

b. In paragraph (d), in the first sentence by revising the words “in VOC series” to read “in VOC service.”

c. In paragraph (d)(1) by revising the words “ASTM E-260, E-168, E-169” to read “ASTM E260-73, 91, or 96, E168-67, 77, or 92, E169-63, 77, or 93.”

d. In paragraphs (e)(1) and (e)(2) by revising the words “0.3 kPa at 20°C” to read “0.3 kPa at 20 °C (1.2 in. H<sub>2</sub>O at 68 °F)” wherever they occur.

e. In paragraph (e)(1) by revising “ASTM D-2879” to read “ASTM D2879-83, 96, or 97.”

f. In paragraph (f) by revising the words “paragraphs (d), (e), and (g)” to read “paragraphs (d), (e), and (g) of this section.”

g. Paragraphs (g)(3) and (g)(4) are revised.

h. In paragraph (g)(5) by revising “ASTM D 2504-67” to read “ASTM D2504-67, 77, or 88 (Reapproved 1993).”

i. In paragraph (g)(6) by revising “ASTM D 2382-76” to read “ASTM D2382-76 or 88 or D4809-95.”

The revisions read as follows:

**§ 60.485 Test methods and procedures.**

\* \* \* \* \*

(g) \* \* \*

(3) The maximum permitted velocity for air assisted flares shall be computed using the following equation:

$$V_{max} = K_1 + K_2 H_T$$

Where:

V<sub>max</sub> = Maximum permitted velocity, m/sec (ft/sec)

H<sub>T</sub> = Net heating value of the gas being combusted, MJ/scm (Btu/scf).

K<sub>1</sub> = 8.706 m/sec (metric units)

= 28.56 ft/sec (English units)

K<sub>2</sub> = 0.7084 m<sup>4</sup>/(MJ-sec) (metric units)

= 0.087 ft<sup>4</sup>/(Btu-sec) (English units)

(4) The net heating value (HT) of the gas being combusted in a flare shall be computed using the following equation:

$$H_T = K \sum_{i=1}^n C_i H_i$$

Where:

K = Conversion constant, 1.740 × 10<sup>7</sup> (g-mole)(MJ)/ (ppm-scm-kcal) (metric units)

= 4.674 × 10<sup>8</sup> [(g-mole)(Btu)/(ppm-scf-kcal)] (English units)

C<sub>i</sub> = Concentration of sample component “i,” ppm

H<sub>i</sub> = net heat of combustion of sample component “i” at 25 °C and 760 mm Hg (77 °F and 14.7 psi), kcal/g-mole

\* \* \* \* \*

**§ 60.486 [Amended]**

155. In § 60.486, paragraph (c)(8) is amended by revising the word “shutdown” to read “shutdowns.”

**§ 60.487 [Amended]**

156. In § 60.487, paragraph (d) is amended by revising the words “An owner or operator electing to comply with the provisions of §§ 60.483-1 and 60.483-2” to read “An owner or operator electing to comply with the provisions of §§ 60.483-1 or 60.483-2.”

**§ 60.489 [Amended]**

157. Amend the table in § 60.489 as follows:

a. Revise the chemical name “Chlorbenzoyl chloride” to read “Chlorobenzoyl chloride;”

b. Revise the chemical name “Chloronaphthalene” to read “Chloronaphthalene;”

c. Revise the CAS No. for diethylene glycol monobutyl ether acetate to read 124-17-4;

d. Revise the chemical name “Ethylne carbonate” to read “Ethylene carbonate;”

e. Revise the chemical name “Ethylene glycol monoethy ether” to read “Ethylene glycol monoethyl ether;”

f. Revise the chemical name “Propionaldehyde” to read “Propionaldehyde;” and

g. Revise the chemical name “Tetrahydronaphthalene” to read “Tetrahydronaphthalene.”

**§ 60.491 [Amended]**

158. In § 60.491, paragraphs (a)(6) and (b) are amended by revising the word “litre” or “litres” to read “liter” or “liters” wherever it occurs.

**§ 60.493 [Amended]**

159. Amend § 60.493 as follows:

a. Paragraph (b)(1) is amended by revising the words “Reference Method” to read “Method” wherever they occur.

b. Paragraph (b)(1)(i)(C) is amended by revising the words “volume-weighted average” to read “volume-weighted average.”

c. In paragraph (b)(1)(i)(C), equation 3 is revised.

d. Paragraph (b)(1)(iii) is amended by revising the words “weighted average of mass of VOC” to read “weighted average mass of VOC.”

The revisions read as follows:

**§ 60.493 Performance test and compliance provisions.**

\* \* \* \* \*

(b) \* \* \*

(1) \* \* \*

(i) \* \* \*

(C) \* \* \*

$$G = \frac{M_o + M_d}{L_s} \quad (3)$$

\* \* \* \* \*

**§ 60.494 [Amended]**

160. In § 60.494, paragraph (b), the second sentence is amended by revising the words “accuracy the greater of ±0.75 percent of the temperature being measured expressed in degrees Celsius or ±2.5°C to read “accuracy of 0.75 percent of the temperature being measured, expressed in degrees Celsius, or ±2.5°C, whichever is greater.”

**§ 60.495 [Amended]**

161. In § 60.495, paragraph (a)(1) is amended by revising the words “from data determined using Reference Method 24 or supplies” to read “from data determined using Method 24 or supplied.”

**§ 60.496 [Amended]**

162. Revise § 60.496 as follows:

a. Paragraph (a)(1) is revised.

b. In paragraphs (a)(2), (b), and (c) by revising the words “Reference Method” to read “Method” wherever they occur.

c. In paragraph (a)(2) by revising the words “30 days in advance” to read “at least 30 days in advance.”

The revisions read as follows:

**§ 60.496 Test methods and procedures.**

(a) \* \* \*

(1) Method 24, an equivalent or alternative method approved by the Administrator, or manufacturers’ formulation data from which the VOC content of the coatings used for each affected facility can be calculated. In the event of a dispute, Method 24 data shall govern. When VOC content of water-borne coatings, determined from data generated by Method 24, is used to determine compliance of affected facilities, the results of the Method 24 analysis shall be adjusted as described in Section 12.6 of Method 24.

\* \* \* \* \*

**§ 60.501 [Amended]**

163. In § 60.501, the definition of “Vapor-tight gasoline tank truck” is amended by revising the words “Reference Method” to read “Method.”

**§ 60.531 [Amended]**

164. Amend § 60.531 as follows:

a. Under the definition of "Coal-only heater", the alphabetical designations of paragraphs (a) through (e) are removed and numerical designations (1) through (5) are added.

b. Under the definition of "Cookstove", the alphabetical designations of paragraphs (a) through (g) are removed and numerical designations (1) through (7) are added.

c. Under the definition of "Wood heater", paragraph (2) is amended by revising the words "20 cubic feet" to read "0.57 cubic meters (20 cubic feet)."

d. Under the definition of "Wood heater", paragraph (3) is amended by revising the words "5 kg/hr" to read "5 kg/hr (11 lb/hr)."

e. Under the definition of "Wood heater", paragraph (4) is amended by revising the words "800 kg" to read "800 kg (1,760 lb)."

**§ 60.532 [Amended]**

165. Amend § 60.532 as follows:

a. In paragraph (b)(1) by revising the words "4.1 g/hr" to read "4.1 g/hr (0.009 lb/hr)."

b. Paragraphs (b)(1)(i), (b)(1)(ii), and (b)(2) are revised.

The revisions read as follows:

**§ 60.532 Standards for particulate matter.**

\* \* \* \* \*

(b) \* \* \*

(1) \* \* \*

(i) At burn rates less than or equal to 2.82 kg/hr (6.2 lb/hr),

$$C = K_1 BR + K_2$$

Where:

BR = Burn rate in kg/hr (lb/hr)

K<sub>1</sub> = 3.55 g/kg (0.00355 lb/lb)

K<sub>2</sub> = 4.98 g/hr (0.0011 lb/hr)

(ii) At burn rates greater than 2.82 kg/hr (6.2 lb/hr), C = 15 g/hr (0.033 lb/hr).

(2) An affected facility not equipped with a catalytic combustor shall not discharge into the atmosphere any gases which contain particulate matter in excess of a weighted average of 7.5 g/hr (0.017 lb/hr). Particulate emissions shall not exceed 15 g/hr (0.033 lb/hr) during any test run at a burn rate less than or equal to 1.5 kg/hr (3.3 lb/hr) that is required to be used in the weighted average and particulate emissions shall not exceed 18 g/hr (0.040 lb/hr) during any test run at a burn rate greater than 1.5 kg/hr (3.3 lb/hr) that is required to be used in the weighted average.

\* \* \* \* \*

**§ 60.533 [Amended]**

166. Amend § 60.533 as follows:

a. In paragraph (k)(1), the third sentence is amended by revising the words "The grant of such a waiver" to read "The granting of such a waiver."

b. Paragraph (k)(2) is amended by revising the words "± ¼ inch" to read "± 0.64 cm (± ¼ inch)."

c. In paragraph (o)(4), the first sentence is amended by revising the word "indicate" to read "indicates."

d. In paragraph (o)(4), the first sentence is amended by revising the words "comply with applicable emission limit" to read "comply with the applicable emission limit."

e. In paragraph (p)(4)(ii)(A), the second sentence is amended by revising the words "± 1 gram per hour" to read "± 1 gram per hour (± 0.0022 lb per hour)."

**§ 60.535 [Amended]**

167. In § 60.535, paragraph (b)(9) is amended by revising the words "a reporting and recordkeeping requirements" to read "reporting and recordkeeping requirements."

**§ 60.536 [Amended]**

168. Amend § 60.536 as follows:

a. Paragraph (a)(3)(ii) and the equation in (i)(4)(ii) are revised.

b. Paragraph (j)(2)(v) is amended by revising the words "five inches by seven inches" to read "12.7 centimeters by 17.8 centimeters (5 inches by 7 inches)."

The revisions read as follows:

**§ 60.536 Permanent label, temporary label, and owner's manual.**

(a) \* \* \*

(3) \* \* \*

(ii) Be at least 8.9 cm long and 5.1 cm wide (3½ inches long and 2 inches wide).

\* \* \* \* \*

(i) \* \* \*

(4) \* \* \*

(ii) \* \* \*

HO<sub>E</sub> = H<sub>v</sub> × (Estimated overall efficiency/100) × BR

Where:

HO<sub>E</sub> = Estimated heat output in Btu/hr

H<sub>v</sub> = Heating value of fuel, 19,140 Btu/kg (8,700 Btu/lb)

BR = Burn rate of dry test fuel per hour, kg (lb)

\* \* \* \* \*

**§ 60.541 [Amended]**

169. Amend § 60.541 as follows:

a. In paragraph (b), the definitions of the terms "D<sub>c</sub>" and "D<sub>r</sub>" are amended by revising the words "(grams per liter)" to read "(grams per liter (lb per gallon))."

b. In paragraph (b), the definitions of the terms "G" and "N" are amended by revising the words "(grams per tire)" to read "(grams (lb) per tire)."

c. In paragraph (b), the definitions of the terms "G<sub>b</sub>" and "N<sub>b</sub>" are amended

by revising the words "(grams per bead)" to read "(grams (lb) per bead)."

d. In paragraph (b), the definitions of the terms "L<sub>c</sub>" and "L<sub>r</sub>" are amended by revising the word "(liters)" to read "(liters (gallons))."

e. In paragraph (b), the definitions of the terms "M", "M<sub>o</sub>", and "M<sub>r</sub>" are amended by revising the word "(grams)" to read "(grams (lb))."

f. In paragraph (b), the definitions of the terms "Q<sub>a</sub>", "Q<sub>b</sub>", and "Q<sub>r</sub>" are amended by revising the words "(dry standard cubic meters per hour)" to read "(dry standard cubic meters (dry standard cubic feet) per hour)."

**§ 60.542 [Amended]**

170. Amend § 60.542 as follows:

a. Paragraphs (a)(1)(ii)(A) through (E), (a)(2)(ii)(A) through (E), (a)(6)(ii)(A) through (E), (a)(8)(ii)(A) through (E), and (a)(9)(ii)(A) through (E) are revised.

b. In paragraph (a)(3) by revising the words "no more than 10 grams of VOC per tire (g/tire)" to read "no more than 10 grams (0.022 lb) of VOC per tire."

c. In paragraph (a)(4) by revising the words "no more than 5 grams of VOC per bead (g/bead)" to read "no more than 5 grams (0.011 lb) of VOC per bead."

d. In paragraph (a)(5)(i) by revising the words "1.2 grams of VOC per tire" to read "1.2 grams (0.0026 lb) of VOC per tire."

e. In paragraph (a)(5)(ii) by revising the words "9.3 grams of VOC per tire" to read "9.3 grams (0.021 lb) of VOC per tire."

f. In paragraph (a)(7)(i) by revising the words "1.2 grams of VOC per tire" to read "1.2 grams (0.0026 lb) of VOC per tire."

g. In paragraph (a)(7)(ii) by revising the words "9.3 grams of VOC per tire" to read "9.3 grams (0.021 lb) of VOC per tire."

The revisions read as follows:

**§ 60.542 Standards for volatile organic compounds.**

(a) \* \* \*

(1) \* \* \*

(ii) \* \* \*

(A) 3,870 kg (8,531 lb) of VOC per 28 days,

(B) 4,010 kg (8,846 lb) of VOC per 29 days,

(C) 4,150 kg (9,149 lb) of VOC per 30 days,

(D) 4,280 kg (9,436 lb) of VOC per 31 days, or

(E) 4,840 kg (10,670 lb) of VOC per 35 days.

\* \* \* \* \*

(2) \* \* \*

- (ii) \* \* \*
- (A) 3,220 kg (7,099 lb) of VOC per 28 days,
- (B) 3,340 kg (7,363 lb) of VOC per 29 days,
- (C) 3,450 kg (7,606 lb) of VOC per 30 days,
- (D) 3,570 kg (7,870 lb) of VOC per 31 days, or
- (E) 4,030 kg (8,885 lb) of VOC per 35 days.

- \* \* \* \* \*
- (6) \* \* \*
- (ii) \* \* \*
- (A) 3,220 kg (7,099 lb) of VOC per 28 days,
- (B) 3,340 kg (7,363 lb) of VOC per 29 days,
- (C) 3,450 kg (7,606 lb) of VOC per 30 days,
- (D) 3,570 kg (7,870 lb) of VOC per 31 days, or
- (E) 4,030 kg (8,885 lb) of VOC per 35 days.

- \* \* \* \* \*
- (8) \* \* \*
- (ii) \* \* \*
- (A) 1,570 kg (3,461 lb) of VOC per 28 days,
- (B) 1,630 kg (3,593 lb) of VOC per 29 days,
- (C) 1,690 kg (3,726 lb) of VOC per 30 days,
- (D) 1,740 kg (3,836 lb) of VOC per 31 days, or
- (E) 1,970 kg (4,343 lb) of VOC per 35 days.

- \* \* \* \* \*
- (9) \* \* \*
- (ii) \* \* \*
- (A) 1,310 kg (2,888 lb) of VOC per 28 days,
- (B) 1,360 kg (2,998 lb) of VOC per 29 days,
- (C) 1,400 kg (3,086 lb) of VOC per 30 days,
- (D) 1,450 kg (3,197 lb) of VOC per 31 days, or
- (E) 1,640 kg (3,616 lb) of VOC per 35 days.

\* \* \* \* \*

**§ 60.542a [Amended]**

171. In § 60.542a, paragraph (a) is amended by revising the words “25 grams” to read “25 grams (0.055 lb)” wherever they occur.

**§ 60.543 [Amended]**

172. Amend § 60.543 as follows:  
 a. In paragraph (c), the first sentence is amended by deleting the abbreviation “(kg/mo).”

b. Paragraph (d) is amended by revising the words “the g/tire limit” to read “the VOC emission per tire limit.”

c. Paragraph (e) is amended by revising the words “g/bead limit” to read “VOC emission per bead limit.”

d. Paragraph (f) is amended by revising the words “operation that use” to read “operation that uses.”

e. Paragraphs (f)(2)(iv)(G) and (f)(2)(iv)(H) are amended by revising the definitions of the terms “W”, “V”, “Q<sub>i</sub>”, and “M<sub>i</sub>” following the equations as follows:

W = Molecular weight of the single VOC, mg/mg-mole (lb/lb-mole).  
 V = The volume occupied by one mole of ideal gas at standard conditions [20°C, 760 mm Hg] on a wet basis, 2.405 × 10<sup>-5</sup> m<sup>3</sup>/mg-mole (385.3 ft<sup>3</sup>/lb-mole).

Q<sub>i</sub> = Volumetric flow in the capture system during run i, on a wet basis, adjusted to standard conditions, m<sup>3</sup> (ft<sup>3</sup>) (see § 60.547(a)(5)).

M<sub>i</sub> = Mass of the single VOC used during run i, mg (lb).

f. Paragraphs (g) and (i) are amended by revising the words “operation that use” to read “operation that uses” wherever they occur.

g. Paragraphs (j)(4) and (j)(5)(ii) are amended by revising the words “100 feet per minute” to read “30.5 meters (100 feet) per minute” wherever they occur.

h. Paragraphs (n) and (n)(5) are amended by revising the words “25 g/tire limit” to read “VOC emission per tire limit” wherever they occur.

**§ 60.544 [Amended]**

173. In § 60.544, paragraph (a)(2) is amended by revising the word “temperatruer” to read “temperature.”

**§ 60.545 [Amended]**

174. Amend § 60.545 as follows:  
 a. Paragraph (b) is amended by revising the words “28 °C” to read “28 °C (50 °F).”

b. Paragraph (d) is amended by revising the words “specified kg/mo uncontrolled VOC use” to read “specified VOC monthly usage.”

c. Paragraph (f) is amended by revising the citation “§ 60.543(B)(4)” to read “§ 60.543(b)(4).”

**§ 60.546 [Amended]**

175. Amend § 60.546 as follows:  
 a. Paragraph (a) is amended by revising the words “green tires spraying

operation where organic solvent-based spray are used” to read “green tire spraying operation where organic solvent-based sprays are used.”

b. Paragraph (c)(1) is amended by revising the words “kg/mo uncontrolled VOC use” to read “VOC monthly usage.”

c. Paragraph (c)(1) is amended by revising the words “the number days” to read “the number of days.”

d. Paragraphs (c)(2), (c)(3), and (c)(5) are amended by revising the words “g/tire or g/bead limit” to read “VOC emission limit per tire or per bead” wherever they occur.

e. In paragraph (d), the second sentence is amended by revising the words “(kg/hr)” to read “(kg/hr or lb/hr).”

f. Paragraph (f)(1) is amended by revising the words “g/tire or g/bead limit” to read “VOC emission limit per tire or per bead.”

g. Paragraph (f)(2) is amended by revising the words “kg/mo VOC use” to read “monthly VOC usage.”

h. In paragraph (j), the second sentence is amended by revising the words “shall be reported within 30 days” to read “shall be reported within 30 days of the change.”

**§ 60.547 [Amended]**

176. Amend § 60.547 as follows:

a. Paragraphs (a)(2) and (a)(5) are amended by revising the words “notify the Administrator 30 days in advance” to read “notify the Administrator at least 30 days in advance” wherever they occur.

b. Paragraphs (a)(2) and (a)(5) are amended by revising the words “1 meter” to read “1.0 meter (3.3 feet)” wherever they occur.

c. Paragraphs (a)(2) and (a)(5)(i) are amended by revising the words “0.003 dry standard cubic meter” to read “0.003 dry standard cubic meter (dscm) (0.11 dry standard cubic feet (dscf))” wherever they occur.

**§ 60.560 [Amended]**

177. Amend § 60.560 as follows:

a. Paragraph (a)(4)(i) is amended by revising the words “1,000 Mg/yr” to read “1,000 Mg/yr (1,102 ton/yr).”

b. In paragraph (b), Table 1 is revised to read as follows:

Polymer	Production process(es)	Process section	Emissions	
			Continuous	Intermittent
Polypropylene .....	Liquid Phase .....	Raw Materials Preparation .....	X	.....
		Polymerization Reaction .....	X	.....

Polymer	Production process(es)	Process section	Emissions	
			Continuous	Intermittent
Polypropylene	Gas Phase	Material Recovery	X	X
		Product Finishing	X	
		Product Storage		
		Raw Materials Preparation		
Low Density Polyethylene	High Pressure	Polymerization Reaction		X
		Material Recovery	X	
		Product Finishing		
		Product Storage		
Low Density Polyethylene	Low Pressure	Raw Materials Preparation	X	X
High Density Polyethylene	Gas Phase	Polymerization Reaction		X
		Material Recovery		
High Density Polyethylene	Liquid Phase Slurry	Product Finishing	X	
		Product Storage		
		Raw Materials Preparation		X
		Polymerization Reaction		
High Density Polyethylene	Liquid Phase Solution	Material Recovery	X	
		Product Finishing	X	
		Product Storage		
		Raw Materials Preparation	X	X
		Polymerization Reaction		X
		Material Recovery	X	X
		Product Finishing		
		Product Storage		

c. In paragraph (d), Table 2 is revised.

d. Paragraph (g) is amended by revising the words “1.6 Mg/yr” to read “1.6 Mg/yr (1.76 ton/yr)” wherever they occur.

The revision reads as follows:

**§ 60.560 Applicability and designation of affected facilities.**

\* \* \* \* \*

(d) \* \* \*

TABLE 2.—MAXIMUM UNCONTROLLED THRESHOLD EMISSION RATES <sup>a</sup>

Production process	Process section	Uncontrolled emission rate, kg TOC/Mg product (See associated footnote)
Polypropylene, liquid phase process	Raw Materials Preparation	0.15 <sup>b</sup>
	Polymerization Reaction	0.14 <sup>b</sup> , 0.24 <sup>c</sup>
	Material Recovery	0.19 <sup>b</sup>
	Product Finishing	1.57 <sup>b</sup>
Polypropylene, gas phase process	Polymerization Reaction	0.12 <sup>c</sup>
	Material Recovery	0.02 <sup>b</sup>
Low Density Polyethylene, low pressure process	Raw Materials Preparation	0.41 <sup>d</sup>
	Polymerization Reaction	(e)
	Material Recovery	(e)
	Product Finishing	(e)
Low Density Polyethylene, low pressure process	Product Storage	(e)
	Raw Materials Preparation	0.05 <sup>f</sup>
	Polymerization Reaction	0.03 <sup>g</sup>
High Density Polyethylene, liquid phase slurry process	Product Finishing	0.01 <sup>b</sup>
	Raw Materials Preparation	0.25 <sup>c</sup>
	Material Recovery	0.11 <sup>b</sup>
High Density Polyethylene, liquid phase solution process	Product Finishing	0.41 <sup>b</sup>
	Raw Materials Preparation	0.24 <sup>f</sup>
	Polymerization Reaction	0.16 <sup>c</sup>
High Density Polyethylene, gas phase process	Material Recovery	1.68 <sup>f</sup>
	Raw Materials Preparation	0.05 <sup>f</sup>
	Polymerization Reaction	0.03 <sup>g</sup>

TABLE 2.—MAXIMUM UNCONTROLLED THRESHOLD EMISSION RATES <sup>a</sup>—Continued

Production process	Process section	Uncontrolled emission rate, kg TOC/Mg product (See associated footnote)
Polystyrene, continuous process .....	Product Finishing .....	0.01 <sup>b</sup>
Poly(ethylene terephthalate), dimethyl terephthalate process .....	Material Recovery .....	0.05 <sup>b, h</sup>
	Material Recovery .....	0.12 <sup>b, h</sup>
	Polymerization Reaction .....	1.80 <sup>h, i, j</sup>
Poly(ethylene terephthalate), terephthalic acid process .....	Raw Materials Preparation .....	(l)
	Polymerization Reaction .....	1.80 <sup>h, j, m</sup>
		3.92 <sup>h, k, m</sup>

<sup>a</sup>“Uncontrolled emission rate” refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.

- <sup>b</sup>Emission rate applies to continuous emissions only.
- <sup>c</sup>Emission rate applies to intermittent emissions only.
- <sup>d</sup>Total emission rate for non-emergency intermittent emissions from raw materials preparation, polymerization reaction, material recovery, product finishing, and product storage process sections.
- <sup>e</sup>See footnote d.
- <sup>f</sup>Emission rate applies to both continuous and intermittent emissions.
- <sup>g</sup>Emission rate applies to non-emergency intermittent emissions only.
- <sup>h</sup>Applies to modified or reconstructed affected facilities only.
- <sup>i</sup>Includes emissions from the cooling water tower.
- <sup>j</sup>Applies to a process line producing low viscosity poly(ethylene terephthalate).
- <sup>k</sup>Applies to a process line producing high viscosity poly(ethylene terephthalate).
- <sup>l</sup>See footnote m.
- <sup>m</sup>Applies to the sum of emissions to the atmosphere from the polymerization reaction section (including emissions from the cooling tower) and the raw materials preparation section (i.e., the esterifiers).

\* \* \* \* \*

**§ 60.561 [Amended]**

178. Amend § 60.561 as follows:
- a. The definition of “End finisher” is amended as revising the words “2 torr” in the first sentence to read “2 mm Hg (1 in. H<sub>2</sub>O)”; and by revising the words “between 5 and 10 torr” in the second sentence to read “between 5 and 10 mm Hg (3 and 5 in. H<sub>2</sub>O).”
  - b. The definition of “High density polyethylene (HDPE)” is amended by revising the words “0.940 g/cm<sup>3</sup>” to read “0.940 gm/cm<sup>3</sup> (58.7 lb/ft<sup>3</sup>).”
  - c. The definition of “High pressure process” is amended by revising the words “15,000 psig” to read “15,000 psig (103,000 kPa gauge).”
  - d. The definition of “Low density polyethylene (LDPE)” is amended by revising the words “0.940 g/cm<sup>3</sup>” to read “0.940 g/cm<sup>3</sup> (58.7 lb/ft<sup>3</sup>).”
  - e. The definition of “Low pressure process” is amended by revising the words “300 psig” to read “300 psig (2,070 kPa gauge).”

**§ 60.562-1 [Amended]**

179. Amend § 60.562-1 as follows:
- a. In paragraph (a)(1)(iii), the second sentence is amended by revising the words “18.2 Mg/yr” to read “18.2 Mg/yr (20.1 ton/yr).”
  - b. Paragraph (b)(1)(i) is amended by revising the words “0.0036 kg TOC/Mg” to read “0.0036 kg TOC/Mg (0.0072 lb TOC/ton).”

- c. Paragraph (c)(1)(i)(A) is amended by revising the words “0.018 kg TOC/Mg” to read “0.018 kg TOC/Mg (0.036 lb TOC/ton).”
- d. Paragraph (c)(1)(ii)(A) is amended by revising the words “0.02 kg TOC/Mg” to read “0.02 kg TOC/Mg (0.04 lb TOC/ton).”
- e. Paragraph (c)(1)(ii)(C) is amended by inserting a comma after the word “weight”.
- f. Paragraph (c)(2)(i) is amended by revising the words “0.04 kg TOC/Mg” to read “0.04 kg TOC/Mg (0.08 lb TOC/ton).”
- g. Paragraph (c)(2)(ii)(A) is amended by revising the words “0.02 kg TOC/Mg” to read “0.02 kg TOC/Mg (0.04 lb TOC/ton).”
- h. Paragraph (c)(2)(ii)(C) is amended by inserting a comma after the word “weight”.

**§ 60.562-2 [Amended]**

180. In § 60.562-2, paragraph (d) is amended by revising the words “150 °C as determined by ASTM Method D86-78” to read “150 °C (302 °F) as determined by ASTM Method D86-78, 82, 90, 95, or 96.”

**§ 60.564 [Amended]**

181. Amend § 60.564 as follows:
- a. In paragraph (c)(1), the definitions of the terms “E<sub>inlet</sub>” and “E<sub>outlet</sub>” are amended by revising the words “kg TOC/hr” to read “kg TOC/hr (lb TOC/hr)” wherever they occur.

b. In Paragraphs (d)(1), (f) introductory text, and (j)(1)(iv), the equations and definitions are revised; and paragraphs (g)(2) and (g)(3) are revised.

c. Paragraph (f)(1) is amended by revising “ASTM D1946-77” to read “ASTM D1946-77 or 90 (Reapproved 1994).”

d. Paragraph (f)(3) is amended by revising “ASTM D2382-76” to read “ASTM D2382-76 or 88 or D4809-95.”

e. In paragraph (h) designate the second paragraph as (h)(1), redesignate existing paragraphs (h)(1) and (h)(2) as paragraphs (h)(2) and (h)(3) and revise the equations and definitions in newly redesignated paragraph (h)(1).

f. Paragraph (h)(3) is amended by revising the words “The rate of polymer produced, P<sub>p</sub> (kg/hr), shall be determined by dividing the weight of polymer pulled in kilograms (kg) from the process line during the performance test by the number of hours (hr) taken to perform the performance test. The polymer pulled, in kilograms, shall” to read “The rate of polymer production, P<sub>p</sub>, shall be determined by dividing the weight of polymer pulled (in kg (lb)) from the process line during the performance test by the number of hours taken to perform the performance test. The weight of polymer pulled shall.”

g. Paragraph (j)(1) introductory text is amended by revising “ASTM D2908-74” to read “ASTM D2908-74 or 91.”

h. Paragraph (j)(1)(i) is amended by revising "ASTM D3370-76" to read "ASTM D3370-76 or 96a."

The revisions read as follows:

**§ 60.564 Test methods and procedures.**

(d) \* \* \*  
(1)

$$E_{unc} = K_2 \left( \sum_{j=1}^n C_j M_j \right) Q \times 8,600$$

Where:

- $E_{unc}$  = uncontrolled annual emissions, Mg/yr (ton/yr)
- $C_j$  = concentration of sample component j of the gas stream, dry basis, ppmv
- $M_j$  = molecular weight of sample component j of the gas stream, g/g-mole (lb/lb-mole)
- $Q$  = flow rate of the gas stream, dscm/hr (dscf/hr)
- $K_2 = 4.157 \times 10^{-11}$  [(Mg)(g-mole)/[(g)(ppm)(dscm)] (metric units) =  $1.298 \times 10^{-12}$  [(ton)(lb-mole)/[(lb)(ppm)(dscf)] (English units)
- 8,600 = operating hours per year
- (f) \* \* \*

$$H_T = K_3 \left( \sum_{j=1}^n C_j J_j \right)$$

Where:

- $H_T$  = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg (68 °F and 30 in. Hg), but the standard temperature for determining the volume corresponding to one mole is 20 °C (68 °F).
- $K_3 = 1.74 \times 10^{-7}$  (1/ppm)(g-mole/scm)(MJ/kcal) (metric units), where standard temperature for (g-mole/scm) is 20°C.
- $= 4.67 \times 10^{-6}$  (1/ppm)(lb-mole/scf)(Btu/kcal) (English units) where standard temperature for (lb-mole/scf) is 68 °F.
- $C_j$  = Concentration on a wet basis of compound j in ppm.
- $J_j$  = Net heat of combustion of compound j, kcal/(g-mole) (kcal/(lb-mole)), based on combustion at 25 °C and 760 mm Hg (77 °F and 30 in. Hg).
- (g) \* \* \*

(2) If applicable, the maximum permitted velocity ( $V_{max}$ ) for steam-assisted and nonassisted flares shall be computed using the following equation:

$$\text{Log}_{10}(V_{max}) = (H_T + K_4)/K_5$$

Where:

- $V_{max}$  = Maximum permitted velocity, m/sec (ft/sec)
- $K_4 = 28.8$  (metric units), 1212 (English units)
- $K_5 = 31.7$  (metric units), 850.8 (English units)
- $H_T$  = The net heating value as determined in paragraph (f) of this section, MJ/scm (Btu/scm)
- (3) The maximum permitted velocity,  $V_{max}$ , for air-assisted flares shall be determined by the following equation:

$$V_{max} = K_6 + K_7 H_T$$

Where:

- $V_{max}$  = Maximum permitted velocity, m/sec (ft/sec).
- $K_6 = 8.706$  m/sec (metric units) = 28.56 ft/sec (English units)
- $K_7 = 0.7084$  [(m/sec)/MJ/scm] (metric units) = 0.00245 [(ft/sec)/Btu/scf] (English units)
- $H_T$  = The net heating value as determined in paragraph (f) of this section, MJ/scm (Btu/scf).
- (h) \* \* \*
- (i) \* \* \*

$$ER_{TOC} = K_5 \frac{E_{TOC}}{P_p}$$

Where:

- $ER_{TOC}$  = Emission rate of total organic compounds (minus methane and ethane), kg TOC/Mg (lb TOC/ton) product
- $E_{TOC}$  = Emission rate of total organic compounds (minus methane and ethane) in the sample, kg/hr (lb/hr)
- $P_p$  = The rate of polymer production, kg/hr (lb/hr)
- $K_5 = 1,000$  kg/Mg (metric units) = 2,000 lb/ton (English units)
- (j) \* \* \*
- (1) \* \* \*
- (iv) \* \* \*

$$CI_{95} = \frac{\sum_{i=1}^n X_i}{n} + 2 \sqrt{\frac{n \sum_{i=1}^n X_i^2 - \left( \sum_{i=1}^n X_i \right)^2}{n(n-1)}}$$

Where:

- $X_i$  = daily ethylene glycol concentration for each day used to calculate the 14-day rolling average used in test results to justify implementing the reduced testing program.
- $n$  = number of ethylene glycol concentrations.
- (k) \* \* \*

**§ 60.565 [Amended]**

182. Amend § 60.565 as follows:

a. In paragraph (a)(1)(ii), the first sentence is amended by revising the words "kilograms TOC (minus methane and ethane) per megagram of product" to read "kg TOC (minus methane and ethane) per Mg (lb TOC/ton) of product."

b. In paragraph (a)(2)(ii) by revising the word "boiler" to read "boilers."

c. In paragraph (f)(1)(i) by removing the words "are exceeded."

**§ 60.581 [Amended]**

183. Amend § 60.581 as follows:

a. In paragraph (a), the definition of the term "ink solids" is amended by revising the words "Reference Method" to read "Method."

b. In paragraph (b), the definitions of the terms " $W_{oi}$ ", " $W_{si}$ ", and " $W_{oj}$ " are amended by revising the words "Reference Method" to read "Method" wherever they occur.

**§ 60.583 [Amended]**

184. Amend § 60.583 as follows:

a. In paragraph (a) introductory text by revising the words "Reference Methods" to read "Methods."

b. In paragraphs (a)(1), (b)(4), (b)(5), (c)(2), (c)(3), and (c)(4) by revising the words "Reference Method" to read "Method" wherever they occur.

**§ 60.584 [Amended]**

185. Amend § 60.584 as follows:

a. In paragraphs (b)(1) and (c)(1) by revising the words "of ±0.75 percent of the temperature being measured or ±2.5° C" to read "of ±0.75 percent of the temperature being measured, expressed in degrees Celsius, or ±2.5° C."

b. In paragraph (b)(2) by revising the words "more than 28° C" to read "more than 28° C (50° F)."

**§ 60.593 [Amended]**

186. Amend § 60.593 as follows:

a. In paragraph (b)(2) by revising "ASTM E-260, E-168, or E-169" to read "ASTM E260-73, 91, or 96, E168-67, 77, or 92, or E169-63, 77, or 93."

b. In paragraph (d) by revising "ASTM Method D86" to read "ASTM Method D86-78, 82, 90, 95, or 96."

**§ 60.600 [Amended]**

187. In § 60.600, paragraph (a) is amended by revising the words "500 megagrams" to read "500 Mg (551 ton)."

**§ 60.602 [Amended]**

188. Amend § 60.602 as follows:

a. By removing the paragraph designation "(a)".

b. In the first sentence, by revising the words "10 kilograms (kg) VOC per megagram (Mg)" to read "10 kg/Mg (20 lb/ton)."

c. In the second sentence, by revising the words "10 kg VOC per Mg" to read "10 kg/Mg (20 lb/ton)."

d. In the third sentence by revising the words "17 kg VOC per Mg" to read "17 kg/Mg (34 lb/ton)."

#### § 60.603 [Amended]

189. Amend § 60.603 as follows:

a. In paragraph (b) introductory text, the first sentence is amended by revising the words "VOC emissions per Mg solvent feed" to read "VOC emissions per unit mass solvent feed."

b. In paragraph (b)(2) by revising the second equation and by revising the definitions following the equations.

c. Paragraph (b)(2)(i) is redesignated as paragraph (b)(3), and newly redesignated paragraph (b)(3) is amended by revising the words "13 kg per Mg solvent feed" to read "13 kg/Mg (26 lb/ton) solvent feed."

The revisions read as follows:

#### § 60.603 Performance test and compliance provisions.

\* \* \* \* \*

(b) \* \* \*

(2) \* \* \*

$$S_w = \frac{S_v S_p D}{K}$$

E = VOC Emissions, in kg/Mg (lb/ton) solvent;

S<sub>v</sub> = Measured or calculated volume of solvent feed, in liters (gallons);

S<sub>w</sub> = Weight of solvent feed, in Mg (ton);

M<sub>v</sub> = Measured volume of makeup solvent, in liters (gallons);

M<sub>w</sub> = Weight of makeup, in kg (lb);

N = Allowance for nongaseous losses, 13 kg/Mg (26 lb/ton) solvent feed;

S<sub>p</sub> = Fraction of measured volume that is actual solvent (excludes water);

D = Density of the solvent, in kg/liter (lb/gallon);

K = Conversion factor, 1,000 kg/Mg (2,000 lb/ton);

I = Allowance for solvent inventory variation or changes in the amount of solvent contained in the affected facility, in kg/Mg (lb/ton) solvent feed (may be positive or negative);

I<sub>s</sub> = Amount of solvent contained in the affected facility at the beginning of the test period, as determined by the owner or operator, in kg (lb);

I<sub>E</sub> = Amount of solvent contained in the affected facility at the close of the test period, as determined by the owner or operator, in kg (lb).

\* \* \* \* \*

#### § 60.604 [Amended]

190. In § 60.604, paragraph (b) is amended by revising the words "500

megagrams" to read "500 Mg (551 ton)" wherever they occur.

#### § 60.613 [Amended]

191. Amend § 60.613 as follows:

a. In paragraph (c) introductory text by revising the words "in the following equipment" to read "the following equipment."

b. Paragraphs (d) and (e) are redesignated as (e) and (f).

c. Paragraph (c)(3) is redesignated as paragraph (d).

#### § 60.614 [Amended]

192. Amend § 60.614 as follows:

a. In paragraph (b)(4)(ii), the definitions of the terms "E<sub>i</sub>" and "E<sub>o</sub>" are amended by revising the term "kg TOC/hr" to read "kg/hr (lb/hr)."

b. In paragraph (b)(4)(iii), the definition of the terms "Q<sub>i</sub>, Q<sub>o</sub>" is amended by revising the units "dscf/hr" to read "dscf/min."

c. In paragraph (b)(4)(iii), the definition of the term "K<sub>2</sub>" is revised.

d. Paragraphs (b)(5), (c), (d), (e), and (f) are redesignated as paragraphs (c), (d), (e), (f), and (g), respectively.

e. In newly redesignated paragraph (e)(1)(i), the second sentence is amended by revising "§ 60.614(d)(2) and (3)" to read "§ 60.614(e)(2) and (3)" and by revising the section reference "(d)(1)(ii)" to read "(e)(1)(ii)."

f. In newly redesignated paragraph (e)(1)(i), the last sentence is amended by revising the words "4 inches" to read "10 centimeters (4 inches)."

g. In newly redesignated paragraph (e)(1)(ii)(C), the second sentence is amended by revising "§ 60.614(d)(4) and (5)" to read "§ 60.614(e)(4) and (5)."

h. Newly redesignated paragraph (e)(2)(ii) is amended by revising "ASTM D1946-77" to read "D1946-77, or 90 (Reapproved 1994)."

i. In newly redesignated paragraphs (e)(4) and (e)(5), the definitions of the equation terms are revised.

j. Newly redesignated paragraphs (f)(1)(i), including Table 1, and (f)(1)(ii) are revised.

k. In newly redesignated paragraph (f)(2) the definitions of the equation terms and Table 2 are revised.

The revisions read as follows:

#### § 60.614 Test methods and procedures.

\* \* \* \* \*

(b) \* \* \*

(4) \* \* \*

(iii) \* \* \*

K<sub>2</sub> = 2.494 × 10<sup>-6</sup> (1/ppm)(g-mole/scm)(kg/g)(min/hr) (metric units), where standard temperature for (g-mole/scm) is 20°C.

= 1.557 × 10<sup>-7</sup> (1/ppm)(lb-mole/scf)(min/hr) (English units), where

standard temperature for (lb-mole/scf) is 68°F.

\* \* \* \* \*

(e) \* \* \*

(4) \* \* \*

H<sub>T</sub> = Net heating value of the sample, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25°C and 760 mm Hg (77°F and 30 in. Hg), but the standard temperature for determining the volume corresponding to one mole is 20°C (68°F).

K<sub>1</sub> = 1.74 × 10<sup>-7</sup> (1/ppm)(g-mole/scm)(MJ/kcal) (metric units), where standard temperature for (g-mole/scm) is 20°C.

= 1.03 × 10<sup>-11</sup> (1/ppm)(lb-mole/scf)(Btu/kcal) (English units) where standard temperature for (lb-mole/scf) is 68°F.

C<sub>j</sub> = Concentration on a wet basis of compound j in ppm, as measured for organics by Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946-77, 90, or 94 (incorporation by reference as specified in § 60.17 of this part) as indicated in § 60.614(e)(2).

H<sub>j</sub> = Net heat of combustion of compound j, kcal/(g-mole) [kcal/(lb-mole)], based on combustion at 25°C and 760 mm Hg (77 °F and 30 in. Hg).

(5) \* \* \*

E<sub>TOC</sub> = Measured emission rate of TOC, kg/hr (lb/hr).

K<sub>2</sub> = 2.494 × 10<sup>-6</sup> (1/ppm)(g-mole/scm)(kg/g)(min/hr) (metric units), where standard temperature for (g-mole/scm) is 20°C.

= 1.557 × 10<sup>-7</sup> (1/ppm)(lb-mole/scf)(min/hr) (English units), where standard temperature for (lb-mole/scf) is 68°F.

C<sub>j</sub> = Concentration on a wet basis of compound j in ppm, as measured by Method 18 as indicated in § 60.614(e)(2).

M<sub>j</sub> = Molecular weight of sample j, g/g-mole (lb/lb-mole).

Q<sub>s</sub> = Vent stream flow rate, scm/hr (scf/hr), at a temperature of 20°C (68°F).

\* \* \* \* \*

(f) \* \* \*

(1) \* \* \*

(i) Where for a vent stream flow rate that is greater than or equal to 14.2 scm/min (501 scf/min) at a standard temperature of 20 °C (68 °F):

TRE = TRE index value.

Q<sub>s</sub> = Vent stream flow rate, scm/min (scf/min), at a temperature of 20°C (68 °F).

H<sub>T</sub> = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is

based on combustion at 25°C and 760 mm Hg (68°F and 30 in. Hg), but the standard temperature for determining the volume corresponding to one mole is 20°C (68°F) as in the definition of  $Q_s$ .

$Y_s = Q_s$  for all vent stream categories listed in Table 1 except for Category E vent streams where  $Y_s = Q_s H_T / 3.6$ .  
 $E_{TOC}$  = Hourly emissions of TOC, kg/hr (lb/hr). a, b, c, d, e, and f are coefficients.

The set of coefficients which apply to a vent stream shall be obtained from Table 1.

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TABLE 1. AIR OXIDATION NSPS TRE COEFFICIENTS FOR VENT STREAMS CONTROLLED BY AN INCINERATOR

DESIGN CATEGORY A1. FOR HALOGENATED PROCESS VENT STREAMS, IF  $0 \leq$  NET HEATING VALUE (MJ/scm)  $\leq 3.5$  OR IF  $0 \leq$  NET HEATING VALUE (Btu/scf)  $\leq 94$ :

$Q_s$ = Vent Stream Flow rate scm/min (scf/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 18.8$ ( $501 \leq Q_s \leq 664$ )	19.18370 (42.29238)	0.27580 (0.017220)	0.75762 (0.072549)	-0.13064 (-0.00030361)	0 (0)	0.01025 (0.003803)
$18.8 < Q_s \leq 699$ ( $664 < Q_s \leq 24,700$ )	20.00563 (44.10441)	0.27580 (0.017220)	0.30387 (0.029098)	-0.13064 (-0.00030361)	0 (0)	0.01025 (0.003803)
$699 < Q_s \leq 1400$ ( $24,700 < Q_s \leq 49,000$ )	39.87022 (87.89789)	0.29973 (0.018714)	0.30387 (0.029098)	-0.13064 (-0.00030361)	0 (0)	0.01449 (0.005376)
$1400 < Q_s \leq 2100$ ( $49,000 < Q_s \leq 74,000$ )	59.73481 (131.6914)	0.31467 (0.019647)	0.30387 (0.029098)	-0.13064 (-0.00030361)	0 (0)	0.01775 (0.006585)
$2100 < Q_s \leq 2800$ ( $74,000 < Q_s \leq 99,000$ )	79.59941 (175.4849)	0.32572 (0.020337)	0.30387 (0.029098)	-0.13064 (-0.00030361)	0 (0)	0.02049 (0.007602)
$2800 < Q_s \leq 3500$ ( $99,000 < Q_s \leq 120,000$ )	99.46400 (219.2783)	0.33456 (0.020888)	0.30387 (0.029098)	-0.13064 (-0.00030361)	0 (0)	0.02291 (0.008500)

DESIGN CATEGORY A2. FOR HALOGENATED PROCESS VENT STREAMS, IF NET HEATING VALUE  $< 3.5$  (MJ/scm) OR IF NET HEATING VALUE  $< 94$  (Btu/scf):

$Q_s$ = Vent Stream Flow rate scm/min (scf/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 18.8$ ( $501 \leq Q_s \leq 664$ )	18.84466 (41.54494)	0.26742 (0.016696)	-0.20044 (-0.019194)	0 (0)	0 (0)	0.01025 (0.003803)
$18.8 < Q_s \leq 699$ ( $664 < Q_s \leq 24,700$ )	19.66658 (43.35694)	0.26742 (0.016696)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01025 (0.003803)
$699 < Q_s \leq 1400$ ( $24,700 < Q_s \leq 49,000$ )	39.19213 (86.40297)	0.29062 (0.018145)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01449 (0.005376)
$1400 < Q_s \leq 2100$ ( $49,000 < Q_s \leq 74,000$ )	58.71768 (129.4490)	0.30511 (0.019050)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01775 (0.006585)
$2100 < Q_s \leq 2800$ ( $74,000 < Q_s \leq 99,000$ )	78.24323 (172.4950)	0.31582 (0.019718)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.02049 (0.007602)
$2800 < Q_s \leq 3500$ ( $99,000 < Q_s \leq 120,000$ )	97.76879 (215.5411)	0.32439 (0.020253)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.02291 (0.008500)

DESIGN CATEGORY B. FOR NONHALOGENATED PROCESS VENT STREAMS, IF  $0 \leq$  NET HEATING VALUE (MJ/scm)  $\leq$  0.48 OR IF  $0 \leq$  NET HEATING VALUE (Btu/scf)  $\leq$  13:

$Q_s$ = Vent Stream Flow rate scm/min(sc/f/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 1340$ ( $501 \leq Q_s \leq 47,300$ )	8.54245 (18.83268)	0.10555 (0.0065901)	0.09030 (0.008647)	-0.17109 (-0.00039762)	0 (0)	0.01025 (0.003803)
$1340 < Q_s \leq 2690$ ( $47,300 < Q_s \leq 95,000$ )	16.94386 (37.35443)	0.11470 (0.0071614)	0.09030 (0.008647)	-0.17109 (-0.00039762)	0 (0)	0.01449 (0.005376)
$2690 < Q_s \leq 4040$ ( $95,000 < Q_s \leq 143,000$ )	25.34528 (55.87620)	0.12042 (0.0075185)	0.09030 (0.008647)	-0.17109 (-0.00039762)	0 (0)	0.01775 (0.00658)

DESIGN CATEGORY C. FOR NONHALOGENATED PROCESS VENT STREAMS, IF  $0.48 <$  NET HEATING VALUE (MJ/scm)  $\leq$  1.9 OR IF  $13 <$  NET HEATING VALUE (Btu/scf)  $\leq$  51:

$Q_s$ = Vent Stream Flow rate scm/min(sc/f/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 1340$ ( $501 \leq Q_s \leq 47,300$ )	9.25233 (20.39769)	0.06105 (0.003812)	0.31937 (0.030582)	-0.16181 (-0.00037605)	0 (0)	0.01025 (0.003803)
$1340 < Q_s \leq 2690$ ( $47,300 < Q_s \leq 95,000$ )	18.36363 (40.48446)	0.06635 (0.004143)	0.31937 (0.030582)	-0.16181 (-0.00037605)	0 (0)	0.01449 (0.005376)
$2690 < Q_s \leq 4040$ ( $95,000 < Q_s \leq 143,000$ )	27.47492 (60.57121)	0.06965 (0.004349)	0.31937 (0.030582)	-0.16181 (-0.00037605)	0 (0)	0.01775 (0.006585)

DESIGN CATEGORY D. FOR NONHALOGENATED PROCESS VENT STREAMS, IF  $1.9 <$  NET HEATING VALUE (MJ/scm)  $\leq$  3.6 OR IF  $51 <$  NET HEATING VALUE (Btu/scf)  $\leq$  97:

$Q_s$ = Vent Stream Flow rate scm/min(sc/f/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 1180$ ( $501 \leq Q_s \leq 41,700$ )	6.67868 (14.72382)	0.06943 (0.004335)	0.02582 (0.002472)	0 (0)	0 (0)	0.01025 (0.003803)
$1180 < Q_s \leq 2370$ ( $41,700 < Q_s \leq 83,700$ )	13.21633 (29.13672)	0.07546 (0.004711)	0.02582 (0.002472)	0 (0)	0 (0)	0.01449 (0.005376)
$2370 < Q_s \leq 3550$ ( $83,700 < Q_s \leq 125,000$ )	19.75398 (43.54962)	0.07922 (0.004946)	0.02582 (0.002472)	0 (0)	0 (0)	0.01775 (0.00658)
$Q_s$ = Vent Stream Flow rate scm/min(sc/f/min)	a	b	c	d	e	f
$14.2 \leq Y_s \leq 1180$ ( $501 \leq Y_s \leq 41,700$ )	6.67868 (14.72382)	0 (0)	0 (0)	-0.00707 (-0.0000164)	0.02220 (0.0001174)	0.01025 (0.003803)
$1180 < Y_s \leq 2370$ ( $41,700 < Y_s \leq 83,700$ )	13.21633 (29.13672)	0 (0)	0 (0)	-0.00707 (-0.0000164)	0.02412 (0.0001276)	0.01449 (0.005376)
$2370 < Y_s \leq 3550$ ( $83,700 < Y_s \leq 125,000$ )	19.75398 (43.54962)	0 (0)	0 (0)	-0.00707 (-0.0000164)	0.02533 (0.0001340)	0.01775 (0.006585)

(ii) Where for a vent stream flow rate that is less than 14.2 scm/min (501 scf/min) at a standard temperature of 20°C (68°F):

TRE = TRE index value.  
 $Q_s = 14.2$  scm/min (501 scf/min).  
 $H_T = (FLOW)(HVAL)/Q_s$ .

Where the following inputs are used:  
 FLOW = Vent stream flow rate, scm/min (scf/min), at a temperature of 20 °C (68 °F).  
 HVAL = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25 °C and 760 mm Hg (68 °F and 30 in. Hg),

but the standard temperature for determining the volume corresponding to one mole is 20 °C (68 °F) as in the definition of  $Q_s$ .

$Y_s = Q_s$  for all vent stream categories listed in Table 1 except for Category E vent streams where  $Y_s = Q_s H_T / 3.6$ .

$E_{TOC}$  = Hourly emissions of TOC, kg/hr (lb/hr).  
 a, b, c, d, e, and f are coefficients.  
 The set of coefficients that apply to a vent stream can be obtained from Table 1.  
 (2) \* \* \*  
 TRE = TRE index value.

$E_{TOC}$  = Hourly emissions of TOC, kg/hr (lb/hr).  
 $Q_s$  = Vent stream flow rate, scm/min (scf/min), at a standard temperature of 20 °C (68 °F).  
 $H_T$  = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25 °C and 760 mm Hg (68 °F and 30 in. Hg), but the standard temperature for determining the volume corresponding to one mole is 20 °C (68 °F) as in the definition of  $Q_s$ .  
 a, b, c, d, and e are coefficients.  
 \* \* \* \* \*

TABLE 2.—AIR OXIDATION PROCESSES NSPS TRE COEFFICIENTS FOR VENT STREAMS CONTROLLED BY A FLARE

	a	b	c	d	e
$H_T < 11.2$ MJ/scm ..... ( $H_T < 301$ Btu/scf) .....	2.25 (0.140)	0.288 (0.0367)	-0.193 (-0.000448)	(-0.0051) (-0.0051)	2.08 (4.59)
$H_T \geq 11.2$ MJ/scm ..... ( $H_T \geq 301$ Btu/scf) .....	0.309 (0.0193)	0.0619 (0.00788)	-0.0043 (-0.000010)	-0.0034 (-0.0034)	2.08 (4.59)

\* \* \* \* \*

**§ 60.615 [Amended]**

193. Amend § 60.615 as follows:  
 a. In paragraph (e), the first sentence is amended by revising the words “44 MW” to read “44 MW (150 million Btu/hour).”  
 b. In paragraph (g), the first sentence is amended by revising “§ 60.613(c)” to read “§ 60.613(e).”

**§ 60.620 [Amended]**

194. In § 60.620, paragraph (b), the second sentence is amended by revising the words “4,700 gallons” to read “17,791 liters (4,700 gallons).”

**§ 60.624 [Amended]**

195. In § 60.624, the third sentence is amended by revising the words “is from the outlet” to read “is the outlet.”

**§ 60.632 [Amended]**

196. Amend § 60.632 as follows:  
 a. In paragraph (f), the second sentence is amended by revising the words “percent VOC content” to read “VOC content.”  
 b. Paragraph (f) is amended by revising “ASTM Methods E169, E168, or E260” to read “ASTM E169–63, 77, or 93, E168–67, 77, or 92, or E260–73, 91, or 96.”

**§ 60.633 [Amended]**

197. Amend § 60.633 as follows:  
 a. Paragraph (b)(4)(i) is amended by revising “§ 60.482–(b)(1)” to read “§ 60.482–4(b)(1).”  
 b. Paragraph (d) is amended by revising the words “283,000 standard

cubic meters per day (scmd) (10 million standard cubic feet per day (scfd))” to read “283,200 standard cubic meters per day (10 million standard cubic feet per day).”  
 c. Paragraphs (h)(1) and (2) are amended by revising the words “at 150 °C” to read “at 150 °C (302 °F).”  
 d. Paragraphs (h)(1) and (2) are amended by revising the words “ASTM Method D86” to read “ASTM Method D86–78, 82, 90, 95, or 96.”

**§ 60.641 [Amended]**

198. Amend § 60.641 as follows:  
 a. The definition for “Total SO<sub>2</sub>” is amended by revising the words “(ppmv or kg/DSCM)” to read “(ppmv or kg/dscm (lb/dscf)).”  
 b. The definitions for “E”, “S”, and “X” are amended to read as follows:

**§ 60.641 Definitions.**

\* \* \* \* \*  
 E = The sulfur emission rate expressed as elemental sulfur, kilograms per hour (kg/hr) [pounds per hour (lb/hr)], rounded to one decimal place.  
 \* \* \* \* \*  
 S = The sulfur production rate, kilograms per hour (kg/hr) [pounds per hour (lb/hr)], rounded to one decimal place.  
 X = The sulfur feed rate from the sweetening unit (i.e., the H<sub>2</sub>S in the acid gas), expressed as sulfur, Mg/D(LT/D), rounded to one decimal place.  
 \* \* \* \* \*

**§ 60.644 [Amended]**

199. Amend § 60.644 as follows:

a. Paragraphs (b)(1), (c)(3), and (c)(4)(iii) are revised.  
 b. In paragraph (b)(2), the first sentence is amended by revising the words “dscf/day” to read “dscm/day (dscf/day).”  
 c. In paragraph (c)(2), the second sentence is amended by revising the words “kg/hr” to read “kg/hr (lb/hr).”  
 d. In the paragraph (c)(4) introductory text, the first sentence is revised.  
 e. Paragraph (c)(4)(i) is amended by deleting the words “in mg/dscm” in the third sentence and by revising the last sentence.  
 f. In paragraph (c)(4)(ii), the last sentence is revised.  
 g. In paragraph (c)(4)(iv), the fifth sentence is amended by revising the words “(0.35 dscf)” to read “(3.5 dscf).”  
 h. Paragraph (d) is amended by revising the words “(b) of (c)” to read “(b) or (c).”  
 The revisions read as follows:

**§ 60.644 Test methods and procedures.**

\* \* \* \* \*  
 (b) \* \* \*  
 (1) The average sulfur feed rate (X) shall be computed as follows:

$$X = KQ_a Y$$

Where:  
 X = average sulfur feed rate, Mg/D (LT/D).  
 $Q_a$  = average volumetric flow rate of acid gas from sweetening unit, dscm/day (dscf/day).  
 Y = average H<sub>2</sub>S concentration in acid gas feed from sweetening unit, percent by volume, expressed as a decimal.

$K = (32 \text{ kg S/kg-mole}) / ((24.04 \text{ dscm/kg-mole})(1000 \text{ kg S/ Mg})) = 1.331 \times 10^{-3} \text{ Mg/dscm}$ , for metric units  
 $= (32 \text{ lb S/lb-mole}) / ((385.36 \text{ dscf/lb-mole})(2240 \text{ lb S/long ton}))$   
 $= 3.707 \times 10^{-5} \text{ long ton/dscf}$ , for English units.

\* \* \* \* \*

(c) \* \* \*

(3) The emission rate of sulfur shall be computed for each run as follows:

$$E = C_e Q_{sd} / K_1$$

Where:

E = emission rate of sulfur per run, kg/hr.

C<sub>e</sub> = concentration of sulfur equivalent (SO<sub>2</sub> + reduced sulfur), g/dscm (lb/dscf).

Q<sub>sd</sub> = volumetric flow rate of effluent gas, dscm/hr (dscf/hr).

K<sub>1</sub> = conversion factor, 1000 g/kg (7000 gr/lb).

(4) The concentration of sulfur equivalent (C<sub>e</sub>) shall be the sum of the SO<sub>2</sub> and reduced sulfur concentrations, after being converted to sulfur equivalents. \* \* \*

(i) \* \* \* The concentration shall be multiplied by  $0.5 \times 10^{-3}$  to convert the results to sulfur equivalent.

(ii) \* \* \* The concentration in ppm reduced sulfur as sulfur shall be multiplied by  $1.333 \times 10^{-3}$  to convert the results to sulfur equivalent.

(iii) Method 16A or 15 shall be used to determine the reduced sulfur concentration from oxidation-type devices or where the oxygen content of the effluent gas is greater than 1.0 percent by volume. Eight samples of 20 minutes each shall be taken at 30-minute intervals. The arithmetic average shall be the concentration for the run. The concentration in ppm reduced sulfur as sulfur shall be multiplied by  $1.333 \times 10^{-3}$  to convert the results to sulfur equivalent.

\* \* \* \* \*

**§ 60.646 [Amended]**

200. Amend § 60.646 as follows:

a. In paragraph (b)(1), the second sentence is amended by revising the words “(kg/hr)” to read “(kg/hr (lb/hr)).”

b. In paragraph (c), the second sentence is amended by revising the words “(kg/hr)” to read “(kg/hr (lb/hr)).”

c. In paragraph (e), the first sentence is amended by revising the words “150 LT/D” to read “152 Mg/D (150 LT/D).”

d. In paragraph (e), the equation and definitions are amended by revising as follows:

**§ 60.646 Monitoring of emissions and operations.**

\* \* \* \* \*

(e) \* \* \*

$$R = \frac{K_2 S}{X}$$

Where:

R = The sulfur dioxide removal efficiency achieved during the 24-hour period, percent.

K<sub>2</sub> = Conversion factor, 0.02400 Mg/D per kg/hr (0.01071 LT/D per lb/hr).

S = The sulfur production rate during the 24-hour period, kg/hr (lb/hr).

X = The sulfur feed rate in the acid gas, Mg/D (LT/D).

\* \* \* \* \*

**§ 60.663 [Amended]**

201. Amend § 60.663 as follows:

a. In paragraph (c) introductory text by revising the words “in the following equipment” to read “the following equipment.”

b. Paragraphs (d) and (e) are redesignated as (e) and (f) and paragraph (c)(3) is redesignated as paragraph (d).

c. In newly redesignated paragraph (f) by revising the words “carbon absorber” to read “carbon adsorber.”

**§ 60.664 [Amended]**

202. Amend § 60.664 as follows:

a. In paragraph (b)(4)(ii), the definitions of the terms “E<sub>i</sub>” and “E<sub>o</sub>” are amended by revising the term “kg TOC/hr” to read “kg/hr (lb/hr).”

b. In paragraph (b)(4)(iii), the definitions of the terms “Q<sub>i</sub>” and “Q<sub>o</sub>” are amended by revising the units “dscf/hr” to read “dscf/min.”

c. In paragraph (b)(4)(iii), the definition of the term “K<sub>2</sub>” is revised.

d. Paragraphs (b)(5), (c), (d), (e), (f), and (g) are redesignated as paragraphs (c), (d), (e), (f), (g), and (h), respectively.

e. In newly redesignated paragraph (e)(1)(i), the second sentence is amended by revising “§ 60.664(d)(2) and (3)” to read “§ 60.664(e)(2) and (3).”

f. In newly redesignated paragraph (e)(1)(i), the second sentence is amended by revising “(d)(1)(ii)” to read “(e)(1)(ii).”

g. In newly redesignated paragraph (e)(1)(i), the third sentence is amended by revising the words “4 inches” to read “10 centimeters (4 inches).”

h. In newly redesignated paragraph (e)(1)(ii)(C), the second sentence is amended by revising “§ 60.664(d)(4) and (5)” to read “§ 60.664(e)(4) and (5).”

i. Newly redesignated paragraph (e)(2)(ii) is amended by revising “ASTM D1946-77” to read “ASTM D1946-77 or 90 (Reapproved 1994).”

j. In newly redesignated paragraphs (e)(4), (e)(5) and (f)(2), the equation

definitions are revised; and newly redesignated paragraphs (f)(1)(i), (f)(1)(ii) including Table 1, and Table 2 of (f)(2) are revised.

k. The last sentence in the newly redesignated paragraph (e)(4) is amended by revising “ASTM D2382-76” to read “ASTM D2382-76 or 88 or D4809-95.”

The revisions read as follows:

**§ 60.664 Test methods and procedures.**

\* \* \* \* \*

(b) \* \* \*

(4) \* \* \*

(iii) \* \* \*

K<sub>2</sub> =  $2.494 \times 10^{-6}$  (1/ppm)(g-mole/scm) (kg/g) (min/hr) (metric units), where standard temperature for (g-mole/scm) is 20 °C.

=  $1.557 \times 10^{-7}$  (1/ppm) (lb-mole/scf) (min/hr) (English units), where standard temperature for (lb-mole/scf) is 68 °F.

\* \* \* \* \*

(e) \* \* \*

(4) \* \* \*

H<sub>T</sub> = Net heating value of the sample, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25 °C and 760 mm Hg (77 °F and 30 in. Hg), but the standard temperature for determining the volume corresponding to one mole is 20 °C (68 °F).

K<sub>1</sub> =  $1.74 \times 10^{-7}$  (1/ppm) (g-mole/scm) (MJ/kcal) (metric units), where standard temperature for (g-mole/scm) is 20 °C.

=  $1.03 \times 10^{-11}$  (1/ppm) (lb-mole/scf) (Btu/kcal) (English units) where standard temperature for (lb-mole/scf) is 68 °F.

C<sub>j</sub> = Concentration on a wet basis of compound j in ppm, as measured for organics by Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946-77 or 90 (Reapproved 1994) (incorporation by reference as specified in § 60.17 of this part) as indicated in § 60.664(e)(2).

H<sub>j</sub> = Net heat of combustion of compound j, kcal/(g-mole) [kcal/(lb-mole)], based on combustion at 25 °C and 760 mm Hg (77 °F and 30 in. Hg).

\* \* \* \* \*

(5) \* \* \*

E<sub>TOC</sub> = Measured emission rate of TOC, kg/hr (lb/hr).

K<sub>2</sub> =  $2.494 \times 10^{-6}$  (1/ppm) (g-mole/scm) (kg/g) (min/hr) (metric units), where standard temperature for (g-mole/scm) is 20 °C.

=  $1.557 \times 10^{-7}$  (1/ppm) (lb-mole/scf) (min/hr) (English units), where

standard temperature for (lb-mole/scf) is 68 °F.  
 $C_j$  = Concentration on a wet basis of compound j in ppm, as measured by Method 18 as indicated in § 60.664(e)(2).  
 $M_j$  = Molecular weight of sample j, g/g-mole (lb/lb-mole).  
 $Q_s$  = Vent stream flow rate, scm/min (scf/min), at a temperature of 20 °C (68 °F).

(i) Where for a vent stream flow rate that is greater than or equal to 14.2 scm/min (501 scf/min) at a standard temperature of 20 °C (68 °F):  
 TRE = TRE index value.  
 $Q_s$  = Vent stream flow rate, scm/min (scf/min), at a temperature of 20 °C (68 °F).  
 $H_T$  = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25 °C and 760 mm Hg (68 °F and 30 in. Hg), but the standard temperature for

determining the volume corresponding to one mole is 20 °C (68 °F) as in the definition of  $Q_s$ .  
 $Y_s = Q_s$  for all vent stream categories listed in Table 1 except for Category E vent streams where  $Y_s = Q_s H_T / 3.6$ .  
 $E_{TOC}$  = Hourly emissions of TOC, kg/hr (lb/hr).  
 a, b, c, d, e, and f are coefficients.  
 The set of coefficients that apply to a vent stream can be obtained from Table 1.

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TABLE 1. DISTILLATION NSPS TRE COEFFICIENTS FOR VENT STREAMS CONTROLLED BY AN INCINERATOR

DESIGN CATEGORY A1. FOR HALOGENATED PROCESS VENT STREAMS, IF  $0 \leq$  NET HEATING VALUE (MJ/scm)  $\leq$  3.5 OR IF  $0 \leq$  NET HEATING VALUE (Btu/scf)  $\leq$  94:

$Q_s$ = Vent Stream Flow rate scm/min (scf/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 18.8$ (501 $\leq Q_s \leq$ 664)	18.84466 (41.54494)	0.26742 (0.016696)	-0.20044 (-0.019194)	0 (0)	0 (0)	0.01025 (0.003803)
$18.8 < Q_s \leq 699$ (664 $< Q_s \leq$ 24,700)	19.66658 (43.35694)	0.26742 (0.016696)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01025 (0.003803)
$699 < Q_s \leq 1400$ (24,700 $< Q_s \leq$ 49,000)	39.19213 (86.40297)	0.29062 (0.018145)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01449 (0.005376)
$1400 < Q_s \leq 2100$ (49,000 $< Q_s \leq$ 74,000)	58.71768 (129.4490)	0.30511 (0.019050)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01775 (0.006585)
$2100 < Q_s \leq 2800$ (74,000 $< Q_s \leq$ 99,000)	78.24323 (172.4950)	0.31582 (0.019718)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.02049 (0.007602)
$2800 < Q_s \leq 3500$ (99,000 $< Q_s \leq$ 120,000)	97.76879 (215.5411)	0.32439 (0.020253)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.02291 (0.008500)

DESIGN CATEGORY A2. FOR HALOGENATED PROCESS VENT STREAMS, IF NET HEATING VALUE < 3.5 (MJ/scm)  
OR IF NET HEATING VALUE < 94 (Btu/scf):

$Q_s$ = Vent Stream Flow rate scm/min(scfl/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 18.8$ (501 $\leq Q_s \leq$ 664)	18.84466 (41.54494)	0.26742 (0.016696)	-0.20044 (-0.019194)	0 (0)	0 (0)	0.01025 (0.003803)
$18.8 < Q_s \leq 699$ (664 < $Q_s \leq$ 24,700)	19.66658 (43.35694)	0.26742 (0.016696)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01025 (0.003803)
$699 < Q_s \leq 1400$ (24,700 < $Q_s \leq$ 49,000)	39.19213 (86.40297)	0.29062 (0.018145)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01449 (0.005376)
$1400 < Q_s \leq 2100$ (49,000 < $Q_s \leq$ 74,000)	58.71768 (129.4490)	0.30511 (0.019050)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.01775 (0.006585)
$2100 < Q_s \leq 2800$ (74,000 < $Q_s \leq$ 99,000)	78.24323 (172.4950)	0.31582 (0.019718)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.02049 (0.007602)
$2800 < Q_s \leq 3500$ (99,000 < $Q_s \leq$ 120,000)	97.76879 (215.5411)	0.32439 (0.020253)	-0.25332 (-0.024258)	0 (0)	0 (0)	0.02291 (0.008500)

DESIGN CATEGORY B. FOR NONHALOGENATED PROCESS VENT STREAMS, IF  $0 \leq$  NET HEATING VALUE (MJ/scm)  $\leq$  0.48  
OR IF  $0 \leq$  NET HEATING VALUE (Btu/scf)  $\leq$  13:

$Q_s$ = Vent Stream Flow rate scm/min(scfl/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 1340$ (501 $\leq Q_s \leq$ 47,300)	8.54245 (18.83268)	0.10555 (0.0065901)	0.09030 (0.008647)	-0.17109 (-0.00039762)	0 (0)	0.01025 (0.003803)
$1340 < Q_s \leq 2690$ (47,300 < $Q_s \leq$ 95,000)	16.94386 (37.35443)	0.11470 (0.0071614)	0.09030 (0.008647)	-0.17109 (-0.00039762)	0 (0)	0.01449 (0.005376)
$2690 < Q_s \leq 4040$ (95,000 < $Q_s \leq$ 143,000)	25.34528 (55.87620)	0.12042 (0.0075185)	0.09030 (0.008647)	-0.17109 (-0.00039762)	0 (0)	0.01775 (0.006585)

DESIGN CATEGORY C. FOR NONHALOGENATED PROCESS VENT STREAMS, IF  $0.48 < \text{NET HEATING VALUE (MJ/scm)} \leq 1.9$   
OR IF  $13 < \text{NET HEATING VALUE (Btu/scf)} \leq 51$ :

$Q_s$ = Vent Stream Flow rate scm/min(scf/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 1340$ ( $501 \leq Q_s \leq 47,300$ )	9.25233 (20.39769)	0.06105 (0.003812)	0.31937 (0.030582)	-0.16181 (-0.00037605)	0 (0)	0.01025 (0.003803)
$1340 < Q_s \leq 2690$ ( $47,300 < Q_s \leq 95,000$ )	18.36363 (40.48446)	0.06635 (0.004143)	0.31937 (0.030582)	-0.16181 (-0.00037605)	0 (0)	0.01449 (0.005376)
$2690 < Q_s \leq 4040$ ( $95,000 < Q_s \leq 143,000$ )	27.47492 (60.57121)	0.06965 (0.004349)	0.31937 (0.030582)	-0.16181 (-0.00037605)	0 (0)	0.01775 (0.006585)

DESIGN CATEGORY D. FOR NONHALOGENATED PROCESS VENT STREAMS, IF  $1.9 < \text{NET HEATING VALUE (MJ/scm)} \leq 3.6$   
OR IF  $51 < \text{NET HEATING VALUE (Btu/scf)} \leq 97$ :

$Q_s$ = Vent Stream Flow rate scm/min(scf/min)	a	b	c	d	e	f
$14.2 \leq Q_s \leq 1180$ ( $501 \leq Q_s \leq 41,700$ )	6.67868 (14.72382)	0.06943 (0.004335)	0.02582 (0.002472)	0 (0)	0 (0)	0.01025 (0.003803)
$1180 < Q_s \leq 2370$ ( $41,700 < Q_s \leq 83,700$ )	13.21633 (29.13672)	0.07546 (0.004711)	0.02582 (0.002472)	0 (0)	0 (0)	0.01449 (0.005376)
$2370 < Q_s \leq 3550$ ( $83,700 < Q_s \leq 125,000$ )	19.75398 (43.54962)	0.07922 (0.004946)	0.02582 (0.002472)	0 (0)	0 (0)	0.01775 (0.006585)

DESIGN CATEGORY E. FOR NONHALOGENATED PROCESS VENT STREAMS, IF NET HEATING VALUE  $> 3.6$  MJ/scm  
OR IF NET HEATING VALUE  $> 97$  (Btu/scf):

$Q_s$ = Vent Stream Flow rate scm/min(scf/min)	a	b	c	d	e	f
$14.2 \leq Y_s \leq 1180$ ( $501 \leq Y_s \leq 41,700$ )	6.67868 (14.72382)	0 (0)	0 (0)	-0.00707 (-0.0000164)	0.02220 (0.0001174)	0.01025 (0.003803)
$1180 < Y_s \leq 2370$ ( $41,700 < Y_s \leq 83,700$ )	13.21633 (29.13672)	0 (0)	0 (0)	-0.00707 (-0.0000164)	0.02412 (0.0001276)	0.01449 (0.005376)
$2370 < Y_s \leq 3550$ ( $83,700 < Y_s \leq 125,000$ )	19.75398 (43.54962)	0 (0)	0 (0)	-0.00707 (-0.0000164)	0.02533 (0.0001340)	0.01775 (0.006585)

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(ii) Where for a vent stream flow rate that is less than 14.2 scm/min (501 scf/min) at a standard temperature of 20 °C (68 °F):

TRE = TRE index value.

$Q_s$  = 14.2 scm/min (501 scf/min).

$H_T$  = (FLOW) (HVAL)/ $Q_s$ .

Where the following inputs are used:

FLOW = Vent stream flow rate, scm/min (scf/min), at a temperature of 20 °C (68 °F).

HVAL = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25 °C and 760 mm Hg (68 °F and 30 in. Hg), but the standard temperature for

determining the volume corresponding to one mole is 20 °C (68 °F) as in the definition of  $Q_s$ .

$Y_s = Q_s$  for all vent stream categories listed in Table 1 except for Category E vent streams where  $Y_s = Q_s H_T / 3.6$ .

$E_{\text{TOC}}$  = Hourly emissions of TOC, kg/hr (lb/hr).

a, b, c, d, e, and f are coefficients

The set of coefficients that apply to a vent stream can be obtained from Table 1.  
 (2) \* \* \*  
 TRE = TRE index value.  
 E<sub>TOC</sub> = Hourly emissions of TOC, kg/hr (lb/hr).

Q<sub>s</sub> = Vent stream flow rate, scm/min (scf/min), at a standard temperature of 20 °C (68 °F).  
 H<sub>T</sub> = Vent stream net heating value, MJ/scm (Btu/scf), where the net enthalpy per mole of vent stream is based on combustion at 25 °C and

760 mm Hg (68 °F and 30 in. Hg), but the standard temperature for determining the volume corresponding to one mole is 20 °C (68 °F) as in the definition of Q<sub>s</sub>.  
 a, b, c, d, and e are coefficients.  
 \* \* \* \* \*

TABLE 2.—DISTILLATION NSPS TRE COEFFICIENTS FOR VENT STREAMS CONTROLLED BY A FLARE

	a	b	c	d	e
H <sub>T</sub> < 11.2 MJ/scm ..... (H <sub>T</sub> < 301 Btu/scf) .....	2.25 (0.140)	0.288 (0.0367)	-0.193 (-0.000448)	-0.0051 (-0.0051)	2.08 (4.59)
H <sub>T</sub> ≥ 11.2 MJ/scm ..... (H <sub>T</sub> ≥ 301 Btu/scf) .....	0.309 (0.0193)	0.0619 (0.00788)	-0.0043 (-0.0000010)	-0.0034 (-0.0034)	2.08 (4.59)

\* \* \* \* \*

**§ 60.665 [Amended]**

203. Amend § 60.665 as follows:  
 a. Paragraph (b)(4)(i) is amended by revising the word “adsorbing” to read “absorbing.”  
 b. In paragraph (e), the first sentence is amended by revising the words “44 MW” to read “44 MW (150 million Btu/hour).”  
 c. In paragraph (g), the first sentence is amended by revising the section reference “§ 60.663(d)” to read “§ 60.663(e).”  
 d. Paragraph (i) is amended by revising the words “0.008 m<sup>3</sup>/min” to read “0.008 scm/min (0.3 scf/min).”  
 e. In paragraph (l)(6), the fourth sentence is amended by revising the words “vent stream flow rate, heating value, E<sub>TOC</sub>” to read “vent stream flow rate, heating value, and E<sub>TOC</sub>.”  
 f. Paragraph (n) is amended by revising the word “capacity” to read “capacity.”

**§ 60.672 [Amended]**

204. In § 60.672, paragraph (a)(1) is amended by revising the words “0.05 g/dscm” to read “0.05 g/dscm (0.022 gr/dscf).”

**§ 60.676 [Amended]**

205. In § 60.676, paragraphs (a)(1)(i), (a)(4)(i), and (a)(4)(ii) are amended by revising the word “tons” to read “megagrams or tons” wherever it occurs.

**§ 60.685 [Amended]**

206. Amend § 60.685 as follows:  
 a. In paragraph (c)(1), the equation definitions are revised.  
 b. In paragraph (c)(2) by revising the words “2.55 dscm (90 dscf)” to read “2.55 dscm (90.1 dscf).”  
 c. In paragraph (c)(3)(i) by revising the words “ASTM Standard Test Method D2584-68 (Reapproved 1979)” to read

“ASTM D2584-68 (Reapproved 1985) or 94.”

The revisions read as follows:

**§ 60.685 Test methods and procedures.**

\* \* \* \* \*  
 (c) \* \* \*  
 (1) \* \* \*

E = emission rate of particulate matter, kg/Mg (lb/ton).  
 C<sub>t</sub> = concentration of particulate matter, g/dscm (gr/dscf).  
 Q<sub>sd</sub> = volumetric flow rate of effluent gas, dscm/hr (dscf/hr).  
 P<sub>avg</sub> = average glass pull rate, Mg/hr (ton/hr).  
 K = 1,000 g/kg (7,000 gr/lb).  
 \* \* \* \* \*

**§ 60.692-3 [Amended]**

207. In § 60.692-3, paragraph (b) is amended by revising the words “16 liters per second (250 gpm)” to read “16 liters per second (250 gallons per minute (gpm)).”

**§ 60.695 [Amended]**

208. In § 60.695, paragraphs (a)(1) and (2) are amended by revising the words “an accuracy of 1 percent of the temperature being measured in °C or ±0.5 °C (±1.0 °F), whichever is greater” to read “an accuracy of ±1 percent of the temperature being measured, expressed in °C, or ±0.5 °C (0.9 °F), whichever is greater.”

**§ 60.697 [Amended]**

209. Amend § 60.697 by adding paragraph (k) as follows:

**§ 60.697 Recordkeeping requirements.**

\* \* \* \* \*

(k) For oil-water separators subject to § 60.693-2, the location, date, and corrective action shall be recorded for inspections required by §§ 60.693-2(a)(1)(iii)(A) and (B), and shall be maintained for the time period specified in paragraphs (k)(1) and (2) of this section.

(1) For inspections required by § 60.693-2(a)(1)(iii)(A), ten years after the information is recorded.

(2) For inspections required by § 60.693-2(a)(1)(iii)(B), two years after the information is recorded.

**§ 60.704 [Amended]**

210. Amend § 60.704 as follows:  
 a. Paragraph (d)(2)(ii) is amended by revising “ASTM D1946-77” to read “ASTM D1946-77 or 90 (Reapproved 1994).”  
 b. The definition of “C<sub>j</sub>” in paragraph (d)(4) is amended by revising “ASTM D1946-77” to read “ASTM D1946-77 or 90 (Reapproved 1994).”  
 c. The definition of “H<sub>j</sub>” in paragraph (d)(4) is amended by revising “ASTM D2382-76” to read “ASTM D2382-76 or 88 or D4809-95.”

**§ 60.723 [Amended]**

211. In § 60.723, paragraph (b)(1) is amended by revising the words “Reference Method” to read “Method” wherever they occur.

**§ 60.724 [Amended]**

212. In § 60.724, paragraph (a)(2) is amended by revising the words “Reference Method” to read “Method.”

**§ 60.732 [Amended]**

213. In § 60.732, paragraph (a) is amended by revising the words “0.057 g/dscm for dryers” to read “0.057 g/dscm (0.025 gr/dscf) for dryers.”

**§ 60.753 [Amended]**

214. In § 60.753, paragraph (c)(2) introductory text is amended by revising the words “Method 3A” to read “Method 3A or 3C.”

**§ 60.754 [Amended]**

215. Amend § 60.754 as follows:  
 a. In paragraphs (a)(1)(i) and (a)(1)(ii), the equations are amended by revising “C<sub>NMOC</sub>” to read “C<sub>NMOC</sub>.”

b. In paragraph (a)(3), the introductory text is revised; and in paragraph (d), the first sentence is removed and three sentences are added in its place to read as follows:

**§ 60.754 Test methods and procedures.**

(a) \* \* \*

(3) *Tier 2.* The landfill owner or operator shall determine the NMOC concentration using the following sampling procedure. The landfill owner or operator shall install at least two sample probes per hectare of landfill surface that has retained waste for at least 2 years. If the landfill is larger than 25 hectares in area, only 50 samples are required. The sample probes should be located to avoid known areas of nondegradable solid waste. The owner or operator shall collect and analyze one sample of landfill gas from each probe to determine the NMOC concentration using Method 25 or 25C of Appendix A of this part. Method 18 of Appendix A of this part may be used to analyze the samples collected by the Method 25 or 25C sampling procedure. Taking composite samples from different probes into a single cylinder is allowed; however, equal sample volumes must be taken from each probe. For each composite, the sampling rate, collection times, beginning and ending cylinder vacuums, or alternative volume measurements must be recorded to verify that composite volumes are equal. Composite sample volumes should not be less than one liter unless evidence can be provided to substantiate the accuracy of smaller volumes. Terminate compositing before the cylinder approaches ambient pressure where measurement accuracy diminishes. If using Method 18, the owner or operator must identify all compounds in the sample and, as a minimum, test for those compounds published in the most recent Compilation of Air Pollutant Emission Factors (AP-42), minus carbon monoxide, hydrogen sulfide, and mercury. As a minimum, the instrument must be calibrated for each of the compounds on the list. Convert the concentration of each Method 18 compound to  $C_{NMOC}$  as hexane by multiplying by the ratio of its carbon atoms divided by six. If more than the required number of samples are taken, all samples must be used in the analysis. The landfill owner or operator must divide the NMOC concentration from Method 25 or 25C of Appendix A of this part by six to convert from  $C_{NMOC}$  as carbon to  $C_{NMOC}$  as hexane. If the landfill has an active or passive gas removal system in place, Method 25 or 25C samples may be collected from

provided the removal system can be shown to provide sampling as representative as the two sampling probe per hectare requirement. For active collection systems, samples may be collected from the common header pipe before the gas moving or condensate removal equipment. For these systems, a minimum of three samples must be collected from the header pipe.

\* \* \* \* \*

(d) For the performance test required in § 60.752(b)(2)(iii)(B), Method 25, 25C, or Method 18 of Appendix A of this part must be used to determine compliance with the 98 weight-percent efficiency or the 20 ppmv outlet concentration level, unless another method to demonstrate compliance has been approved by the Administrator as provided by § 60.752(b)(2)(i)(B). Method 3 or 3A shall be used to determine oxygen for correcting the NMOC concentration as hexane to 3 percent. In cases where the outlet concentration is less than 50 ppm NMOC as carbon (8 ppm NMOC as hexane), Method 25A should be used in place of Method 25. \* \* \*

\* \* \* \* \*

216. In Part 60, Appendix A is amended by revising Methods 1, 1A, 2, 2A, 2B, 2C, 2D, 2E, 3, 3B, 4, 5, 5A, 5B, 5D, 5E, 5F, 5G, 5H, 6, 6A, 6B, 7, 7A, 7B, 7C, 7D, 8, 10A, 10B, 11, 12, 13A, 13B, 14, 15, 15A, 16, 16A, 16B, 17, 18, 19, 21, 22, 24, 24A, 25, 25A, 25B, 25C, 25D, 25E, 26, 26A, 27, 28, 28A, and 29 to read as follows:

**METHOD 1—Sample and Velocity Traverses for Stationary Sources**

**Note:** This method does not include all of the specifications (e.g., equipment and supplies) and procedures (e.g., sampling) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test method: Method 2.

**1.0 Scope and Application**

1.1 Measured Parameters. The purpose of the method is to provide guidance for the selection of sampling ports and traverse points at which sampling for air pollutants will be performed pursuant to regulations set forth in this part. Two procedures are presented: a simplified procedure, and an alternative procedure (see Section 11.5). The magnitude of cyclonic flow of effluent gas in a stack or duct is the only parameter quantitatively measured in the simplified procedure.

1.2 Applicability. This method is applicable to gas streams flowing in

ducts, stacks, and flues. This method cannot be used when: (1) the flow is cyclonic or swirling; or (2) a stack is smaller than 0.30 meter (12 in.) in diameter, or 0.071 m<sup>2</sup> (113 in.<sup>2</sup>) in cross-sectional area. The simplified procedure cannot be used when the measurement site is less than two stack or duct diameters downstream or less than a half diameter upstream from a flow disturbance.

**1.3 Data Quality Objectives.**

Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

**Note:** The requirements of this method must be considered before construction of a new facility from which emissions are to be measured; failure to do so may require subsequent alterations to the stack or deviation from the standard procedure. Cases involving variants are subject to approval by the Administrator.

**2.0 Summary of Method**

2.1 This method is designed to aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source. A measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. Traverse points are then located within each of these equal areas.

**3.0 Definitions [Reserved]**

**4.0 Interferences [Reserved]**

**5.0 Safety**

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

**6.0 Equipment and Supplies.**

6.1 Apparatus. The apparatus described below is required only when utilizing the alternative site selection procedure described in Section 11.5 of this method.

6.1.1 Directional Probe. Any directional probe, such as United Sensor Type DA Three-Dimensional Directional Probe, capable of measuring both the pitch and yaw angles of gas flows is acceptable. Before using the probe, assign an identification number to the directional probe, and permanently mark or engrave the number on the body of the probe. The pressure holes of directional probes are susceptible to

plugging when used in particulate-laden gas streams. Therefore, a procedure for cleaning the pressure holes by "back-purging" with pressurized air is required.

6.1.2 Differential Pressure Gauges. Inclined manometers, U-tube manometers, or other differential pressure gauges (e.g., magnehelic gauges) that meet the specifications described in Method 2, Section 6.2.

**Note:** If the differential pressure gauge produces both negative and positive readings, then both negative and positive pressure readings shall be calibrated at a minimum of three points as specified in Method 2, Section 6.2.

#### 7.0 Reagents and Standards [Reserved]

#### 8.0 Sample Collection, Preservation, Storage, and Transport [Reserved]

#### 9.0 Quality Control [Reserved]

#### 10.0 Calibration and Standardization [Reserved]

#### 11.0 Procedure

##### 11.1 Selection of Measurement Site.

11.1.1 Sampling and/or velocity measurements are performed at a site located at least eight stack or duct diameters downstream and two diameters upstream from any flow disturbance such as a bend, expansion, or contraction in the stack, or from a visible flame. If necessary, an alternative location may be selected, at a position at least two stack or duct diameters downstream and a half diameter upstream from any flow disturbance.

11.1.2 An alternative procedure is available for determining the acceptability of a measurement location not meeting the criteria above. This procedure described in Section 11.5 allows for the determination of gas flow angles at the sampling points and comparison of the measured results with acceptability criteria.

##### 11.2 Determining the Number of Traverse Points.

###### 11.2.1 Particulate Traverses.

11.2.1.1 When the eight- and two-diameter criterion can be met, the minimum number of traverse points shall be: (1) twelve, for circular or rectangular stacks with diameters (or equivalent diameters) greater than 0.61 meter (24 in.); (2) eight, for circular stacks with diameters between 0.30 and 0.61 meter (12 and 24 in.); and (3) nine, for rectangular stacks with equivalent diameters between 0.30 and 0.61 meter (12 and 24 in.).

11.2.1.2 When the eight- and two-diameter criterion cannot be met, the minimum number of traverse points is determined from Figure 1-1. Before referring to the figure, however,

determine the distances from the measurement site to the nearest upstream and downstream disturbances, and divide each distance by the stack diameter or equivalent diameter, to determine the distance in terms of the number of duct diameters. Then, determine from Figure 1-1 the minimum number of traverse points that corresponds: (1) to the number of duct diameters upstream; and (2) to the number of diameters downstream. Select the higher of the two minimum numbers of traverse points, or a greater value, so that for circular stacks the number is a multiple of 4, and for rectangular stacks, the number is one of those shown in Table 1-1.

11.2.2 Velocity (Non-Particulate) Traverses. When velocity or volumetric flow rate is to be determined (but not particulate matter), the same procedure as that used for particulate traverses (Section 11.2.1) is followed, except that Figure 1-2 may be used instead of Figure 1-1.

##### 11.3 Cross-Sectional Layout and Location of Traverse Points.

###### 11.3.1 Circular Stacks.

11.3.1.1 Locate the traverse points on two perpendicular diameters according to Table 1-2 and the example shown in Figure 1-3. Any equation (see examples in References 2 and 3 in Section 16.0) that gives the same values as those in Table 1-2 may be used in lieu of Table 1-2.

11.3.1.2 For particulate traverses, one of the diameters must coincide with the plane containing the greatest expected concentration variation (e.g., after bends); one diameter shall be congruent to the direction of the bend. This requirement becomes less critical as the distance from the disturbance increases; therefore, other diameter locations may be used, subject to the approval of the Administrator.

11.3.1.3 In addition, for elliptical stacks having unequal perpendicular diameters, separate traverse points shall be calculated and located along each diameter. To determine the cross-sectional area of the elliptical stack, use the following equation:

$$\text{Square Area} = D_1 \times D_2 \times 0.7854$$

Where:  $D_1$  = Stack diameter 1

$D_2$  = Stack diameter 2

11.3.1.4 In addition, for stacks having diameters greater than 0.61 m (24 in.), no traverse points shall be within 2.5 centimeters (1.00 in.) of the stack walls; and for stack diameters equal to or less than 0.61 m (24 in.), no traverse points shall be located within 1.3 cm (0.50 in.) of the stack walls. To meet these criteria, observe the procedures given below.

##### 11.3.2 Stacks With Diameters Greater Than 0.61 m (24 in.).

11.3.2.1 When any of the traverse points as located in Section 11.3.1 fall within 2.5 cm (1.0 in.) of the stack walls, relocate them away from the stack walls to: (1) a distance of 2.5 cm (1.0 in.); or (2) a distance equal to the nozzle inside diameter, whichever is larger. These relocated traverse points (on each end of a diameter) shall be the "adjusted" traverse points.

11.3.2.2 Whenever two successive traverse points are combined to form a single adjusted traverse point, treat the adjusted point as two separate traverse points, both in the sampling and/or velocity measurement procedure, and in recording of the data.

11.3.3 Stacks With Diameters Equal To or Less Than 0.61 m (24 in.). Follow the procedure in Section 11.3.1.1, noting only that any "adjusted" points should be relocated away from the stack walls to: (1) a distance of 1.3 cm (0.50 in.); or (2) a distance equal to the nozzle inside diameter, whichever is larger.

###### 11.3.4 Rectangular Stacks.

11.3.4.1 Determine the number of traverse points as explained in Sections 11.1 and 11.2 of this method. From Table 1-1, determine the grid configuration. Divide the stack cross-section into as many equal rectangular elemental areas as traverse points, and then locate a traverse point at the centroid of each equal area according to the example in Figure 1-4.

11.3.4.2 To use more than the minimum number of traverse points, expand the "minimum number of traverse points" matrix (see Table 1-1) by adding the extra traverse points along one or the other or both legs of the matrix; the final matrix need not be balanced. For example, if a  $4 \times 3$  "minimum number of points" matrix were expanded to 36 points, the final matrix could be  $9 \times 4$  or  $12 \times 3$ , and would not necessarily have to be  $6 \times 6$ . After constructing the final matrix, divide the stack cross-section into as many equal rectangular, elemental areas as traverse points, and locate a traverse point at the centroid of each equal area.

11.3.4.3 The situation of traverse points being too close to the stack walls is not expected to arise with rectangular stacks. If this problem should ever arise, the Administrator must be contacted for resolution of the matter.

##### 11.4 Verification of Absence of Cyclonic Flow.

11.4.1 In most stationary sources, the direction of stack gas flow is essentially parallel to the stack walls. However, cyclonic flow may exist (1) after such devices as cyclones and inertial demisters following venturi

scrubbers, or (2) in stacks having tangential inlets or other duct configurations which tend to induce swirling; in these instances, the presence or absence of cyclonic flow at the sampling location must be determined. The following techniques are acceptable for this determination.

11.4.2 Level and zero the manometer. Connect a Type S pitot tube to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "0° reference." Note the differential pressure ( $\Delta p$ ) reading at each traverse point. If a null (zero) pitot reading is obtained at 0° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at 0° reference, rotate the pitot tube (up to  $\pm 90^\circ$  yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle ( $\alpha$ ) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of  $\alpha$ ; assign  $\alpha$  values of 0° to those points for which no rotation was required, and include these in the overall average. If the average value of  $\alpha$  is greater than 20°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

11.5 The alternative site selection procedure may be used to determine the rotation angles in lieu of the procedure outlined in Section 11.4.

11.5.1 Alternative Measurement Site Selection Procedure. This alternative applies to sources where measurement locations are less than 2 equivalent or duct diameters downstream or less than one-half duct diameter upstream from a flow disturbance. The alternative should be limited to ducts larger than 24 in. in diameter where blockage and wall effects are minimal. A directional flow-sensing probe is used to measure pitch and yaw angles of the gas flow at 40 or more traverse points; the resultant angle is calculated and compared with acceptable criteria for mean and standard deviation.

**Note:** Both the pitch and yaw angles are measured from a line passing through the traverse point and parallel to the stack axis. The pitch angle is the angle of the gas flow component in the plane that INCLUDES the traverse line and is parallel to the stack axis. The yaw angle is the angle of the gas flow component in the plane PERPENDICULAR to

the traverse line at the traverse point and is measured from the line passing through the traverse point and parallel to the stack axis.

11.5.2 Traverse Points. Use a minimum of 40 traverse points for circular ducts and 42 points for rectangular ducts for the gas flow angle determinations. Follow the procedure outlined in Section 11.3 and Table 1-1 or 1-2 for the location and layout of the traverse points. If the measurement location is determined to be acceptable according to the criteria in this alternative procedure, use the same traverse point number and locations for sampling and velocity measurements.

11.5.3 Measurement Procedure.

11.5.3.1 Prepare the directional probe and differential pressure gauges as recommended by the manufacturer. Capillary tubing or surge tanks may be used to dampen pressure fluctuations. It is recommended, but not required, that a pretest leak check be conducted. To perform a leak check, pressurize or use suction on the impact opening until a reading of at least 7.6 cm (3 in.) H<sub>2</sub>O registers on the differential pressure gauge, then plug the impact opening. The pressure of a leak-free system will remain stable for at least 15 seconds.

11.5.3.2 Level and zero the manometers. Since the manometer level and zero may drift because of vibrations and temperature changes, periodically check the level and zero during the traverse.

11.5.3.3 Position the probe at the appropriate locations in the gas stream, and rotate until zero deflection is indicated for the yaw angle pressure gauge. Determine and record the yaw angle. Record the pressure gauge readings for the pitch angle, and determine the pitch angle from the calibration curve. Repeat this procedure for each traverse point. Complete a "back-purge" of the pressure lines and the impact openings prior to measurements of each traverse point.

11.5.3.4 A post-test check as described in Section 11.5.3.1 is required. If the criteria for a leak-free system are not met, repair the equipment, and repeat the flow angle measurements.

11.5.4 Calibration. Use a flow system as described in Sections 10.1.2.1 and 10.1.2.2 of Method 2. In addition, the flow system shall have the capacity to generate two test-section velocities: one between 365 and 730 m/min (1,200 and 2,400 ft/min) and one between 730 and 1,100 m/min (2,400 and 3,600 ft/min).

11.5.4.1 Cut two entry ports in the test section. The axes through the entry ports shall be perpendicular to each other and intersect in the centroid of the

test section. The ports should be elongated slots parallel to the axis of the test section and of sufficient length to allow measurement of pitch angles while maintaining the pitot head position at the test-section centroid. To facilitate alignment of the directional probe during calibration, the test section should be constructed of plexiglass or some other transparent material. All calibration measurements should be made at the same point in the test section, preferably at the centroid of the test section.

11.5.4.2 To ensure that the gas flow is parallel to the central axis of the test section, follow the procedure outlined in Section 11.4 for cyclonic flow determination to measure the gas flow angles at the centroid of the test section from two test ports located 90° apart. The gas flow angle measured in each port must be  $\pm 2^\circ$  of 0°. Straightening vanes should be installed, if necessary, to meet this criterion.

11.5.4.3 Pitch Angle Calibration. Perform a calibration traverse according to the manufacturer's recommended protocol in 5° increments for angles from -60° to +60° at one velocity in each of the two ranges specified above. Average the pressure ratio values obtained for each angle in the two flow ranges, and plot a calibration curve with the average values of the pressure ratio (or other suitable measurement factor as recommended by the manufacturer) versus the pitch angle. Draw a smooth line through the data points. Plot also the data values for each traverse point. Determine the differences between the measured data values and the angle from the calibration curve at the same pressure ratio. The difference at each comparison must be within 2° for angles between 0° and 40° and within 3° for angles between 40° and 60°.

11.5.4.4 Yaw Angle Calibration. Mark the three-dimensional probe to allow the determination of the yaw position of the probe. This is usually a line extending the length of the probe and aligned with the impact opening. To determine the accuracy of measurements of the yaw angle, only the zero or null position need be calibrated as follows: Place the directional probe in the test section, and rotate the probe until the zero position is found. With a protractor or other angle measuring device, measure the angle indicated by the yaw angle indicator on the three-dimensional probe. This should be within 2° of 0°. Repeat this measurement for any other points along the length of the pitot where yaw angle measurements could be read in order to account for

variations in the pitot markings used to indicate pitot head positions.

12.0 Data Analysis and Calculations

12.1 Nomenclature.

L = length.

n = total number of traverse points.

P<sub>i</sub> = pitch angle at traverse point i, degree.

R<sub>avg</sub> = average resultant angle, degree.

R<sub>i</sub> = resultant angle at traverse point i, degree.

S<sub>d</sub> = standard deviation, degree.

W = width.

Y<sub>i</sub> = yaw angle at traverse point i, degree.

12.2 For a rectangular cross section, an equivalent diameter (D<sub>e</sub>) shall be calculated using the following equation, to determine the upstream and downstream distances:

$$D_e = \frac{2(L)(W)}{L + W} \quad \text{Eq. 1-1}$$

12.3 If use of the alternative site selection procedure (Section 11.5 of this

method) is required, perform the following calculations using the equations below: the resultant angle at each traverse point, the average resultant angle, and the standard deviation. Complete the calculations retaining at least one extra significant figure beyond that of the acquired data. Round the values after the final calculations.

12.3.1 Calculate the resultant angle at each traverse point:

$$R_i = \text{arc cosine} \left[ (\text{cosine } Y_i)(\text{cosine } P_i) \right] \quad \text{Eq. 1-2}$$

12.3.2 Calculate the average resultant for the measurements:

$$R_{\text{avg}} = \sum R_i / n \quad \text{Eq. 1-3}$$

12.3.3 Calculate the standard deviations:

$$S_d = \sqrt{\frac{\sum_{i=1}^n (R_i - R_{\text{avg}})^2}{(n - 1)}} \quad \text{Eq. 1-4}$$

12.3.4 Acceptability Criteria. The measurement location is acceptable if R<sub>avg</sub> ≤ 20° and S<sub>d</sub> ≤ 10°.

13.0 Method Performance [Reserved]

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 References

1. Determining Dust Concentration in a Gas Stream, ASME Performance Test Code No. 27. New York. 1957.

2. DeVorkin, Howard, et al. Air Pollution Source Testing Manual. Air Pollution Control District. Los Angeles, CA. November 1963.

3. Methods for Determining of Velocity, Volume, Dust and Mist Content of Gases.

Western Precipitation Division of Joy Manufacturing Co. Los Angeles, CA. Bulletin WP-50. 1968.

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8. Brooks, E.F., and R.L. Williams. Flow and Gas Sampling Manual. U.S. Environmental Protection Agency. Research Triangle Park, NC. Publication No. EPA-600/2-76-203. July 1976. 93 pp.

9. Entropy Environmentalists, Inc. Traverse Point Study. EPA Contract No. 68-02-3172. June 1977. 19 pp.

10. Brown, J. and K. Yu. Test Report: Particulate Sampling Strategy in Circular Ducts. Emission Measurement Branch. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. July 31, 1980. 12 pp.

11. Hawksley, P.G.W., S. Badzioch, and J.H. Blackett. Measurement of Solids in Flue Gases. Leatherhead, England, The British Coal Utilisation Research Association. 1961. pp. 129-133.

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13. Smith, W.S. and D.J. Grove. A Proposed Extension of EPA Method 1 Criteria. Pollution Engineering. XV (8):36-37. August 1983.

14. Gerhart, P.M. and M.J. Dorsey. Investigation of Field Test Procedures for Large Fans. University of Akron. Akron, OH. (EPRI Contract CS-1651). Final Report (RP-1649-5). December 1980.

15. Smith, W.S. and D.J. Grove. A New Look at Isokinetic Sampling—Theory and Applications. Source Evaluation Society Newsletter. VIII (3):19-24. August 1983.

17.0 Tables, Diagrams, Flowcharts, and Validation Data

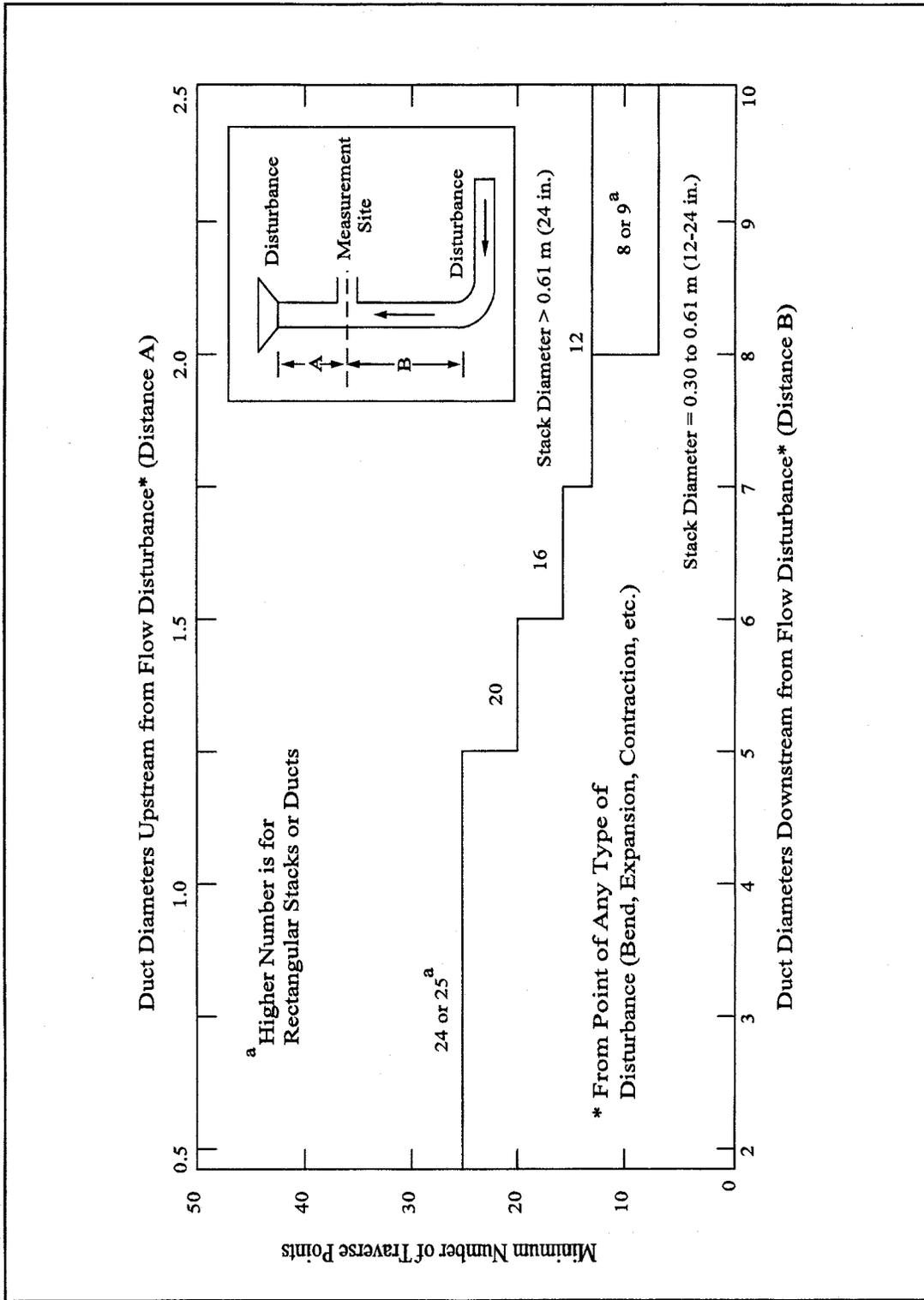


Figure 1-1. Minimum number of traverse points for particulate traverses.

TABLE 1-1 CROSS-SECTION LAYOUT FOR RECTANGULAR STACKS

Number of transverse points layout	Matrix
9 .....	3×3
12 .....	4×3
16 .....	4×4
20 .....	5×4
25 .....	5×5
30 .....	6×5
36 .....	6×6
42 .....	7×6
49 .....	7×7

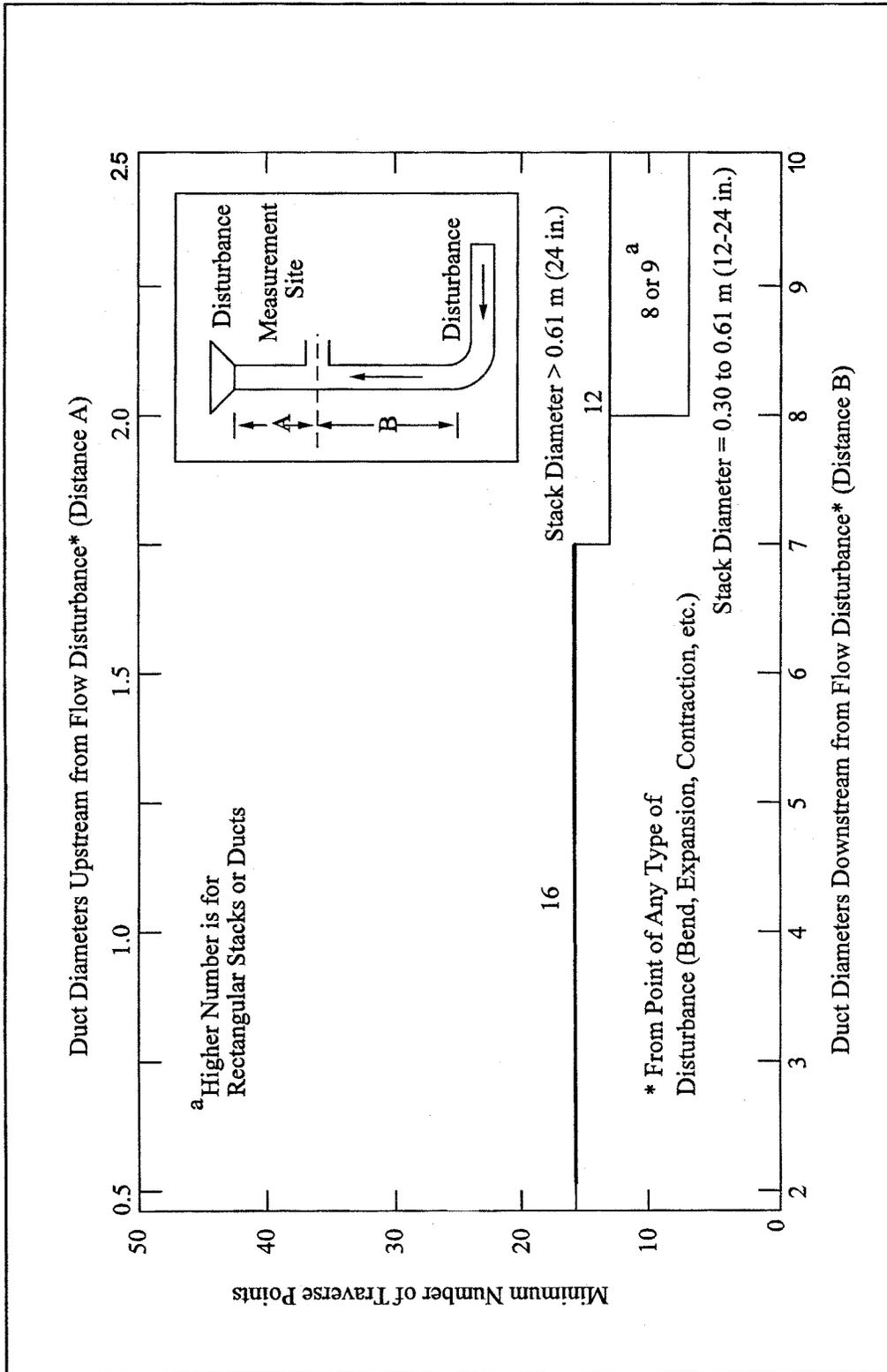


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.



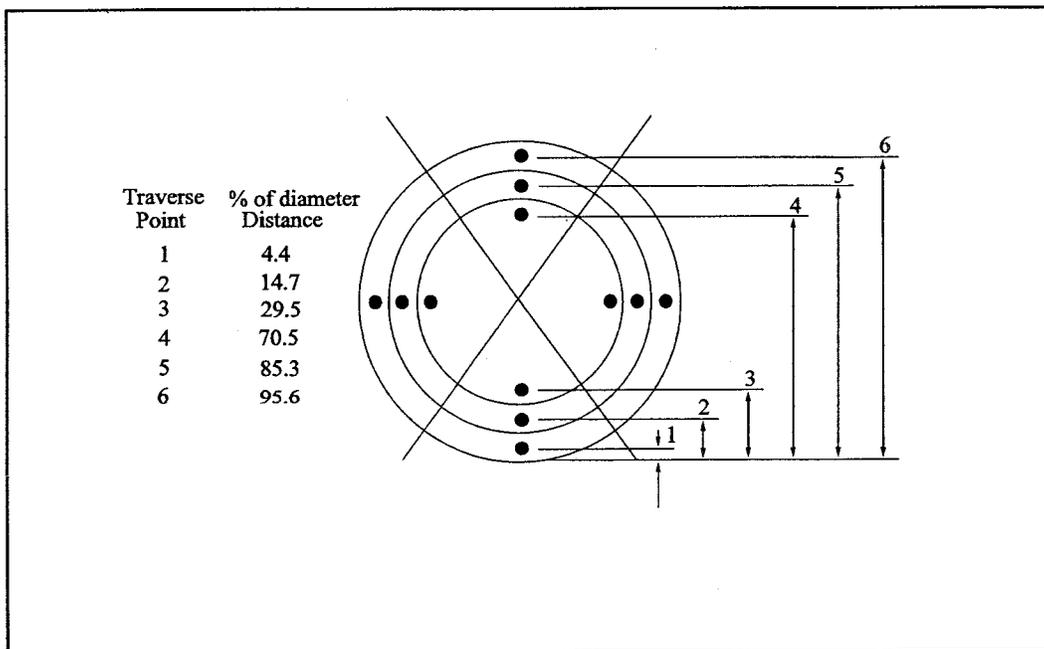


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points.

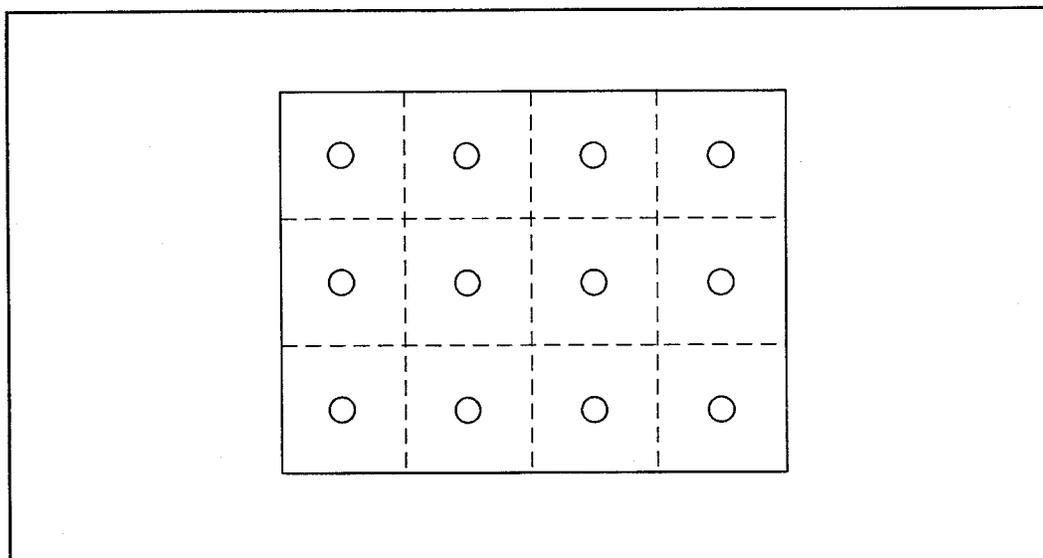


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with traverse points at centroid of each area.

### Method 1A—Sample and Velocity Traverses for Stationary Sources With Small Stacks or Ducts

**Note:** This method does not include all of the specifications (e.g., equipment and supplies) and procedures (e.g., sampling) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test method: Method 1.

#### 1.0 Scope and Application

1.1 Measured Parameters. The purpose of the method is to provide guidance for the selection of sampling ports and traverse points at which sampling for air pollutants will be performed pursuant to regulations set forth in this part.

1.2 Applicability. The applicability and principle of this method are identical to Method 1, except its applicability is limited to stacks or ducts. This method is applicable to flowing gas streams in ducts, stacks, and flues of less than about 0.30 meter (12 in.) in diameter, or 0.071 m<sup>2</sup> (113 in.<sup>2</sup>) in cross-sectional area, but equal to or greater than about 0.10 meter (4 in.) in diameter, or 0.0081 m<sup>2</sup> (12.57 in.<sup>2</sup>) in cross-sectional area. This method cannot be used when the flow is cyclonic or swirling.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

#### 2.0 Summary of Method

2.1 The method is designed to aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source. A measurement site or a pair of measurement sites where the effluent stream is flowing in a known direction is (are) selected. The cross-section of the stack is divided into a number of equal areas. Traverse points are then located within each of these equal areas.

2.2 In these small diameter stacks or ducts, the conventional Method 5 stack assembly (consisting of a Type S pitot tube attached to a sampling probe, equipped with a nozzle and thermocouple) blocks a significant portion of the cross-section of the duct and causes inaccurate measurements. Therefore, for particulate matter (PM) sampling in small stacks or ducts, the gas velocity is measured using a standard pitot tube downstream of the actual emission sampling site. The straight run of duct between the PM sampling and velocity measurement

sites allows the flow profile, temporarily disturbed by the presence of the sampling probe, to redevelop and stabilize.

#### 3.0 Definitions [Reserved]

#### 4.0 Interferences [Reserved]

#### 5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

#### 6.0 Equipment and Supplies [Reserved]

#### 7.0 Reagents and Standards [Reserved]

#### 8.0 Sample Collection, Preservation, Storage, and Transport [Reserved]

#### 9.0 Quality Control [Reserved]

#### 10.0 Calibration and Standardization [Reserved]

#### 11.0 Procedure

##### 11.1 Selection of Measurement Site.

11.1.1 Particulate Measurements—Steady or Unsteady Flow. Select a particulate measurement site located preferably at least eight equivalent stack or duct diameters downstream and 10 equivalent diameters upstream from any flow disturbances such as bends, expansions, or contractions in the stack, or from a visible flame. Next, locate the velocity measurement site eight equivalent diameters downstream of the particulate measurement site (see Figure 1A-1). If such locations are not available, select an alternative particulate measurement location at least two equivalent stack or duct diameters downstream and two and one-half diameters upstream from any flow disturbance. Then, locate the velocity measurement site two equivalent diameters downstream from the particulate measurement site. (See Section 12.2 of Method 1 for calculating equivalent diameters for a rectangular cross-section.)

11.1.2 PM Sampling (Steady Flow) or Velocity (Steady or Unsteady Flow) Measurements. For PM sampling when the volumetric flow rate in a duct is constant with respect to time, Section 11.1.1 of Method 1 may be followed, with the PM sampling and velocity measurement performed at one location. To demonstrate that the flow rate is constant (within 10 percent) when PM measurements are made, perform complete velocity traverses before and

after the PM sampling run, and calculate the deviation of the flow rate derived after the PM sampling run from the one derived before the PM sampling run. The PM sampling run is acceptable if the deviation does not exceed 10 percent.

#### 11.2 Determining the Number of Traverse Points.

11.2.1 Particulate Measurements (Steady or Unsteady Flow). Use Figure 1-1 of Method 1 to determine the number of traverse points to use at both the velocity measurement and PM sampling locations. Before referring to the figure, however, determine the distances between both the velocity measurement and PM sampling sites to the nearest upstream and downstream disturbances. Then divide each distance by the stack diameter or equivalent diameter to express the distances in terms of the number of duct diameters. Then, determine the number of traverse points from Figure 1-1 of Method 1 corresponding to each of these four distances. Choose the highest of the four numbers of traverse points (or a greater number) so that, for circular ducts the number is a multiple of four; and for rectangular ducts, the number is one of those shown in Table 1-1 of Method 1. When the optimum duct diameter location criteria can be satisfied, the minimum number of traverse points required is eight for circular ducts and nine for rectangular ducts.

11.2.2 PM Sampling (Steady Flow) or only Velocity (Non-Particulate) Measurements. Use Figure 1-2 of Method 1 to determine number of traverse points, following the same procedure used for PM sampling as described in Section 11.2.1 of Method 1. When the optimum duct diameter location criteria can be satisfied, the minimum number of traverse points required is eight for circular ducts and nine for rectangular ducts.

11.3 Cross-sectional Layout, Location of Traverse Points, and Verification of the Absence of Cyclonic Flow. Same as Method 1, Sections 11.3 and 11.4, respectively.

#### 12.0 Data Analysis and Calculations [Reserved]

#### 13.0 Method Performance [Reserved]

#### 14.0 Pollution Prevention [Reserved]

#### 15.0 Waste Management [Reserved]

#### 16.0 References

Same as Method 1, Section 16.0, References 1 through 6, with the addition of the following:

1. Vollaro, Robert F. Recommended Procedure for Sample Traverses in Ducts Smaller Than 12 Inches in

Diameter. U.S. Environmental Protection Agency, Emission

Measurement Branch, Research Triangle Park, North Carolina. January 1977.

17.0 Tables, Diagrams, Flowcharts, and Validation Data

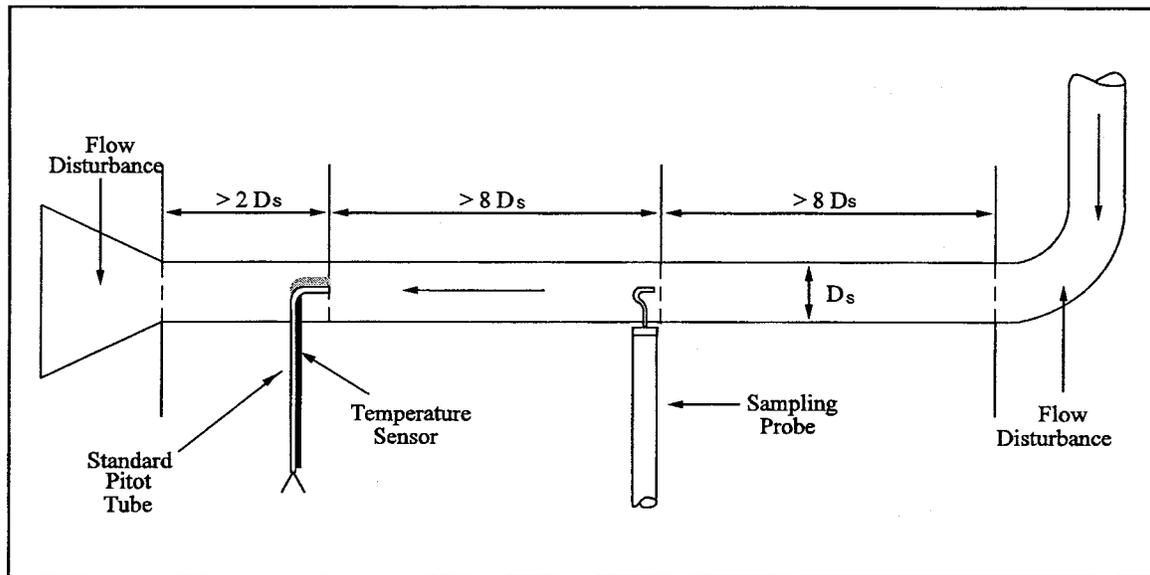


Figure 1A-1. Recommended sampling arrangement for small ducts

### Method 2—Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

**Note:** This method does not include all of the specifications (e.g., equipment and supplies) and procedures (e.g., sampling) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test method: Method 1.

#### 1.0 Scope and Application.

1.1 This method is applicable for the determination of the average velocity and the volumetric flow rate of a gas stream.

1.2 This method is not applicable at measurement sites that fail to meet the criteria of Method 1, Section 11.1. Also, the method cannot be used for direct measurement in cyclonic or swirling gas streams; Section 11.4 of Method 1 shows how to determine cyclonic or swirling flow conditions. When unacceptable conditions exist, alternative procedures, subject to the approval of the Administrator, must be employed to produce accurate flow rate determinations. Examples of such alternative procedures are: (1) to install straightening vanes; (2) to calculate the total volumetric flow rate stoichiometrically, or (3) to move to another measurement site at which the flow is acceptable.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

#### 2.0 Summary of Method.

2.1 The average gas velocity in a stack is determined from the gas density and from measurement of the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube.

#### 3.0 Definitions [Reserved]

#### 4.0 Interferences [Reserved]

#### 5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

#### 6.0 Equipment and Supplies

Specifications for the apparatus are given below. Any other apparatus that has been demonstrated (subject to approval of the Administrator) to be capable of meeting the specifications will be considered acceptable.

##### 6.1 Type S Pitot Tube.

6.1.1 Pitot tube made of metal tubing (e.g., stainless steel) as shown in Figure 2-1. It is recommended that the external tubing diameter (dimension  $D_t$ , Figure

2-2b) be between 0.48 and 0.95 cm ( $\frac{3}{16}$  and  $\frac{3}{8}$  inch). There shall be an equal distance from the base of each leg of the pitot tube to its face-opening plane (dimensions  $P_A$  and  $P_B$ , Figure 2-2b); it is recommended that this distance be between 1.05 and 1.50 times the external tubing diameter. The face openings of the pitot tube shall, preferably, be aligned as shown in Figure 2-2; however, slight misalignments of the openings are permissible (see Figure 2-3).

6.1.2 The Type S pitot tube shall have a known coefficient, determined as outlined in Section 10.0. An identification number shall be assigned to the pitot tube; this number shall be permanently marked or engraved on the body of the tube. A standard pitot tube may be used instead of a Type S, provided that it meets the specifications of Sections 6.7 and 10.2. Note, however, that the static and impact pressure holes of standard pitot tubes are susceptible to plugging in particulate-laden gas streams. Therefore, whenever a standard pitot tube is used to perform a traverse, adequate proof must be furnished that the openings of the pitot tube have not plugged up during the traverse period. This can be accomplished by comparing the velocity head ( $\Delta p$ ) measurement recorded at a selected traverse point (readable  $\Delta p$  value) with a second  $\Delta p$  measurement recorded after "back purging" with pressurized air to clean the impact and static holes of the standard pitot tube. If the before and

after  $\Delta p$  measurements are within 5 percent, then the traverse data are acceptable. Otherwise, the data should be rejected and the traverse measurements redone. Note that the selected traverse point should be one that demonstrates a readable  $\Delta p$  value. If "back purging" at regular intervals is part of a routine procedure, then comparative  $\Delta p$  measurements shall be conducted as above for the last two traverse points that exhibit suitable  $\Delta p$  measurements.

6.2 Differential Pressure Gauge. An inclined manometer or equivalent device. Most sampling trains are equipped with a 10 in. (water column) inclined-vertical manometer, having 0.01 in. H<sub>2</sub>O divisions on the 0 to 1 in. inclined scale, and 0.1 in. H<sub>2</sub>O divisions on the 1 to 10 in. vertical scale. This type of manometer (or other gauge of equivalent sensitivity) is satisfactory for the measurement of  $\Delta p$  values as low as 1.27 mm (0.05 in.) H<sub>2</sub>O. However, a differential pressure gauge of greater sensitivity shall be used (subject to the approval of the Administrator), if any of the following is found to be true: (1) the arithmetic average of all  $\Delta p$  readings at the traverse points in the stack is less than 1.27 mm (0.05 in.) H<sub>2</sub>O; (2) for traverses of 12 or more points, more than 10 percent of the individual  $\Delta p$  readings are below 1.27 mm (0.05 in.) H<sub>2</sub>O; or (3) for traverses of fewer than 12 points, more than one  $\Delta p$  reading is below 1.27 mm (0.05 in.) H<sub>2</sub>O. Reference 18 (see Section 17.0) describes commercially available instrumentation for the measurement of low-range gas velocities.

6.2.1 As an alternative to criteria (1) through (3) above, Equation 2-1 (Section 12.2) may be used to determine the necessity of using a more sensitive differential pressure gauge. If  $T$  is greater than 1.05, the velocity head data are unacceptable and a more sensitive differential pressure gauge must be used.

**Note:** If differential pressure gauges other than inclined manometers are used (e.g., magnehelic gauges), their calibration must be checked after each test series. To check the calibration of a differential pressure gauge, compare  $\Delta p$  readings of the gauge with those of a gauge-oil manometer at a minimum of three points, approximately representing the range of  $\Delta p$  values in the stack. If, at each point, the values of  $\Delta p$  as read by the differential pressure gauge and gauge-oil manometer agree to within 5 percent, the differential pressure gauge shall be considered to be in proper calibration. Otherwise, the test series shall either be voided, or procedures to adjust the measured  $\Delta p$  values and final results shall be used, subject to the approval of the Administrator.

6.3 Temperature Sensor. A thermocouple, liquid-filled bulb thermometer, bimetallic thermometer, mercury-in-glass thermometer, or other gauge capable of measuring temperatures to within 1.5 percent of the minimum absolute stack temperature. The temperature sensor shall be attached to the pitot tube such that the sensor tip does not touch any metal; the gauge shall be in an interference-free arrangement with respect to the pitot tube face openings (see Figure 2-1 and Figure 2-4). Alternative positions may be used if the pitot tube-temperature gauge system is calibrated according to the procedure of Section 10.0. Provided that a difference of not more than 1 percent in the average velocity measurement is introduced, the temperature gauge need not be attached to the pitot tube. This alternative is subject to the approval of the Administrator.

6.4 Pressure Probe and Gauge. A piezometer tube and mercury- or water-filled U-tube manometer capable of measuring stack pressure to within 2.5 mm (0.1 in.) Hg. The static tap of a standard type pitot tube or one leg of a Type S pitot tube with the face opening planes positioned parallel to the gas flow may also be used as the pressure probe.

6.5 Barometer. A mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.54 mm (0.1 in.) Hg.

**Note:** The barometric pressure reading may be obtained from a nearby National Weather Service station. In this case, the station value (which is the absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be made at a rate of minus 2.5 mm (0.1 in.) Hg per 30 m (100 ft) elevation increase or plus 2.5 mm (0.1 in.) Hg per 30 m (100 ft.) for elevation decrease.

6.6 Gas Density Determination Equipment. Method 3 equipment, if needed (see Section 8.6), to determine the stack gas dry molecular weight, and Method 4 (reference method) or Method 5 equipment for moisture content determination. Other methods may be used subject to approval of the Administrator.

6.7 Calibration Pitot Tube. When calibration of the Type S pitot tube is necessary (see Section 10.1), a standard pitot tube shall be used for a reference. The standard pitot tube shall, preferably, have a known coefficient, obtained either (1) directly from the National Institute of Standards and Technology (NIST), Gaithersburg MD 20899, (301) 975-2002, or (2) by calibration against another standard

pitot tube with an NIST-traceable coefficient. Alternatively, a standard pitot tube designed according to the criteria given in Sections 6.7.1 through 6.7.5 below and illustrated in Figure 2-5 (see also References 7, 8, and 17 in Section 17.0) may be used. Pitot tubes designed according to these specifications will have baseline coefficients of  $0.99 \pm 0.01$ .

6.7.1 Standard Pitot Design.

6.7.1.1 Hemispherical (shown in Figure 2-5), ellipsoidal, or conical tip.

6.7.1.2 A minimum of six diameters straight run (based upon  $D$ , the external diameter of the tube) between the tip and the static pressure holes.

6.7.1.3 A minimum of eight diameters straight run between the static pressure holes and the centerline of the external tube, following the 90° bend.

6.7.1.4 Static pressure holes of equal size (approximately 0.1  $D$ ), equally spaced in a piezometer ring configuration.

6.7.1.5 90° bend, with curved or mitered junction.

6.8 Differential Pressure Gauge for Type S Pitot Tube Calibration. An inclined manometer or equivalent. If the single-velocity calibration technique is employed (see Section 10.1.2.3), the calibration differential pressure gauge shall be readable to the nearest 0.127 mm (0.005 in.) H<sub>2</sub>O. For multivelocity calibrations, the gauge shall be readable to the nearest 0.127 mm (0.005 in.) H<sub>2</sub>O for  $\Delta p$  values between 1.27 and 25.4 mm (0.05 and 1.00 in.) H<sub>2</sub>O, and to the nearest 1.27 mm (0.05 in.) H<sub>2</sub>O for  $\Delta p$  values above 25.4 mm (1.00 in.) H<sub>2</sub>O. A special, more sensitive gauge will be required to read  $\Delta p$  values below 1.27 mm (0.05 in.) H<sub>2</sub>O (see Reference 18 in Section 16.0).

7.0 Reagents and Standards [Reserved]

8.0 Sample Collection and Analysis

8.1 Set up the apparatus as shown in Figure 2-1. Capillary tubing or surge tanks installed between the manometer and pitot tube may be used to dampen  $\Delta p$  fluctuations. It is recommended, but not required, that a pretest leak-check be conducted as follows: (1) blow through the pitot impact opening until at least 7.6 cm (3.0 in.) H<sub>2</sub>O velocity head registers on the manometer; then, close off the impact opening. The pressure shall remain stable for at least 15 seconds; (2) do the same for the static pressure side, except using suction to obtain the minimum of 7.6 cm (3.0 in.) H<sub>2</sub>O. Other leak-check procedures, subject to the approval of the Administrator, may be used.

8.2 Level and zero the manometer. Because the manometer level and zero

may drift due to vibrations and temperature changes, make periodic checks during the traverse (at least once per hour). Record all necessary data on a form similar to that shown in Figure 2-6.

8.3 Measure the velocity head and temperature at the traverse points specified by Method 1. Ensure that the proper differential pressure gauge is being used for the range of  $\Delta p$  values encountered (see Section 6.2). If it is necessary to change to a more sensitive gauge, do so, and remeasure the  $\Delta p$  and temperature readings at each traverse

point. Conduct a post-test leak-check (mandatory), as described in Section 8.1 above, to validate the traverse run.

8.4 Measure the static pressure in the stack. One reading is usually adequate.

8.5 Determine the atmospheric pressure.

8.6 Determine the stack gas dry molecular weight. For combustion processes or processes that emit essentially CO<sub>2</sub>, O<sub>2</sub>, CO, and N<sub>2</sub>, use Method 3. For processes emitting essentially air, an analysis need not be conducted; use a dry molecular weight

of 29.0. For other processes, other methods, subject to the approval of the Administrator, must be used.

8.7 Obtain the moisture content from Method 4 (reference method, or equivalent) or from Method 5.

8.8 Determine the cross-sectional area of the stack or duct at the sampling location. Whenever possible, physically measure the stack dimensions rather than using blueprints. Do not assume that stack diameters are equal. Measure each diameter distance to verify its dimensions.

9.0 Quality Control

Section	Quality control measure	Effect
10.1-10.4	Sampling equipment calibration	Ensure accurate measurement of stack gas flow rate, sample volume.

10.0 Calibration and Standardization

10.1 Type S Pitot Tube. Before its initial use, carefully examine the Type S pitot tube top, side, and end views to verify that the face openings of the tube are aligned within the specifications illustrated in Figures 2-2 and 2-3. The pitot tube shall not be used if it fails to meet these alignment specifications. After verifying the face opening alignment, measure and record the following dimensions of the pitot tube: (a) the external tubing diameter (dimension D<sub>t</sub>, Figure 2-2b); and (b) the base-to-opening plane distances (dimensions P<sub>A</sub> and P<sub>B</sub>, Figure 2-2b). If D<sub>t</sub> is between 0.48 and 0.95 cm (3/16 and 3/8 in.), and if P<sub>A</sub> and P<sub>B</sub> are equal and between 1.05 and 1.50 D<sub>t</sub>, there are two possible options: (1) the pitot tube may be calibrated according to the procedure outlined in Sections 10.1.2 through 10.1.5, or (2) a baseline (isolated tube) coefficient value of 0.84 may be assigned to the pitot tube. Note, however, that if the pitot tube is part of an assembly, calibration may still be required, despite knowledge of the baseline coefficient value (see Section 10.1.1). If D<sub>t</sub>, P<sub>A</sub>, and P<sub>B</sub> are outside the specified limits, the pitot tube must be calibrated as outlined in Sections 10.1.2 through 10.1.5.

10.1.1 Type S Pitot Tube Assemblies. During sample and velocity traverses, the isolated Type S pitot tube is not always used; in many instances, the pitot tube is used in combination with other source-sampling components (e.g., thermocouple, sampling probe, nozzle) as part of an "assembly." The presence of other sampling components can sometimes affect the baseline value of the Type S pitot tube coefficient (Reference 9 in Section 17.0); therefore, an assigned (or otherwise known)

baseline coefficient value may or may not be valid for a given assembly. The baseline and assembly coefficient values will be identical only when the relative placement of the components in the assembly is such that aerodynamic interference effects are eliminated. Figures 2-4, 2-7, and 2-8 illustrate interference-free component arrangements for Type S pitot tubes having external tubing diameters between 0.48 and 0.95 cm (3/16 and 3/8 in.). Type S pitot tube assemblies that fail to meet any or all of the specifications of Figures 2-4, 2-7, and 2-8 shall be calibrated according to the procedure outlined in Sections 10.1.2 through 10.1.5, and prior to calibration, the values of the intercomponent spacings (pitot-nozzle, pitot-thermocouple, pitot-probe sheath) shall be measured and recorded.

**Note:** Do not use a Type S pitot tube assembly that is constructed such that the impact pressure opening plane of the pitot tube is below the entry plane of the nozzle (see Figure 2-6B).

10.1.2 Calibration Setup. If the Type S pitot tube is to be calibrated, one leg of the tube shall be permanently marked A, and the other, B. Calibration shall be performed in a flow system having the following essential design features:

10.1.2.1 The flowing gas stream must be confined to a duct of definite cross-sectional area, either circular or rectangular. For circular cross sections, the minimum duct diameter shall be 30.48 cm (12 in.); for rectangular cross sections, the width (shorter side) shall be at least 25.4 cm (10 in.).

10.1.2.2 The cross-sectional area of the calibration duct must be constant over a distance of 10 or more duct diameters. For a rectangular cross section, use an equivalent diameter,

calculated according to Equation 2-2 (see Section 12.3), to determine the number of duct diameters. To ensure the presence of stable, fully developed flow patterns at the calibration site, or "test section," the site must be located at least eight diameters downstream and two diameters upstream from the nearest disturbances.

**Note:** The eight- and two-diameter criteria are not absolute; other test section locations may be used (subject to approval of the Administrator), provided that the flow at the test site has been demonstrated to be or found stable and parallel to the duct axis.

10.1.2.3 The flow system shall have the capacity to generate a test-section velocity around 910 m/min (3,000 ft/min). This velocity must be constant with time to guarantee steady flow during calibration. Note that Type S pitot tube coefficients obtained by single-velocity calibration at 910 m/min (3,000 ft/min) will generally be valid to ±3 percent for the measurement of velocities above 300 m/min (1,000 ft/min) and to ±6 percent for the measurement of velocities between 180 and 300 m/min (600 and 1,000 ft/min). If a more precise correlation between the pitot tube coefficient, (C<sub>p</sub>), and velocity is desired, the flow system should have the capacity to generate at least four distinct, time-invariant test-section velocities covering the velocity range from 180 to 1,500 m/min (600 to 5,000 ft/min), and calibration data shall be taken at regular velocity intervals over this range (see References 9 and 14 in Section 17.0 for details).

10.1.2.4 Two entry ports, one for each of the standard and Type S pitot tubes, shall be cut in the test section. The standard pitot entry port shall be located slightly downstream of the Type S port, so that the standard and Type S

impact openings will lie in the same cross-sectional plane during calibration. To facilitate alignment of the pitot tubes during calibration, it is advisable that the test section be constructed of Plexiglas™ or some other transparent material.

10.1.3 Calibration Procedure. Note that this procedure is a general one and must not be used without first referring to the special considerations presented in Section 10.1.5. Note also that this procedure applies only to single-velocity calibration. To obtain calibration data for the A and B sides of the Type S pitot tube, proceed as follows:

10.1.3.1 Make sure that the manometer is properly filled and that the oil is free from contamination and is of the proper density. Inspect and leak-check all pitot lines; repair or replace if necessary.

10.1.3.2 Level and zero the manometer. Switch on the fan, and allow the flow to stabilize. Seal the Type S pitot tube entry port.

10.1.3.3 Ensure that the manometer is level and zeroed. Position the standard pitot tube at the calibration point (determined as outlined in Section 10.1.5.1), and align the tube so that its tip is pointed directly into the flow. Particular care should be taken in aligning the tube to avoid yaw and pitch angles. Make sure that the entry port surrounding the tube is properly sealed.

10.1.3.4 Read  $\Delta p_{std}$ , and record its value in a data table similar to the one shown in Figure 2-9. Remove the standard pitot tube from the duct, and disconnect it from the manometer. Seal the standard entry port.

10.1.3.5 Connect the Type S pitot tube to the manometer and leak-check. Open the Type S tube entry port. Check the manometer level and zero. Insert and align the Type S pitot tube so that its A side impact opening is at the same point as was the standard pitot tube and is pointed directly into the flow. Make sure that the entry port surrounding the tube is properly sealed.

10.1.3.6 Read  $\Delta p_s$ , and enter its value in the data table. Remove the Type S pitot tube from the duct, and disconnect it from the manometer.

10.1.3.7 Repeat Steps 10.1.3.3 through 10.1.3.6 until three pairs of  $\Delta p$  readings have been obtained for the A side of the Type S pitot tube.

10.1.3.8 Repeat Steps 10.1.3.3 through 10.1.3.7 for the B side of the Type S pitot tube.

10.1.3.9 Perform calculations as described in Section 12.4. Use the Type S pitot tube only if the values of  $\sigma_A$  and  $\sigma_B$  are less than or equal to 0.01 and if

the absolute value of the difference between  $\bar{C}_{p(A)}$  and  $\bar{C}_{p(B)}$  is 0.01 or less.

#### 10.1.4 Special Considerations.

##### 10.1.4.1 Selection of Calibration Point.

10.1.4.1.1 When an isolated Type S pitot tube is calibrated, select a calibration point at or near the center of the duct, and follow the procedures outlined in Section 10.1.3. The Type S pitot coefficients measured or calculated, (*i.e.*  $\bar{C}_{p(A)}$  and  $\bar{C}_{p(B)}$ ) will be valid, so long as either: (1) the isolated pitot tube is used; or (2) the pitot tube is used with other components (nozzle, thermocouple, sample probe) in an arrangement that is free from aerodynamic interference effects (see Figures 2-4, 2-7, and 2-8).

10.1.4.1.2 For Type S pitot tube-thermocouple combinations (without probe assembly), select a calibration point at or near the center of the duct, and follow the procedures outlined in Section 10.1.3. The coefficients so obtained will be valid so long as the pitot tube-thermocouple combination is used by itself or with other components in an interference-free arrangement (Figures 2-4, 2-7, and 2-8).

10.1.4.1.3 For Type S pitot tube combinations with complete probe assemblies, the calibration point should be located at or near the center of the duct; however, insertion of a probe sheath into a small duct may cause significant cross-sectional area interference and blockage and yield incorrect coefficient values (Reference 9 in Section 17.0). Therefore, to minimize the blockage effect, the calibration point may be a few inches off-center if necessary. The actual blockage effect will be negligible when the theoretical blockage, as determined by a projected-area model of the probe sheath, is 2 percent or less of the duct cross-sectional area for assemblies without external sheaths (Figure 2-10a), and 3 percent or less for assemblies with external sheaths (Figure 2-10b).

10.1.4.2 For those probe assemblies in which pitot tube-nozzle interference is a factor (*i.e.*, those in which the pitot-nozzle separation distance fails to meet the specifications illustrated in Figure 2-7A), the value of  $C_{p(s)}$  depends upon the amount of free space between the tube and nozzle and, therefore, is a function of nozzle size. In these instances, separate calibrations shall be performed with each of the commonly used nozzle sizes in place. Note that the single-velocity calibration technique is acceptable for this purpose, even though the larger nozzle sizes (>0.635 cm or 1/4 in.) are not ordinarily used for isokinetic sampling at velocities around 910 m/min (3,000 ft/min), which is the

calibration velocity. Note also that it is not necessary to draw an isokinetic sample during calibration (see Reference 19 in Section 17.0).

10.1.4.3 For a probe assembly constructed such that its pitot tube is always used in the same orientation, only one side of the pitot tube need be calibrated (the side which will face the flow). The pitot tube must still meet the alignment specifications of Figure 2-2 or 2-3, however, and must have an average deviation ( $\sigma$ ) value of 0.01 or less (see Section 10.1.4.4).

#### 10.1.5 Field Use and Recalibration.

##### 10.1.5.1 Field Use.

10.1.5.1.1 When a Type S pitot tube (isolated or in an assembly) is used in the field, the appropriate coefficient value (whether assigned or obtained by calibration) shall be used to perform velocity calculations. For calibrated Type S pitot tubes, the A side coefficient shall be used when the A side of the tube faces the flow, and the B side coefficient shall be used when the B side faces the flow. Alternatively, the arithmetic average of the A and B side coefficient values may be used, irrespective of which side faces the flow.

10.1.5.1.2 When a probe assembly is used to sample a small duct, 30.5 to 91.4 cm (12 to 36 in.) in diameter, the probe sheath sometimes blocks a significant part of the duct cross-section, causing a reduction in the effective value of  $C_{p(s)}$ . Consult Reference 9 (see Section 17.0) for details. Conventional pitot-sampling probe assemblies are not recommended for use in ducts having inside diameters smaller than 30.5 cm (12 in.) (see Reference 16 in Section 17.0).

##### 10.1.5.2 Recalibration.

10.1.5.2.1 Isolated Pitot Tubes. After each field use, the pitot tube shall be carefully reexamined in top, side, and end views. If the pitot face openings are still aligned within the specifications illustrated in Figure 2-2 and Figure 2-3, it can be assumed that the baseline coefficient of the pitot tube has not changed. If, however, the tube has been damaged to the extent that it no longer meets the specifications of Figure 2-2 and Figure 2-3, the damage shall either be repaired to restore proper alignment of the face openings, or the tube shall be discarded.

10.1.5.2.2 Pitot Tube Assemblies. After each field use, check the face opening alignment of the pitot tube, as in Section 10.1.5.2.1. Also, remeasure the intercomponent spacings of the assembly. If the intercomponent spacings have not changed and the face opening alignment is acceptable, it can be assumed that the coefficient of the assembly has not changed. If the face