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Tuesday  
October 7, 1997

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**Part II**

**Environmental  
Protection Agency**

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**40 CFR Parts 9, 60, and 63  
National Emission Standards for  
Hazardous Air Pollutants for Source  
Categories; National Emission Standards  
for Hazardous Air Pollutants for Primary  
Aluminum Reduction Plants; Final Rule**

**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Parts 9, 60, and 63**

[IL-64-2-5807; FRL-5898-5]

RIN 2060-AE76

**National Emission Standards for Hazardous Air Pollutants for Source Categories; National Emission Standards for Hazardous Air Pollutants for Primary Aluminum Reduction Plants**

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

**ACTION:** Final rule.

**SUMMARY:** This action promulgates national emission standards for each new or existing potline, paste production plant, and anode bake furnace associated with a primary aluminum reduction plant, and for each new pitch storage tank associated with a primary aluminum production plant. In addition, the new source performance standard for primary aluminum plants is amended and most of the requirements are incorporated in the final national emission standards. This action also adds Method 315 for the measurement of extractable organic matter to appendix A of part 63 and Method 14A for the measurement of total fluoride (TF) to appendix A of part 60.

The major hazardous air pollutants (HAPs) emitted by the facilities covered by this rule include hydrogen fluoride (HF) and polycyclic organic matter (POM). Polycyclic aromatic hydrocarbons (PAHs) are included in the chemical group POM. Polycyclic aromatic hydrocarbons have been reported to produce carcinogenic, reproductive, and developmental effects as well as toxic effects on blood, the liver, eyes, and the immune system. The final rule will result in a 50 percent reduction in fluoride and POM emissions from the current level of 11,000 tons per year (tpy); a substantial reduction in emissions of nonHAP pollutants, such as particulate matter, also will be achieved.

These standards implement section 112(d) of the Clean Air Act as amended (the Act) and are based on the Administrator's determination that primary aluminum plants may reasonably be anticipated to emit several of the HAPs listed in section 112(b) of the Act from the various process operations found within the industry.

**EFFECTIVE DATE:** October 7, 1997. See the **SUPPLEMENTARY INFORMATION** section concerning judicial review.

The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of October 7, 1997.

**ADDRESSES:** *Docket.* The docket for this rulemaking containing the information considered by the EPA in development of the final rule is Docket No. A-92-60. This docket is available for public inspection between 8 a.m. and 4 p.m., Monday through Friday except for Federal holidays, at the following address: U.S. Environmental Protection Agency, Air and Radiation Docket and Information Center (6102), 401 M Street SW., Washington, DC 20460; telephone: (202) 260-7548. The docket is located at the above address in Room M-1500, Waterside Mall (ground floor). A reasonable fee may be charged for copying.

*Background Information Document.* A background information document, titled "National Emission Standards for Hazardous Air Pollutants (NESHAP) for Primary Aluminum Reduction Plants—Background Information for Promulgated Standards, Summary of Public Comments and Responses," has been prepared summarizing the significant public comments made on the proposed rule and the Administrator's response to those comments. This document is available in the docket for this rulemaking and also is available for downloading from the Technology Transfer Network under the Clean Air Act Amendments, Recently Signed Rules.

**FOR FURTHER INFORMATION CONTACT:** Steve Fruh, Policy, Planning, and Standards Group, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-2837, electronic mail address, "fruh.steve@epamail.epa.gov".

**SUPPLEMENTARY INFORMATION:**

**Regulated Entities**

Entities potentially regulated by this action are those that emit or have the potential to emit HAPs listed in section 112(b) of the Act. Regulated categories and entities include:

Category	Examples of regulated entities
Industry .....	Primary aluminum reduction plants.
Federal government: Not affected	
State/local/tribal government: Not affected.	

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility is regulated by this action, you should carefully examine the applicability criteria in § 63.840 of the final rule. If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

**Judicial Review**

This NESHAP for primary aluminum reduction plants was proposed on September 26, 1996 (61 FR 50586). This notice promulgating a NESHAP for primary aluminum reduction plants constitutes final administrative action concerning that proposal. Under section 307(b)(1) of the Clean Air Act, judicial review of this final rule is available only by filing a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit by December 8, 1997. Under section 307(d)(7)(B) of the Act, only an objection to this rule which was raised with reasonable specificity during the period for public comment can be raised during judicial review. Moreover, under section 307(b)(2) of the Act, the requirements established by today's final action may not be challenged separately in any civil or criminal proceeding brought by EPA to enforce these requirements.

**Technology Transfer Network**

The Technology Transfer Network is one of the EPA's electronic bulletin boards. The Technology Transfer Network provides information and technology exchange in various areas of air pollution control. The service is free except for the cost of a phone call. Dial (919) 541-5472 for up to a 14,400 bps modem. The Technology Transfer Network is also accessible through the Internet at "http://ttncwww.rtpnc.epa.gov." If more information on the Technology Transfer Network is needed, call the HELP line at (919) 541-5384.

**Outline**

The following outline is provided to aid in reading this preamble to the final rule.

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## I. Statutory Authority

The statutory authority for this rule is provided by sections 101, 112, 114, 116, and 301 of the Clean Air Act, as amended; 42 U.S.C., 7401, 7412, 7414, 7416, and 7601.

## II. Purpose

The Clean Air Act was created in part "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." [See section 101(b)(1).] Section 112 of the Act establishes a technology-based program to reduce stationary source emissions of HAPs from new and existing sources.

Section 112(d) of the Act requires the regulations to reflect the maximum degree of reduction in emissions of HAPs that is achievable taking into consideration the cost of achieving the emission reduction, any non-air quality health and environmental impacts, and energy requirements. This level of control is commonly referred to as the maximum achievable control

technology (MACT). The goal of the section 112(d) MACT standards is to apply such control technology to reduce emissions and thereby reduce the hazard of HAPs emitted from stationary sources.

This final rule is technology based, i.e., based on MACT. In essence, these MACT standards ensure that all major sources of air toxic emissions achieve the level of control already being achieved by the better controlled and lower emitting sources in each category. This approach provides assurance to citizens that each major source of toxic air pollution will be required to effectively control its emissions. At the same time, this approach provides a level economic playing field, ensuring that facilities that use cleaner processes and good emission controls are not disadvantaged relative to competitors with poorer controls.

## III. Background

### A. Primary Aluminum Source Category

Section 112(c) of the Act requires the EPA to list each category of major and area sources, as appropriate, emitting one or more of the HAPs listed in section 112(b) of the Act. The term "major source" is defined by the Act to mean:

\* \* \* Any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, considering controls, in the aggregate 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs.

On July 16, 1992 (57 FR 31576), the EPA published a list of major and area sources for which NESHAP are to be promulgated, and primary aluminum production was one of the 174 categories of sources listed. The listing was based on the Administrator's determination that primary aluminum plants may reasonably be anticipated to emit several of the listed HAPs in sufficient quantity to be designated as major sources. The EPA schedule for promulgation of the MACT standards was published on December 3, 1993 (58 FR 63941), and requires that rules for the primary aluminum source category be promulgated by November 15, 1997.

The primary aluminum source category includes facilities engaged in producing primary aluminum by electrolytically reducing alumina. The NESHAP for primary aluminum production applies to all primary aluminum production plants because all of these sites are major sources.

### B. NESHAP for Source Categories

The control of HAPs is achieved through the promulgation of technology-based emission standards under section 112(d) and design, equipment, work practice, or operational standards under section 112(h) for categories of sources that emit HAPs. Emission reductions may be accomplished through the application of measures, processes, methods, systems, or techniques including, but not limited to: (1) Reducing the volume of, or eliminating emissions of, such pollutants through process changes, substitution of materials, or other modifications; (2) enclosing systems or processes to eliminate emissions; (3) collecting, capturing, or treating such pollutants when released from a process, stack, storage, or fugitive emissions point; (4) design, equipment, work practice, or operational standards (including requirements for operator training or certification) as provided in subsection (h); or (5) a combination of the above. (See section 112(d)(2).)

A statutory minimum or baseline level of HAP emission control that the EPA can select to be MACT for a particular source category is defined under section 112(d)(3) of the Act and is referred to as the "MACT floor." For new sources, the MACT floor is the level of HAP emission control that is achieved in practice by the best controlled similar source. The statute allows standards under a NESHAP for existing sources to be less stringent than standards for new sources. The determination of MACT floor for existing sources depends on the nationwide number of existing sources within the source category. The floor is based on the average emission limitation achieved by the best-performing 12 percent of existing sources for categories and subcategories with 30 or more sources, or the best-performing 5 sources for categories or subcategories with fewer than 30 sources.

Once the MACT floors are determined for new and existing sources in a source category, the EPA must establish standards under a NESHAP that are no less stringent than the applicable MACT floors. The Administrator may promulgate standards that are more stringent than the MACT floor when such standards are determined by the EPA to be achievable taking into consideration the cost of implementing the standards as well as any non-air quality health and environmental impacts and energy requirements.

Section 112(d) of the Act requires EPA to establish emission standards for

each category or subcategory of major and area sources. Section 112(d)(1) of the Act provides that the Administrator may distinguish among classes, types, and sizes of sources within a category in establishing such standards. In establishing subcategories, EPA considers factors such as air pollution control engineering differences, process operations (including differences between batch and continuous operations), emission characteristics, control device applicability, and opportunities for pollution prevention.

### C. Health Effects of Pollutants

Available emission data, collected in conjunction with development of the standard, show that the pollutants that are listed in section 112(b)(1) and are emitted by primary aluminum plants include HF, a gaseous inorganic compound, and POM. Following is a summary of the potential health effects caused by emission of pollutants that will be reduced by the standard.

Short-term inhalation exposure to gaseous HF and related fluoride compounds can cause severe respiratory damage in humans, including severe irritation and pulmonary edema. Long-term inhalation exposure to low levels of HF by humans has been reported to result in irritation and congestion of the nose, throat, and bronchi while damage to liver, kidney, and lungs has been observed in animals. Occupational studies have not specifically implicated inhaled fluoride as a cause of cancer, and the Agency has not classified HF with respect to potential carcinogenicity.

There is generally a lack of information on human health effects associated with exposures to HF at current ambient air concentrations near primary aluminum plants. In their comments on the proposed rule, the aluminum industry asserted that there was no evidence of adverse effects on human health or the environment from HF emissions from aluminum production at the industry's current level of emission control.

Emission test results reveal that primary aluminum reduction plants emit POM, which includes a combination of PAHs such as anthracene, benzo(a)pyrene, and naphthalene, among others. Several of the PAH compounds, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, are probable human carcinogens. Cancer is the major concern from exposure to these PAHs. Specifically, long-term exposure to

benzo(a)pyrene has been reported to result in toxic effects on skin, irritation to eyes, cataracts in humans, and toxic effects on the liver, blood, and the immune system in animal studies. Reproductive and developmental effects from benzo(a)pyrene have also been reported in animal studies.

In addition to HAPs, this final standard also would reduce emissions of particulate matter smaller than 10 microns in diameter (PM<sub>10</sub>), which are controlled under the National Ambient Air Quality Standards (NAAQS). The health effects of PM<sub>10</sub> are described in EPA's criteria documents that support the NAAQS. For example, particles addressed by the PM<sub>10</sub> standard have been associated with aggravation of existing respiratory and cardiovascular disease and increased risk of premature death.

The EPA does recognize that the degree of adverse effects to health can range from mild to severe. The extent and degree to which the health effects may be experienced depends upon: (1) The ambient concentrations observed in the area (e.g., as influenced by emission rates, meteorological conditions, and terrain), (2) the frequency of and duration of exposures, (3) characteristics of exposed individuals (e.g., genetics, age, pre-existing health conditions, and lifestyle), which vary significantly with the population, and (4) pollutant-specific characteristics (e.g., toxicity, half-life in the environment, bioaccumulation, and persistence).

## IV. Summary of Final Rule and Changes Since Proposal

Changes have been incorporated into the final NESHAP for primary aluminum reduction plants in response to comments on the proposed rule. The principal changes made since proposal are summarized below.

### A. Applicability

As proposed, the final standard applies to emissions of HF, measured using TF as a surrogate, and POM (as measured by methylene chloride extractables) from each affected source associated with primary aluminum reduction and located at a major source.

Under the proposed standard, affected sources included each new and existing potline of reduction cells, anode bake furnace, and paste production plant, except for one off-site anode bake furnace that is subject to the State MACT determination established by the applicable regulatory authority. No changes were made to the final standard affecting the applicability of the rule to these affected sources.

In response to public comments, the applicability of the proposed rule was revised to include new pitch storage tanks. The control technology and standards applicable to this affected source are summarized in section IV.B of this document.

Following proposal, the EPA's Office of Solid Waste (OSW) received information that one primary aluminum plant has recently installed a new process designed to recycle spent potliner from aluminum reduction cells. Spent potliner is listed as a hazardous waste under the Resource Conservation and Recovery Act. This process vitrifies the waste into a glass material and recovers sodium fluoride and calcium fluoride for use in the aluminum production process. Although the process is not defined as an affected source under the final MACT rule, the Office of Air Quality Planning and Standards (OAQPS) and OSW are working in cooperation with the State agency and the plant to evaluate potential air emissions (e.g., emission testing will be performed in the near future) and to determine whether additional emission control requirements beyond those currently required by the State are needed.

### B. Emission Limits and Standards

No changes were made to the control options serving as the basis of the proposed standards. The emission control technology selected as the basis of the standards is discussed in section III.C of the proposal preamble document (61 FR 50588, September 26, 1996).

Three changes were made to the emission limits and standards in §§ 63.843 and 63.844 of the proposed rule. The POM emission limit for the VSS2 subcategory was reduced from 3.7 lbs/ton to 3.6 lbs/ton based on data received for the MACT floor potline from that subcategory. Section 63.843(b)(3) of the proposed rule concerning use of an alternative control device for paste production plants was revised to encourage pollution prevention options. Section 63.844 of the proposed rule also was revised to include new paragraph (d) containing provisions for new pitch storage tanks. No other changes were made to the proposed limits and standards for potlines or anode bake furnaces. These limits are summarized in Tables 1 and 2 of the proposal preamble document (61 FR 50588-50589, September 26, 1996).

No changes were made to the proposed equipment standard developed under section 112(h) of the Act that required a dry coke scrubber for the paste production plant. The EPA

concluded that it was not feasible or practicable to develop a defensible quantitative emission limit because there were too few POM data available. However, the available information and engineering judgement indicated that the best POM control technology in use for paste plants was the dry coke scrubber, which was determined to represent MACT.

The proposed provisions in § 63.843(b)(3) that qualify alternatives to the dry coke scrubber for paste production plants were revised in response to public comments to encourage pollution prevention measures, such as reducing the quantity of POMs used in paste production. The control efficiency standard that was proposed was replaced with POM emission limits for batch and continuous mixers in terms of pounds of POM per ton of paste. With this approach, an affected plant would not be penalized for using pollution prevention measures that reduce uncontrolled emissions. This change will encourage innovative or pollution prevention measures, such as reducing the quantity of POMs used in the paste operation. The alternative limit in lb/ton does not preclude plants from petitioning for other alternative means of emission limitation under section 112(h)(3) of the Act based on demonstrating an equivalent or greater emission reduction. A detailed discussion is provided in section VI.B of this document.

Section 63.844 of the proposed rule was revised to include new paragraph (d) establishing standards for new pitch storage tanks. New paragraph (d) requires that each new pitch storage tank be equipped with an emission control system designed and operated to reduce inlet emissions of POM by 95 percent or greater. Compliance and monitoring provisions are summarized in sections IV.E and IV.F of this document.

### C. Incorporation of the NSPS

In response to comments on this issue, the EPA incorporated the provisions of the new source performance standard (NSPS) in subpart S of part 60 into a new section (§ 63.845) of the final rule and added appropriate definitions from the NSPS. Also, the NSPS was amended to allow the owner or operator to comply with either the NSPS or with the special provisions that were incorporated into § 63.845. With this change, any modified, reconstructed, or new potroom group that would have triggered the NSPS may now use the special provisions in the NESHAP to demonstrate compliance.

Sampling and monitoring were streamlined by using the MACT requirements and by developing a single emission limit for a potline rather than overlapping limits for both the potline and the affected potroom group. The NSPS opacity limit was also incorporated.

### D. Emission Averaging

Only one change was made to the emission limits in § 63.845 of the proposed NESHAP pertaining to emission averaging for potlines and anode bake furnaces. The POM limits for the VSS2 subcategory were reduced based on data collected for the MACT floor potline from that subcategory. The proposed limits are summarized in Tables 3 and 4 of the proposal preamble document (61 FR 50591, September 26, 1996). This section is renumbered as § 63.846 in the final rule.

The final standard contains provisions allowing the owner or operator to demonstrate compliance through averaging emissions of TF from all existing potlines, POM from existing Soderberg potlines, and TF and POM from existing anode bake furnaces (i.e., averaging is not allowed for new sources). Averaging between pollutants (TF and POM) is not allowed. The final standard also limits averaging to like sources (i.e., TF emissions from a potline can be averaged only with TF emissions from another potline at the same plant site). Emission averaging would not be allowed in any State that selects to exclude this option from its approved permitting program.

Monthly TF and quarterly POM limits for each group of potlines (two or more lines) are included in the rule. Under this approach, the owner or operator samples TF and/or POM emissions from at least three runs each month/quarter for each potline in the group to determine the average emissions from each potline. A minor revision was made to the wording in § 63.845(d)(2) of the proposed NESHAP (§ 63.846(d)(2) of the final rule) to clarify that monthly average potline emissions are determined from *each* potline from at least three runs *per potline* each month for TF secondary emissions and/or the quarterly average emissions from at least one run each month for POM emissions using the procedures and methods in §§ 63.847 and 63.849 of the final rule (emphasis added). As proposed, the sum of emissions from each potline is divided by total aluminum production from all of the potlines for the month (or for the quarter for POM) to determine the emissions in lb/ton for comparison to the applicable emission limit.

Section 63.846(d) of the NESHAP describes the requirements for an emission averaging implementation plan. The proposed standard required that unless an operating permit application has been submitted, the owner or operator must develop and submit an implementation plan for emission averaging to the applicable regulatory authority for review and approval. This language was revised to remove the misleading phrase, "unless an operating permit application has been submitted" to clarify that each owner or operator desiring to participate in emission averaging must develop and submit an implementation plan. Paragraph (d)(2) of this section clearly states that the owner or operator must include the specified information in an implementation plan or in the application for an operating permit.

The language in § 63.845(d)(1) of the proposed NESHAP pertaining to the deadline for submission of the plan also was revised. Section 63.846(d)(1) of the final rule clarifies that the plan is to be submitted 6 months before the facility intends to comply with the emission averaging limits rather than 6 months before the applicable compliance date.

The content of the implementation plan is described in § 63.846(d)(2) of the final rule. The proposed rule required that this information include the emission sources to be averaged, the applicable limit assigned to each averaging group, the specific control technology or measure to be used for each source in the group, the results of an initial performance test, the operating parameters to be monitored (with additional information if an alternative parameter is monitored), and a demonstration that compliance with each of the applicable limits will be achieved under representative operating conditions. A clarifying change was made in the final rule to delete the requirement for submission of the results of an initial performance test to determine the TF or POM emissions and emission reduction from each source in the averaging group. This provision was replaced with a requirement for a test plan to measure TF or POM emissions in accordance with the performance test requirements in § 63.847. Section 63.847 requires a performance test to be conducted during the first month following the applicable compliance date.

As proposed, the owner or operator may submit a request to revise the plan, or if emission averaging is not selected initially, the owner or operator may submit a request to implement emission averaging after the compliance date.

This standard is not the first NESHAP to include provisions permitting emission averaging. However, the mechanism by which EPA has previously permitted owners and operators to average emissions has been to define the affected source governed by the standard broadly enough such that it includes all emission points to be averaged. Under this model, which was first employed in the Hazardous Organics NESHAP ("HON"), 59 FR 19402, 19425-34, April 22, 1994, compliance by particular units within a broadly defined source is only an element in determining the overall compliance with the standard by the aggregate source. For this type of standard, conformity of the quantitative standard to the MACT floor provision in section 112(d)(3) is determined for the source as a whole, and averaging or trading between discrete emission points within the source presents no potential conflict with the MACT floor provision.

The HON approach to averaging affords substantial flexibility, by permitting averaging of dissimilar emission points and differing pollutants. However, there are also potential disadvantages to this approach to averaging. Heterogeneous emission points are deemed to be part of one affected source, rather than discrete sources that can be subcategorized and regulated in relatively homogeneous groups. New sources often must be defined more narrowly than existing sources in order to ensure that state-of-the-art controls are required for technically discrete new units.

The final primary aluminum NESHAP takes a different approach to averaging from the HON approach. In this standard, owners or operators are permitted to average across sources in determining overall compliance with the standard. In the HON rulemaking, EPA expressed concern that averaging across sources could be incompatible with the MACT floor provisions. However, upon further analysis, EPA has decided that averaging across affected sources is neither expressly permitted nor expressly precluded by the Clean Air Act. Thus, in construing the statute, EPA has focused instead on identifying those circumstances in which averaging across sources would be fully consistent with the overall statutory intent.

In general, EPA has concluded that it is permissible to establish within a NESHAP a unified compliance regimen that permits averaging or trading across affected sources subject to the standard under certain conditions. Averaging across affected sources is permitted only

if it can be demonstrated that the total quantity of any particular HAP that may be emitted by that portion of a contiguous major source that is subject to the NESHAP will not be greater under the averaging mechanism than it would be if each individual affected source complied separately with the applicable standard. Under this rigorous test, the practical outcome of averaging is equivalent in every respect to compliance by the discrete sources, and the statutory policy embodied in the MACT floor provisions is therefore fully effectuated. A construction of the Act which permits EPA to establish a unified compliance regimen in these limited circumstances promotes economic efficiency and has no adverse environmental consequences. In a NESHAP incorporating such a unified compliance regimen, EPA would construe compliance with the overall regimen to constitute compliance for each of the affected sources.

Strict limits on the scope and nature of averaging across sources are necessary to ensure that no HAP is emitted by that portion of a major source subject to a NESHAP in quantities that are greater than those that would result from compliance by each discrete affected source within the facility. These limits include: (1) No averaging can be permitted between differing pollutants, (2) no averaging can be permitted between sources that are not part of the same major source, (3) no averaging can be permitted between sources within the same major source that are not subject to the same NESHAP, (4) statistical discounts must be derived and applied to account for the variability in emissions by the sources to be averaged, and (5) no averaging can be permitted between existing sources and new sources.

This NESHAP fully satisfies each of these criteria. Accordingly, EPA has concluded that the averaging of emissions across affected sources permitted by this NESHAP is consistent with the Clean Air Act. In addition, EPA notes that the provision in this NESHAP that requires each facility that intends to utilize emission averaging to submit an implementation plan provides additional assurance that the necessary criteria will be adhered to.

#### *E. Compliance Provisions*

Compliance with the standard must be demonstrated at startup for new sources and in 2 to 4 years from the effective date of the final rule for existing sources. All existing plants would be allowed at least 2 years. An extension for a fourth year may be

granted by the regulatory authority under section 112(i)(3)(B) of the Act.

Few changes were made to § 63.846 of the proposed rule concerning requirements for performance tests. Following approval of a site-specific test plan, § 63.847 of the final rule requires the owner or operator to conduct an initial performance test during the first month following the compliance date. A clarification was made to § 63.846(d) of the proposed rule (§ 63.847(c) of the final rule) that not all of the primary emission control devices have to be sampled during the first month of compliance. If valid emission test results are available for the control device from tests during the preceding 12 months, those results can be used to determine the contribution of the primary control system to the total emissions for the initial performance test.

Section 63.847(d), which contains instructions for determining compliance, also includes clarifying revisions. Sections 63.847(d)(1) of the final standard clarifies that to determine compliance for TF emissions from potlines, the owner or operator must compute and record the average of at least three runs each month for secondary emissions and at least three runs each year for the primary control device. Section 63.847(d)(2) clarifies that to determine compliance for POM emissions from Soderberg potlines, the average of at least three runs each quarter (one run per month) for secondary emissions and at least three runs each year for the primary control system is required. Compliance with the applicable emission limits for anode bake plants is determined by the average of at least three runs each year. Section 63.847(d)(3) clarifies that the provisions for previous control device tests include anode bake furnaces as well as potlines.

Section 63.847(e) of the final rule also includes minor changes to clarify the equations used to determine compliance. Editorial changes were made to correct misnumbering of Equations 1 and 2. In Equation 1, the definition of  $Q_{sd}$  was clarified to read as the volumetric flow rate of effluent gas "corresponding to the appropriate subscript location" with units of dry standard cubic meters per hour (dscm/hr) or dry standard cubic feet per hour (dscf/hr). The instructions for determining the aluminum rate (P) in §§ 63.846(e)(6) and (e)(7) also were revised. Sections 63.847(e)(6) and (e)(7) of the final rule require the owner or operator to determine the aluminum production rate by dividing the number of hours in the calendar month into the weight of aluminum tapped from the

potline during the calendar month that includes the three runs of a performance test. The rate of green anode material introduced into the furnace is determined by dividing the number of operating hours in the calendar month into the weight of green anode material used during the calendar month in which the performance test was conducted.

No changes were made to the proposed performance test provisions for paste production in § 63.847(f) of the final rule. Initial compliance with the equipment standards for new and existing plants is demonstrated through site inspections(s) and review of site records by the applicable regulatory authority.

A new paragraph, § 63.847(g), was added to describe compliance provisions for new pitch storage tanks. The owner or operator may elect one of two methods of demonstrating compliance: (1) Submit a design evaluation documenting that the control device being used achieves the required control efficiency for POM (95 percent or more) during a reasonably expected maximum filling rate; or (2) submit the results of a performance test. Specific information to be included under either method of compliance is described in the rule. The owner or operator also would include a description of the parameters to be monitored to ensure the control device is being properly operated and maintained, an explanation of the criteria used to select that parameter, and the frequency with which monitoring will be performed.

Section 63.846(g) of the proposed rule was renumbered as § 63.847(h) in the final rule to accommodate the addition of the preceding paragraph. Minor changes were made to clarify the wording in paragraph (h), which requires that the owner or operator determine the parametric operating limits and monitoring frequency for each control device. Section 63.847(h)(1) of the final rule clarifies that for potlines and anode bake furnaces, the owner or operator must determine upper and/or lower operating limits, as appropriate, for each monitoring device "for the emission control system" from the values recorded during each of the runs performed during the initial performance test and from historical data from previous performance tests. The wording of § 63.847(h)(2) also was clarified to require the owner or operator of a paste production plant to specify parameters to be monitored and operating limits for the emission control device (rather than the emission capture

and control devices). References to the part 70 operating permit were deleted.

#### F. Emission Monitoring

Few changes were made since the proposal in the emission monitoring requirements of § 63.848. The final standard requires the owner or operator to perform monthly sampling of TF secondary emissions from each potline using Methods 13 and 14 (40 CFR part 60, appendix A) or an approved alternative method. Emissions of POM from Soderberg potlines are monitored by performing quarterly sampling of POM using Method 315 or an approved alternative method. The monthly average for TF and the quarterly average for POM are computed using the results of at least three runs per month for secondary emissions of TF and at least one run per month (three runs per quarter) for POM from Soderberg potlines, the aluminum production rate, and the most recent compliance test for the primary control system. Sections 63.848(a) and (b) clarify that the duration of each run for secondary emissions must cover a complete operating cycle. Under § 63.848(b), the primary control system for POM emissions must be sampled over an 8-hour period, unless site-specific factors dictate an alternative sampling time, subject to the approval of the regulatory authority. Annual sampling of TF using Method 13 and POM (for Soderberg potlines) using Method 315 is required for the primary emission control system for potlines. Annual sampling of TF using Method 13 and POM using Method 315 is required for the anode bake furnace stack.

Section 63.848(d) of the rule provides an alternative to monthly monitoring of TF or POM secondary emissions from each potline by allowing the owner or operator to conduct a monthly performance test for one potline using reference test methods and to monitor similar potline(s) using approved alternative methods. In response to public comment, the criteria for similar potlines were revised to require that their structure, operability, type of emissions, and volume and concentration of emissions be substantially equivalent.

Section 63.848(d) provides that a similar potline is to be monitored using an alternative method meeting the requirements in the rule. An approved alternative may include an HF continuous emission monitor (CEM). Because the Alcan cassette method is included in the final rule as Method 14A, references to this method as an approved alternative for monitoring

similar potlines were unnecessary and were deleted from the rule.

To show that another method is an acceptable alternative, the owner or operator must develop a correlation with results from the applicable methods in the rule (such as Methods 13, 14, and 315) to the satisfaction of the regulatory authority. For fluoride measurements, the alternative method must account for or include gaseous fluoride and cannot be based on measurement of particulate matter or particulate fluoride alone because HF, the HAP of interest, is in gaseous form. The final rule also requires the owner or operator to derive an alternative limit for the HF CEM or other alternative monitoring method. The owner or operator must demonstrate that the alternative method and limit will result in a level of emission control that is the same as or better than the level that would have otherwise been achieved. After demonstrating that the potlines are similar, EPA methods must be used to monitor one potline, and the other similar potlines must be monitored using an approved alternative procedure.

Under § 63.848(e) of the final standard, the owner or operator of a plant that demonstrates consistent compliance with an applicable emission limit and low variability may apply for a reduced sampling frequency, such as quarterly sampling instead of monthly sampling. This section of the proposed rule was changed after proposal to provide a simplified procedure to obtain reduced sampling frequency, including removal of the requirement to publish the approval of reduced sampling in the **Federal Register**. This reduced sampling provision was clarified to apply only to the monthly sampling requirement for TF from potroom roofs. If a facility achieves a long-term average over 24 months of sampling that is no more than 60 percent of the applicable limit and no monthly average exceeds 75 percent of the limit, then monthly sampling for TF can be reduced to quarterly sampling.

Proposed provisions governing excess emissions also were revised. Under the final rule, if emissions in excess of the applicable TF limit occur while performing quarterly sampling (under an approved alternative), the owner or operator must return to monthly sampling for at least 12 months and may reduce to quarterly sampling when: (1) The average of all tests performed over the most recent 24-month period does not exceed 60 percent of the applicable limit and (2) no more than one monthly performance test in the most recent 24-month period exceeds 75 percent of the

applicable limit. If emissions in excess of the applicable TF limit occur while performing quarterly sampling (under an approved alternative), the owner or operator must return to the monthly sampling schedule until another request for an alternative sampling frequency is approved.

The final standard requires the monitoring of control device parameters. For example, plants with dry alumina scrubbers must perform a daily visual inspection of the stack and install devices to monitor the flow of alumina and air. The control device parameters are evaluated from data collected during the initial performance test and from historical performance tests to determine upper and/or lower limit(s), as appropriate, for each process parameter. The owner or operator may redetermine the upper and/or lower operating limits, as appropriate, based on historical data and other information and submit an application to the regulatory authority to change the applicable limit(s). A corrective action program is triggered if the control device is operating outside of the acceptable range for the specified parameters. Failure to initiate corrective actions within 1 hour after exceeding the limit is a violation. A violation also occurs if the operating limit for a parameter is exceeded more than six times in any 6-month reporting period. For the purpose of determining the number of exceedances, no more than one exceedance will be attributed in any given 24-hour period.

A clarification was made to § 63.848(f) with respect to the selection of monitoring parameters and frequency. Whenever practicable, the EPA expects the owner or operator to install a continuous parameter monitoring system as defined in the general provisions and this subpart. At a minimum, the owner or operator must submit a description of the parameters and a rationale for selecting the operating limits and monitoring frequency. A discussion of how the selected parameters would relate to emission controls must be included.

The owner or operator also must install devices to measure the daily weight of aluminum produced and the weight of anodes placed in the furnace for an operating cycle. The total weight of all anodes placed in the furnace may be measured, or the number of anodes placed in the furnace and a representative weight may be measured to determine the total weight.

#### G. Test Methods

Section 63.849 of the final rule adds Method 14A to appendix A of 40 CFR

part 60 as an approved alternative method for measuring TF from potroom roofs. Minor changes were made to Method 315 (added to appendix A of 40 CFR part 63) as a result of public comment. For example, section 6.1 of Method 315 was revised to acknowledge that the use of grease for sampling train components is not recommended because many greases are soluble in methylene chloride. Section 6.2 of Method 315 was revised to include the use of Teflon® bristle brushes and tetrafluoroethylene (TFE) wash bottles. A Buchner fritted funnel was substituted for Allihn tubes in section 6.3.8 and other sections.

Section 63.849(e) of the final rule was clarified in terms of procedures and criteria to qualify an alternative test method. The alternative method must be evaluated from simultaneous sampling using a reference test method. Approval is granted only if the owner or operator demonstrates that the level of emission control from an alternative method and alternative emission limit is the same as or better than the level that would have otherwise been achieved.

#### H. Time Limit for Approval or Disapproval of Submissions

The proposed rule was revised to add a new section (§ 63.851) that places a 60-day limit on the amount of time for the regulatory authority to indicate the need for additional time to review the applications and requests for changes allowed under this rule or to approve or disapprove applications and requests for changes allowed under the rule. The 60-day period begins after the owner or operator has been notified that the submission is complete. This provision applies to the compliance test plan, an application to change control device parameter operating limits, requests for alternative monitoring for similar potlines, requests for approval of alternative methods for sampling and analysis, and requests for reduced sampling frequency.

#### I. Notification, Reporting, and Recordkeeping Requirements

Notification, reporting, and recordkeeping requirements for MACT standards are included in the NESHAP general provisions (40 CFR part 63, subpart A). Section 63.850 of the final standard incorporates all of these provisions, except that the existing performance specifications for CEM are not applicable to an HF CEM because such specifications have not yet been developed for that device.

The notification requirements include one-time notifications of applicability, intent to construct or reconstruct,

anticipated startup date, actual startup date, date of performance test, compliance status, compliance approach (if applicable), and the intent to use an HF CEM (if applicable) for each affected source. The notification of special compliance obligations was deleted because it does not apply to this source category. The proposed rule also was revised to indicate that the notification of the intent to use an HF CEM was a one-time event per affected source.

The owner or operator is required to submit a report of performance test results (which can be sent as part of the compliance status notification), an annual summary of all subsequent tests, and semiannual reports of excess emissions, if any excess emissions occurred. If excess emissions are reported, quarterly reports are required until compliance has been demonstrated for 1 year. A startup, shutdown, and malfunction plan also would be required with semiannual reports of events that are not managed according to the plan. The plan must also include the corrective actions to be taken if the limit for a control device's operating parameter is exceeded.

Recordkeeping requirements for all MACT standards are established in § 63.10(b) of the general provisions. In addition to these requirements, the standard requires plants to maintain records of information needed to determine compliance. Section 63.850(e)(4)(ii) of the final rule clarifies that the owner or operator must maintain the daily production rate of green anode material placed in the anode bake furnace (rather than the production rate for each operating cycle). A new recordkeeping requirement was also added in response to public comment. Section 63.850(e)(4)(xv) requires records documenting the portion of TF that is captured and measured as particulate matter and the portion that is captured and measured as gaseous. This requirement provides potentially useful information to EPA and the States at no additional cost.

All records must be retained for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. The records for the most recent 2 years must be retained onsite; records for the remaining 3 years may be retained offsite but still must be readily available for review. The files may be retained on microfilm, on microfiche, on a computer, or on computer or magnetic disks.



### *J. Display of OMB Control Numbers*

In a separate rulemaking action taken in conjunction with the final rule adopting a NESHAP for primary aluminum reduction plants, EPA is amending the table of currently approved information collection request (ICR) control numbers issued by the Office of Management and Budget (OMB) for various regulations. This separate amendment updates the table to accurately display those information requirements contained in the NESHAP. This display of the OMB control number and its subsequent codification in the Code of Federal Regulations satisfies the requirements of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*) and OMB's implementing regulations at 5 CFR 1320.

The ICR was previously subject to public notice and comment prior to OMB approval. As a result, EPA finds there is "good cause" under section 553(b)(B) of the Administrative Procedure Act [5 U.S.C. 553(b)(B)] to amend this table without prior notice and comment. Due to the technical nature of the table, further notice and comment would be unnecessary. For the same reasons, EPA also finds that there is good cause under 5 U.S.C. 553(d)(3).

### **V. Summary of Impacts**

Nationwide emissions from primary aluminum potlines are estimated at 6,400 tpy of TF. After implementation of the final standards, these emissions will decrease by almost 50 percent to 3,400 tpy. Polycyclic organic matter emissions will be reduced by about 45 percent, from 3,200 tpy to 1,800 tpy. TF emissions from the anode bake furnaces are estimated at 700 tpy; POM emissions are estimated at 555 tpy. After control of all bake furnaces, TF emissions will be reduced by 97 percent, and POM emissions will be reduced by 84 percent. Polycyclic organic matter emissions from paste production plants, estimated at 147 tpy at baseline, will be reduced by about 130 tpy, to about 16 tpy—an 89 percent reduction from current levels. Emissions of other HAPs included in the TF and POM emissions will also be reduced, as will non-HAP pollutants such as PM. For example, PM emissions will be reduced by 16,000 tpy.

The generation of solid waste and wastewater will be reduced when at least one plant replaces its wet scrubber system with a dry alumina scrubber. The dry alumina scrubber captures fluorides and other pollutants and returns them to the reduction cell. The proposed rule is estimated to have no

significant effect on energy consumption.

The total capital cost of the proposed rule is estimated as about \$160 million, with a total annualized cost of \$40 million per year. As discussed in section VI.I of this document, cost estimates supplied by the industry's trade association were much higher than the EPA estimates. The major cost impacts for potlines are expected to come from the installation of dry alumina scrubbers for the primary control system at one plant and from work practices, operating procedures, maintenance and repair, and equipment modifications at most plants. A few plants may incur capital costs to replace or upgrade hoods or doors and to install automated equipment for improved emission control.

The cost estimates for paste production assume that the 18 plants without dry coke scrubbers for controlling POM emissions will each install one. However, some plants may be able to meet the performance standard with dry alumina scrubbers or other control devices, or they may be able to utilize many of the components of their existing system. The estimated cost for control of anode bake furnaces assumes that the 5 of 17 plants without a dry alumina scrubber must each install one.

Currently, about one-third of existing potlines are sampled for TF regularly. Because of the flexibility provided in the rule, many plants are expected to take advantage of the use of HF CEMs and Alcan cassettes for similar potlines, both of which are much less expensive than manual sampling using Methods 13 and 14. The nationwide capital cost estimate of \$7 million for monitoring equipment includes new Method 14 manifolds, HF CEMs, and Alcan cassettes. The total annualized cost of monitoring (including capital recovery) is estimated as about \$4 million per year after all plants are subject to the rule. These costs may be reduced significantly as plants qualify for reduced sampling frequency (e.g., quarterly instead of monthly). The CEM will have value as a process monitoring tool in addition to its use for monitoring to determine compliance.

The market price increase calculation indicated that implementing the controls will result in a primary aluminum market price increase of less than 1 percent. As a result of the low market price increase and relatively inelastic demand, the corresponding changes in output, employment, and total revenue were also low (all less than 1 percent). Therefore, the economic impact analysis estimates that the rule

will not result in significant economic impacts for the primary aluminum industry.

### **VI. Summary of Responses to Major Comments**

The EPA proposed the NESHAP for primary aluminum reduction plants on September 26, 1996 (61 FR 50586). The proposed regulatory text of the rule, the Basis and Purpose Document, and the Technical Support Document that presented information used in developing the proposed rule were made available to the public for review and comment. A 60-day comment period from September 26, 1996, to November 25, 1996, was provided to accept written comments from the public on the proposed rule. The opportunity for a public hearing was provided to allow interested people to present oral comments to the EPA on the rulemaking. However, the EPA did not receive a request for a public hearing, so a public hearing was not held.

The EPA received a total of 15 comment letters regarding the proposed NESHAP for primary aluminum reduction plants. A copy of each comment letter is available for public inspection in the docket for the rulemaking (Docket No. A-92-60; see the ADDRESSES section of this document for information on inspecting the docket). The EPA has had follow-up discussions with various commenters regarding specific issues initially raised in their written comments that were submitted to the Agency during the comment period. Copies of correspondence and other information exchanged between the EPA and the commenters during the post-comment period are available for public inspection in the docket for the rulemaking.

All of the comments received by the EPA were reviewed and carefully considered by the Agency. Changes to the rule were made when the EPA determined it to be appropriate. A summary of responses to selected major comments received on the proposed rule is presented below. Additional discussion of the EPA's responses to public comments is presented in the Background Information Document (see the ADDRESSES section of this preamble).

#### *A. Subcategories*

*Comment:* Several commenters supported the subcategories that were developed for potlines, and two commenters questioned the number of and basis for the subcategories. Specific questions were raised about the subcategories for the older vintage

prebake potlines (CWPB2), for potlines producing high-purity aluminum (CWPB3), and for the vertical stud Soderberg potlines (VSS2).

*Response:* The development of subcategories is discussed in detail in the Basis and Support Document. In general, the subcategories are based primarily on differences in the process operation, process equipment, emissions, and the applicability of control devices.

A distinction was made between the larger and more modern prebake potlines in CWPB1 and the smaller and older potlines in CWPB2. The CWPB2 potlines have somewhat higher emissions than the CWPB1 potlines because they are more difficult to control and there are more opportunities for fugitive emissions to escape. A major factor is that these smaller potlines require more frequent anode changes and more frequent opening of the reduction cells, both of which result in more fugitive emissions' escaping from the cells.

The potlines in the CWPB3 subcategory that produce high-purity aluminum can do so only because they use wet scrubbers as the primary control device and do not return the contaminants removed with the pollution control residue back to the process. In contrast, the potlines in the CWPB1 subcategory use dry alumina scrubbers as the primary control device and return pollution control residue, including contaminants and fluorides, back to the process. If the CWPB3 potlines were forced to install dry alumina scrubbers, an adequate quantity of high-purity aluminum could not be produced and their market would be lost.

A distinction was made between two types of vertical stud Soderberg potlines (VSS1 and VSS2) because of differences in the applicability of control devices. The VSS1 group of potlines uses wet roof scrubbers to control fugitive emissions from the cells, and the VSS2 group of potlines uses work practices and equipment maintenance to control the escape of fugitive emissions from the cells (i.e., they focus on pollution prevention for emission control). A major concern in requiring the installation of wet roof scrubbers on the VSS2 potlines was that other plants with wet roof scrubbers had reported operational problems in cold weather (i.e., freezing conditions), and the VSS2 potlines operate in the cold climate of northern Montana. Consequently, the technology was judged not to be adequately demonstrated for the VSS2 potlines. Another concern was that roof scrubbers could provide a disincentive

for the VSS2 potlines to continue their efforts to prevent the escape of emissions because the emissions would be subsequently controlled by the scrubbers. Currently, the VSS2 potlines have much lower levels of fugitive emissions in terms of the quantity that actually escapes from the reduction cells compared to the VSS1 potlines, which rely in large part on the roof scrubbers for additional fugitive emission control.

#### *B. Format of the Standard*

*Comment:* Two State commenters asked that EPA consider developing work practice standards for potlines, and some commenters also suggested that an emission limit be developed for paste plants instead of an equipment standard.

Other commenters supported the development of an equipment standard for paste plants. Commenters also asked that EPA consider alternatives for the paste plant that would allow and encourage pollution prevention, as well as other control alternatives that might be equivalent to or better than the equipment standard that was proposed (dry coke scrubber).

*Response:* Section 112(h) of the Act only allows development of a design, equipment, work practice, or operational standard when it is not feasible or practicable to establish an emission standard. Consequently, a work practice standard was not developed for potlines because there was an extensive database on TF emissions on which to base an emission standard. An emission standard allows the owner or operator to meet the emission limit using any combination of control techniques, including work practices, upgrading equipment, process modifications, pollution prevention, etc. It also provides flexibility for developing innovative controls or pollution prevention measures in the future that may be more cost effective by not mandating work practice techniques. The owner or operator will find it necessary to have adequate work practices in place to meet the emission limits in the rule; consequently, it is not necessary to develop a work practice standard.

The first choice was also the development of an emission standard for paste production plants; however, there were too few POM data (only two data points) to develop defensible and achievable limits. One reason for this is that the control technology is relatively new, and there were no data collected by EPA test methods prior to this rulemaking. Therefore, the development of a quantitative standard was not

feasible or practicable. The problem was also complicated by the numerous variations in the design and operation of paste plants. However, the available information and engineering judgement indicated that the best POM control technology in use for paste plants was the dry coke scrubber, which was determined to represent MACT. For these reasons, an equipment standard requiring the use of a dry coke scrubber or equivalent alternative control for paste production was developed under section 112(h) of the Act.

Comments were received from both the industry and States asking for consideration of control techniques, including pollution prevention, that might provide a level of control equivalent to or better than a dry coke scrubber. After consideration, EPA decided that a streamlined approach could be used to implement more efficiently section 112(h)(3) of the Act, which allows the development of an alternative means of emission limitation if it achieves an emission reduction at least equivalent to that achieved by the design, equipment, work practice, or operational standard. An emission limit for POM in lb/ton of paste was developed from the limited data associated with two of the best controlled plants in the industry. Although the limit may represent a level of emission control more stringent than the equipment standard that was determined to be MACT, an alternative standard in lb/ton of paste will provide opportunity for pollution prevention measures (such as reducing the quantity of POM used in paste production). The alternative standard also provides the opportunity to qualify other types of emission controls that might be developed in the future that are more efficient than the dry coke scrubber.

The alternative limit in lb/ton does not preclude plants from petitioning for other alternative means of emission limitation under section 112(h)(3) of the Act based on demonstrating an equivalent or greater emission reduction. However, it provides one method to implement the provisions for alternative standards more efficiently. As required in section 112(h)(4) of the Act, when EPA has sufficient data to replace both parts of the current standard for paste production plants with a quantitative emission limit, EPA will revise that standard accordingly.

#### *C. Achievability of Emission Limits*

*Comment:* Several commenters expressed concern that the emission limits for anode bake furnaces might not be achievable and requested that the rule acknowledge that these limits may

need to be increased as more data are collected. One commenter questioned the achievability of the POM limit for HSS potlines, and another commenter supported the HSS limits and submitted additional data for the MACT floor potlines to show that it had been achieved. One commenter questioned the POM limits for VSS2 potlines because the limits were based on data from VSS1 potlines.

*Response:* The data for anode bake furnaces support that the proposed emission limits for both new and existing sources are achievable. Opportunities for improved control other than the installation of dry alumina scrubbers are available, and each owner or operator should investigate these opportunities thoroughly. For example, careful cleaning of recycled anodes to remove fluorides has been demonstrated to reduce fluoride emissions from anode bake furnaces. Careful control and optimization of combustion conditions improve destruction of POM compounds and reduce POM emissions.

The EPA believes that the data show that the POM limit is achievable for the HSS subcategory by plants using the MACT floor technology. Note that the control technology used for the primary system for the MACT floor plant is a dry alumina scrubber, whereas the plant concerned about the achievability uses an electrostatic precipitator. Improvements may be needed in the electrostatic precipitator primary control system and in the potline's capture system to reduce fugitive emissions to achieve the same level of control achieved by the MACT floor plant.

The proposed POM limit for the VSS2 subcategory was based on data from VSS1 potlines because there were no valid data available for POM emissions from VSS2 potlines. Following proposal, POM data were collected for the MACT floor VSS2 potline, and a commenter for the company asked that EPA consider their data in establishing the POM limit. The EPA analyzed the new POM data and concluded that the POM limit for the VSS2 subcategory should be reduced from 3.7 lbs/ton to 3.6 lbs/ton. The emission test reports and EPA's analysis are documented in the rulemaking docket. [See Docket Item IV-B-1.] The EPA appreciates the effort of the company to perform emission testing and to provide data that improve the technical basis of the POM limit for VSS2 potlines.

#### *D. Incorporation of the NSPS*

*Comment:* Several commenters recommended that the NSPS for

primary aluminum plants (40 CFR part 60, subpart S) be removed and any necessary provisions be incorporated into the NESHAP. These commenters believed that the higher TF limits in the amended NSPS should be incorporated instead of the lower limits in the original NSPS because the amendment concluded that the original emission limits were not achievable 100 percent of the time. In addition, the NESHAP general provisions (40 CFR part 63, subpart A) require that control equipment be operated and maintained in a manner consistent with good air pollution control practices for minimizing emissions at least to the level required by all relevant standards. Therefore, these commenters concluded that this requirement overlaps the "exemplary operation" requirement of the NSPS, and by complying with the general provisions, a source qualifies for the higher limits in the NSPS. State agency commenters thought that the more stringent limits in the original NSPS should be used for incorporation into the NESHAP.

Some commenters stated that the opacity requirements of the NSPS were a monitoring provision and not an emission limit. They pointed out that the proposed NESHAP contained more provisions than the NSPS to ensure the control equipment was operating properly, such as monitoring the air and alumina flow to the dry alumina scrubbers and a daily visual inspection of the control equipment rather than only a monthly observation of opacity, which the NSPS requires. Consequently, they believed the opacity standard in the NSPS could be removed without any loss of stringency. Another commenter stated that the NSPS opacity limit was not applicable for wet emission control systems because of interferences and observer error and recommended that facilities with wet emission control systems be allowed to develop an alternative opacity limit if they could demonstrate that the mass emission limit for TF was being met. State agency commenters stated that the opacity standard should be retained when the NSPS is incorporated into the NESHAP.

In general, State agency commenters agreed that the NSPS could be incorporated into the NESHAP, but only if all of the NSPS provisions are retained. These include the lower emission limits in the original NSPS, retention of the modification and reconstruction provisions of part 60, and maintenance of the opacity limits.

*Response:* The EPA had stated in the original proposal when requesting comments on this issue that incorporating the NSPS into the

NESHAP should result in a standard that would be no less stringent than if both standards remained in place. Following the receipt of comments and no indication that anyone was opposed to incorporation of the NSPS, EPA conducted additional discussions with all stakeholders. Representatives from each of the 14 States that have primary aluminum reduction plants were contacted and were provided the opportunity to discuss the issues and provide comments. Similar discussions were held with the Aluminum Association and industry representatives, who also provided comments.

Based on these discussions, a general consensus was reached on how the NSPS could be incorporated into the NESHAP. First, the NSPS was amended to allow an affected facility to comply either with the NSPS or with the special provisions incorporated into the NESHAP. Second, the NSPS requirements were included in a separate section of the NESHAP, and these provisions apply only to emissions of TF. They apply only to Soderberg potlines and prebake potlines in the CWPB2 and CWPB3 subcategories because other types of existing potlines are subject to TF emission limits under the NESHAP that are more stringent than the NSPS limits. Anode bake furnaces are not included because the NESHAP limits for existing bake furnaces are equivalent to those in the NSPS, and the NESHAP limits for new bake furnaces are much more stringent than those in the NSPS.

The result of these discussions was general agreement that the definitions of "modification" and "reconstruction" should be incorporated so that any new, modified, or reconstructed potroom group would trigger the NSPS provisions that have been included in the NESHAP. In other words, any potroom group that would have become subject to the NSPS because of the part 60 provisions would become subject to the special provisions incorporated into subpart LL of part 63. This was accomplished by adding definitions for "potroom group modification" and "potroom group reconstruction" that matched the requirements in part 60. The modification would occur if there was an increase in the total or overall TF emissions from the potroom group (i.e., changes that result in a decrease in emissions in one part of the potroom group and an increase in another part of the group are not modifications if total emissions from the group do not increase).

The EPA decided not to incorporate only the lower NSPS limits as suggested

by some commenters or only the higher limits recommended by other commenters. Instead, both sets of limits were incorporated into the NESHAP with the same language as that used in the amended NSPS. In other words, the lower limits apply unless the owner or operator can meet the exemplary operation requirements as stated in the NSPS, in which case the upper limits would apply. This requires that the owner or operator demonstrate that exemplary operation and maintenance procedures were used with respect to the emission control system and that control equipment was operating properly at the potline during the performance test.

Additional insight into proper operation and maintenance is given in the proposal preamble for the amended NSPS (45 FR 44203), which lists these items as basic to good control of emissions from prebake plants:

- (1) Hood covers should fit properly and be in good repair;
- (2) The hood exhaust rate should be increased for individual pots when hood covers are removed (if there is an adjustable air damper system);
- (3) Hood covers should be replaced as soon as possible after each potroom operation;
- (4) Dust entrainment should be minimized during materials handling operations and sweeping of the working aisles;
- (5) Only tapping crucibles with functional air return systems should be used; and
- (6) The primary control system should be regularly inspected and properly maintained.

For horizontal stud Soderberg potlines, Items (4) through (6) apply, but Items (1) through (3) are replaced by the following because of differences in pot design:

- (1) Side and end doors should fit properly and be in good repair;
- (2) The exhaust rate should be increased for individual pots when a side or end door is open (if there is an adjustable air damper system); and
- (3) Side and end doors should be closed as soon as possible after each potroom operation.

The following variations apply to vertical stud Soderberg potlines:

- (1) An ore cover should be maintained on the pot;
- (2) The collector skirt and burner should be in good repair; and
- (3) Tap holes should not be opened too far in advance of the tap.

Another issue was related to the fact that the NSPS limits apply to a potroom group, whereas the NESHAP limits apply to a potline. Because of many

variations in the configuration of potrooms and potlines in the industry, limits for both would result in a somewhat confusing situation of duplicative emission limits and other requirements for certain reduction cells and unnecessary requirements associated with monitoring, reporting, and recordkeeping for both potroom groups and the potline. To resolve this issue, a method was devised in the NESHAP to combine the limit for the NSPS potroom group with that for the NESHAP potline based on the production capacity of the reduction cells that would be subject to each set of limits. The result is a single TF emission limit for the entire potline that maintains equivalent stringency, and it has the additional advantage of allowing the use of the NESHAP potline requirements for monitoring, reporting, and recordkeeping to avoid unnecessary duplication.

The opacity issue was resolved by incorporating the 10 percent limit for potroom groups from the NSPS into the NESHAP. However, the provisions in part 60 that allow the development of an alternative opacity limit when the facility demonstrates that the mass emission limits are being met were also included in the NESHAP. The alternative opacity limit cannot exceed 20 percent. Historically, opacity has been measured routinely for the discharge stacks of primary control systems. However, the EPA has no indication that the opacity of a potroom group roof monitor has been measured using Method 9.

The EPA decided that additional provisions for anode bake furnaces were not necessary because the NESHAP requires that existing furnaces be controlled at levels equivalent to what the NSPS would have required for new, modified, or reconstructed furnaces. This ensures that the MACT floor control technology (dry alumina scrubbers) or the equivalent will be installed on all bake furnaces to control emissions. There was no need to incorporate the NSPS opacity limit of 20 percent for bake furnaces because the MACT floor technology will achieve lower opacity levels, the NESHAP monitoring requirements for the control device are more comprehensive, there is no loss in stringency, and most States already have general opacity limits of 20 percent for stationary point sources.

In consolidating the two rules, the EPA decided to use the sampling frequency and monitoring provisions of the NESHAP. They offer several advantages over the NSPS provisions alone, there is no effect on the relative stringency or the emission reductions

achieved, and they will reduce unnecessary monitoring, reporting, and recordkeeping. In addition, the NESHAP requires that any new, modified, or reconstructed potroom group be sampled for TF emissions, which is what the NSPS would have required. Sampling can be performed effectively for the potroom group with the addition of new monitoring equipment or the expansion or adaptation of existing monitoring equipment in the same potline if the sampling system is determined to be representative of the entire potline and if the relevant regulatory authority determines that the sampling system meets the requirements of the reference test methods. In addition, the sampling of that potroom group may be used to determine emissions from the total potline if they are representative of the entire potline. To be representative of the entire potline, the sampling system must not cover only or primarily new reduction cells, which would be expected to have better hooding and emission control than older cells.

#### **E. Time Limit for Approval by the Regulatory Authority**

*Comment:* Several industry commenters recommended that the final rule include a time limit for regulatory authority review, approval, and/or action on submissions. Examples include the compliance test plan, the implementation plan for emission averaging, an application to change control device parameter operating limits, requests for alternative monitoring for similar potlines, requests for approval of alternative methods for sampling and analysis, requests for reduced sampling frequency, and requests to modify the startup, shutdown, and malfunction plan. According to the commenters, each submission should be given automatic approval if no action or response is taken by the applicable regulatory authority within some time period (generally within 30 days of receipt).

*Response:* The proposed rule contained provisions for a time limit of 120 days for regulatory approval or disapproval of the implementation plan for emission averaging, and this provision was kept in the final rule. In addition, the general provisions in subpart A of 40 CFR part 63 allow the owner or operator to revise the startup, shutdown, and malfunction plan without submitting it for approval. The owner or operator must keep the previous (superseded) version and make it available upon request for a period of 5 years after the revision. With respect to other submissions, the rule was

revised to give the regulatory authority 60 days after the submission is deemed to be complete to approve or disapprove the submission. The 60-day period applies to the facility's test plan used to determine compliance, requests for changes in operating parameter limits, applications for similar potline monitoring, requests for reduced sampling frequency, and requests for alternative test methods.

#### F. Relationship to Other Rules

*Comment:* Several commenters asked about the relationship of the NESHAP to other rules. One commenter asked for discussion of how existing new source review (NSR) and prevention of significant deterioration (PSD) rules affect the NESHAP, and another asked for clarification of what TF emission limit would apply in the event of a modification under the NSPS. Another commenter believes that conversion and installation of equipment in order to comply with this rule should not trigger the NSPS. The commenter requested that the language of the preamble and the rule be changed to reflect that modifications made to affected sources to come into compliance with the primary aluminum NESHAP are exempted from NSPS applicability. Several industry commenters recommended that the final rule include a provision acknowledging that the monitoring provisions in the rule, including the approved methods and alternatives, satisfy the monitoring provisions under section 114 of the Act and the title I monitoring requirements for PM emissions. Other commenters asked that certain alternatives allowed by the rule, such as requests to change monitoring parameters or to implement emission averaging, be identified within the rule as "administrative changes" to the operating permit issued under the part 70 permit program.

*Response:* The NSR and PSD requirements are not changed or directly affected by the provisions in the NESHAP. However, the NESHAP incorporates the NSPS provisions for primary aluminum reduction plants, which will reduce duplicative monitoring, reporting, and recordkeeping requirements while maintaining equivalent stringency in the applicable emission limits. In addition, the incorporation of the NSPS includes language from part 60 that excludes from the definition of "modification" the addition of an emission control system that results in the reduction of air pollutants, as the commenter suggested. As several commenters suggested, the compliance assurance monitoring (CAM) rule would not apply

to the sources and pollutants regulated under the NESHAP. Standards promulgated after 1990 are not subject to the CAM under the assumption that the prescribed monitoring in such rules would meet the requirements equivalent to those required for CAM. The EPA determined that it is not appropriate to specify within the NESHAP whether changes to permits should be considered administrative or as permit modifications. This is accomplished more directly through the permit writer, who can incorporate the alternatives allowed by the NESHAP into the permit. By adding the NESHAP provisions to the permit, the flexibility allowed by the NESHAP is maintained with respect to implementation of emission averaging and other provisions. In addition, the source may suggest to the permit writer that certain flexible provisions are important to the source based on the compliance approach that the source anticipates implementing.

#### G. Reduced Sampling Frequency

*Comment:* One commenter did not think there is any need for **Federal Register** publication to provide public notification of approval of reduced sampling frequency. Another commenter asked that criteria for qualifying for reduced sampling frequency be included in the rule and suggested using the approaches that had been used in other rules, with reductions in the frequency after demonstrating compliance over some period of time.

Several commenters recommended that monitoring provisions in the final rule be expanded to allow less frequent monitoring for POM upon demonstration of good emission control performance, as is allowed for TF.

State agency commenters supported the concept of reduced sampling if a facility consistently achieves compliance with an emission limit and has low variability. However, the commenters asked that EPA specify a minimum measure of acceptable variability for reduced sampling frequency to ensure consistent evaluations of these requests and to ease the burden on the regulatory authority.

*Response:* The EPA agrees that the provisions for qualifying for reduced sampling can be improved by making them easier to implement and that there is no need for publication in the **Federal Register**. In addition, if they are structured properly, provisions for reduced sampling frequency can be used to obtain control performance well below the emission limit, which will result in additional emission reductions.

The EPA reviewed the performance of plants that had qualified for reduced sampling under the NSPS and also examined the average performance, variability, and emission limits achieved by the MACT floor plants. Based on this review, a procedure was developed that was designed to ensure that plants that qualified for reduced sampling had low variability, consistently met the limit, and achieved an average long-term performance that was well below the limit. The proposed rule was revised to allow the monthly sampling of a potline's secondary emissions of TF to be reduced to quarterly if: (1) The overall average after 24 consecutive months of sampling was no more than 60 percent of the applicable limit and (2) no monthly average during the 24 consecutive months exceeded 75 percent of the applicable emission limit.

If an exceedance occurs while under the reduced sampling frequency, the plant must return to monthly sampling for at least 12 months. The plant can qualify for a reduction to quarterly sampling again when: (1) The average of all results over the most recent 24-month period is no more than 60 percent of the limit and (2) no more than one monthly average during the 24-month period exceeds 75 percent of the limit.

As an alternative, the facility can petition for reduced sampling based on the statistical approach given in the EPA guidance document, "Primary Aluminum: Statistical Analysis of Potline Fluoride Emissions and Alternative Sampling Frequency" (EPA-450/3-86-012, October 1986). A copy of this document is included in the docket (docket item II-A-10). This document also is available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161.

Reduced sampling was not considered for POM because the sampling is already reduced relative to sampling for TF. The rule contains provisions for reducing TF sampling of secondary emissions from monthly to quarterly, and it only requires quarterly sampling for POM secondary emissions (and only annual sampling for POM from the primary control system). The quarterly sampling is necessary to ensure compliance and is particularly important for POM because of the potential risk associated with the POM compounds.

#### H. Approval of Alcan Cassette Method (Method 14A)

*Comment:* Several commenters stated that the Alcan cassette monitoring

method should be included as an approved method to determine compliance for emissions monitoring, as it is approved for demonstrating similar potlines. The final rule should also allow the method to be used in developing correlations of emissions for alternative monitoring devices, such as the HF CEM. Another commenter asked for the results of the investigation of the use of Alcan cassettes as an alternative to Methods 13 and 14, including information on accuracy, precision, and any biases.

*Response:* The EPA's intent to evaluate and approve the Alcan cassette method as an acceptable alternative to Method 14 was discussed in the proposal preamble. Numerous comments were received supporting the method, and no comments were received that were opposed to the method as an alternative to Methods 13 and 14. The method had been previously approved for sampling and analysis of TF for the NSPS, and additional data from comparison testing (available in the docket) confirmed it to be an acceptable alternative. Consequently, the EPA has approved the Alcan cassette method as an alternative to Method 14 and has included it as Method 14A in appendix A to 40 CFR part 60.

#### *I. Estimates of Costs for Control and Monitoring*

*Comment:* The industry commenters contended the capital costs of the proposed rule are higher than the EPA's estimates and asked that the estimates presented at promulgation be revised to incorporate their higher estimates of cost. The cost estimates submitted by the Aluminum Association included a capital cost estimate of \$555 million and a total annual cost of \$126 million compared to the EPA cost estimate of \$160 million in capital and a total annual cost of \$40 million. Another commenter believes the monitoring costs estimates are low and asked for information on the monitoring scenario that was used for costing.

*Response:* The limited information supplied with the industry's cost estimates suggests that these costs may be overstated; relevant points are discussed below. The industry's report states that the largest component of their capital cost estimate of \$555 million is for removing existing primary control systems and installing dry alumina scrubbers, which they say is 60 percent of the total capital cost. The EPA worked closely with the industry to develop the MACT floor, and based on numerous discussions with the industry, only one plant was identified

as likely to install new dry alumina scrubbers. This plant estimated a cost of \$120 million; however, this total capital investment includes costs for controls that are not directly attributable to the MACT standard (e.g., it includes the cost of sulfur dioxide scrubbers that are required by the State but are not required by the MACT standard). In addition, there is an indication that the company's decision to install dry alumina scrubbers may not have been made only because of the impending MACT standard but also in consideration of State and local agency concerns. Another company that included the capital cost of new dry scrubbers in its estimate submitted by the Aluminum Association has subsequently confirmed that new dry scrubbers will not be installed to meet MACT. Instead, they will upgrade their existing control equipment at a much lower cost.

Included in the industry's estimate are costs for several potlines that have been idled, and it has not been determined when these potlines will operate at capacity. If they are not restarted, it is obvious that large investments to improve emission control will not be made.

Significant cost estimates are included in the industry's estimates for MACT floor potlines, which are lines that by definition are already achieving the MACT level of control (because the proposed emission limits for MACT are based on the floor). Apparently these companies included the routine capital and operating costs currently being incurred or planned for the near future, probably to meet existing State limits, and attributed this cost to MACT. The cost due to MACT is the incremental cost above what would be spent in the absence of MACT and should not include what is being spent to meet existing regulations.

The few details that are available in the industry's report indicate that some of the estimated capital investment is for improvements or modernization of the process that is not necessarily being done only to improve emission control. In addition, companies will save operating expenses through improved efficiency and operation from these improvements, and no credit (cost savings) is identified for these improvements.

The information available for the cost of dry coke scrubbers indicates that the industry's estimate is overstated by a factor of at least two. The EPA estimate is based on the actual installation cost reported by one company and was verified by another company that obtained an actual construction cost

estimate prior to installing a new coke scrubber. The source of the industry's estimate is undocumented. In addition, more recent information from a few plants indicates that they may be able to improve the control efficiency of existing control equipment without installing dry coke scrubbers. The EPA cost estimate assumes that all plants without dry coke scrubbers will install one.

#### *J. Exceeding an Operating Parameter Limit*

*Comment:* Several industry commenters stated that an exceedance of an enforceable operating parameter limit for which the owner or operator has submitted a request for redetermination should not count toward the six allowable exceedances or automatically constitute a violation. Another commenter felt that exceedances should be a matter of enforcement discretion and any mention of what would constitute a violation should be deleted from the rule. One commenter asked for EPA's basis in deciding that a violation has occurred only after there have been six exceedances of a monitoring parameter (in any 6-month reporting period).

*Response:* The proposal preamble discussed at length why any single exceedance of the parametric monitoring limits should not be considered an exceedance of the emission limit and a violation of the standard. However, a limit was placed on the number of exceedances (six) allowed in a 6-month period to provide incentive to correct any problems with control devices promptly and to avoid recurring difficulties with control devices. Consequently, any exceedance of an enforceable operating parameter limit will count toward the six allowable exceedances, or will constitute a violation if a source has already had six exceedances. The fact that a facility has submitted a request for a redetermination of its operating parameter limits is no shield against enforcement of the existing permit limits. This is because the owner or operator could submit requests for redetermination to avoid a violation whenever control device monitoring indicates a problem. While the commenter is correct in pointing out that EPA may exercise prosecutorial discretion, such discretion is independent from the identification of a violation.

#### *K. Pitch Storage Tanks*

*Comment:* Several commenters requested that the proposed rule be clarified to indicate that pitch storage

tanks are not included as part of the paste production plant.

*Response:* Based on comments that pitch storage tanks are not a part of the paste production operation, the EPA reexamined this issue and determined that pitch storage tanks not located within the paste production plant should be defined as a separate affected source. Pitch storage tanks located within the boundaries of the paste production plant, such as day tanks or feed tanks that manage heated pitch, are included in the definition of paste production plant and must be controlled as required for the paste plant. An examination of the available data for pitch storage tanks that are not a part of the paste production plant indicated that the MACT floor and MACT for existing sources was no control. However, one plant was found to have installed controls on a recently constructed pitch storage tank. In addition, the EPA found that a new pitch storage tank planned for installation in Canada would be installing a catalytic oxidizer to control pitch fumes with a control efficiency of at least 95 percent. Consequently, EPA determined that new source MACT for pitch storage tanks would require at least 95 percent control of POM, and these provisions were added to the final rule.

There are several types of emission control techniques that can achieve 95 percent control or better, including combustion devices, dry scrubbers, and carbon adsorption. A question arose about the acceptability of vapor balancing, in which emissions displaced from the pitch storage tank during loading are returned to the tank truck or rail car as it is emptied. This technique would be an acceptable alternative if the owner or operator demonstrates (to the satisfaction of the applicable regulatory authority) that emissions from the transport vessel are controlled when it is refilled and that POM emissions from the pitch storage tank are ultimately controlled at 95 percent or better.

## VII. Administrative Requirements

### A. Docket

The docket is an organized and complete file of information considered by the EPA in the development of a rulemaking. The docket is a dynamic file because information is added throughout the rulemaking development process. The docketing system is intended to allow members of the public and industries involved to readily identify and locate documents so that they can effectively participate in the rulemaking process. Along with the

proposed and promulgated standards and their preambles, the contents of the docket will serve as the record in case of judicial review. [See section 307(d)(7)(A) of the Act.] The official rulemaking record, including all public comments received on the proposed rule, is located at the address in the ADDRESSES section at the beginning of this document.

### B. Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the EPA must determine whether the regulatory action is "significant" and therefore subject to review by the Office of Management and Budget (OMB) and the requirements of the Executive Order. The Executive 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 obligation 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.

Although this is a significant regulatory action OMB has waived Executive Order 12866 review because there was no significant negative comment on the proposed rule.

### C. Enhancing the Intergovernmental Partnership Under Executive Order 12875

In compliance with Executive Order 12875, the EPA involved State regulatory experts in the development of the rule. The EPA also coordinated with tribal governments having an interest in the rulemaking. State and local governments and tribal governments are not directly affected by the rule, i.e., they are not required to purchase control systems to meet the requirements of the rule. However, State and local governments will be required to implement the rule; i.e., incorporate the rule into permits and enforce the rule. They will collect permit fees that will be used to offset the resource burden of implementing the rule. Comments were solicited from States and tribal governments and have been

considered in the development of the final rule.

### D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to 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 EPA 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 EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments; enabling officials of affected small governments to have meaningful and timely input in developing EPA regulatory proposals with significant Federal intergovernmental mandates; and informing, educating, and advising small governments on compliance with the regulatory requirements.

The EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of \$100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. The total annualized cost of the final standard is estimated at \$40 million per year—well under the \$100 million per year threshold. Thus, today's rule is not subject to the requirements of sections 202 and 205 of UMRA.

### E. Regulatory Flexibility

The Regulatory Flexibility Act (RFA) generally requires an agency to conduct

a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions.

The EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. None of the 23 facilities in this industry is classified as a small entity. The EPA has determined that this rule will not have a significant economic impact on a substantial number of small entities.

**F. Submission to Congress and the General Accounting Office**

Under 5 U.S.C. 801(a)(1)(A), as added by the Small Business Regulatory Enforcement Fairness Act of 1996, EPA submitted 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 General Accounting Office prior to publication of the rule in today's **Federal Register**. This rule is not a "major rule" as defined by 5 U.S.C. 804(2).

**G. Paperwork Reduction Act**

The information collection requirements for this NESHAP have been submitted for approval to OMB under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* An Information Collection Request (ICR) document has been prepared by the EPA (ICR No. 1767.02), and a copy may be obtained from Sandy Farmer, OPPE Regulatory Information Division, U.S. Environmental Protection Agency (2137), 401 M Street, S.W., Washington, DC 20460, or by calling (202) 260-2740. The information requirements are not effective until OMB approves them.

The information collection requirements include mandatory notifications, records, and reports required by the NESHAP general provisions (40 CFR part 63, subpart A). These information collection requirements are needed to confirm the compliance status of major sources, to identify any nonmajor sources not subject to the standards and any new or reconstructed sources subject to the standards, to confirm that emission control devices are being properly operated and maintained, and to ensure that the standards are being achieved. Based on the recorded and reported information, EPA can decide which plants, records, or processes should be inspected. These recordkeeping and

reporting requirements are specifically authorized by section 114 of the Act (42 U.S.C. 7414). All information submitted to the Agency for which a claim of confidentiality is made will be safeguarded according to Agency policies in 40 CFR part 2, subpart B. (See 41 FR 36902, September 1, 1976; 43 FR 39999, September 28, 1978; 43 FR 42251, September 28, 1978; and 44 FR 17674, March 23, 1979.)

The annual public reporting and recordkeeping burden for collecting this information (averaged over the first 3 years after the effective date of the rule) is estimated to total 52,544 hours for the 23 respondents and to average 2,300 hours per respondent (i.e., per plant). Each respondent is required to report semiannually. The annualized cost of monitoring equipment is estimated as \$390,000 per year, with an operation and maintenance cost of \$39,000 per year (excluding labor hours included in the previous total).

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for collecting, validating, and verifying information; process and maintain information and disclose and provide information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to respond to a collection of information; search existing data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An Agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15.

**H. Clean Air Act**

The NESHAP for primary aluminum reduction plants will be reviewed 8 years from the date of promulgation. This review will include an assessment of such factors as residual health risks, any duplication with other air programs, the existence of alternative methods, enforceability, improvements in air emission control technology and health data, and the recordkeeping and reporting requirements.

**List of Subjects**

**40 CFR Part 9**

Environmental protection, Reporting and recordkeeping requirements.

**40 CFR Part 60**

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

**40 CFR Part 63**

Air pollution control, Hazardous substances, Incorporation by reference, Primary aluminum reduction plants, Reporting and recordkeeping requirements.

Dated: September 19, 1997.

**Carol M. Browner,**  
Administrator.

For the reasons set out in the preamble, parts 9, 60, and 63 of title 40, chapter I of the Code of Federal Regulations are amended as follows:

**PART 9—OMB APPROVALS UNDER THE PAPERWORK REDUCTION ACT**

1. The authority citation for part 9 continues to read as follows:

**Authority:** 7 U.S.C. 135 *et seq.*, 136-136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601-2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1321, 1326, 1330, 1342, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971-1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-1, 300j-2, 300j-3, 300j-4, 300j-9, 1857 *et seq.*, 6901-6992k, 7401-7671q, 7542, 9601-9657, 11023, 11048.

2. In §9.1 the table is amended by adding new entries under the indicated heading in numerical order to read as follows:

**§9.1 OMB approvals under the Paperwork Reduction Act.**

40 CFR citation	OMB control No.
* * * * *	
National Emission Standards for Hazardous Air Pollutants for Source Categories <sup>3</sup>	
* * * * *	
63.846(d) .....	2060-0360
63.847(b), (g) .....	2060-0360
63.848(d)(5), (e), .....	
(f)(5)(ii), (g), (k), (m) .....	2060-0360
63.850 .....	2060-0360
* * * * *	

<sup>3</sup>The ICRs referenced in this section of the Table encompass the applicable general provisions contained in 40 CFR part 63, subpart A, which are not independent information collection requirements.



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

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

**Authority:** 42 U.S.C. 7401, 7411, 7413, 7414, 7416, 7429, 7601 and 7602.

**§ 60.17 [Amended]**

4. Section 60.17(a)(22) of subpart A is amended by adding the phrase “; Method 14A, par. 7.1” to the end of the paragraph.

5. Section 60.190 is amended by revising paragraph (b) and adding new paragraph (c) to read as follows:

**§ 60.190 Applicability and designation of affected facility.**

\* \* \* \* \*

(b) Except as provided in paragraph (c) of this section, any affected facility under paragraph (a) of this section that commences construction or modification after October 23, 1974, is subject to the requirements of this subpart.

(c) An owner or operator of an affected facility under paragraph (a) of this section may elect to comply with the requirements of this subpart or the requirements of subpart LL of part 63 of this chapter.

6. Appendix A to part 60 is amended by revising the appendix heading and adding, in numerical order, Method 14A to read as follows:

**Appendix A To part 60—Test Methods**

\* \* \* \* \*

**Method 14A—Determination of Total Fluoride Emissions from Selected Sources at Primary Aluminum Production Facilities**

**Note:** This method does not include all 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 methods: Method 5, Methods 13A and 13B, and Method 14 of this appendix.

**1.0 Scope and Application.**

**1.1 Analytes.**

Analyte	CAS No.	Sensitivity
Total fluorides	None assigned.	Not determined.
Includes hydrogen fluoride.	007664-39-3	Not determined.

1.2 **Applicability.** This method is applicable for the determination of total fluorides (TF) emissions from sources

specified in the applicable regulation. This method was developed by consensus with the Aluminum Association and the U.S. Environmental Protection Agency (EPA).

**2.0 Summary of Method.**

2.1 Total fluorides, in the form of solid and gaseous fluorides, are withdrawn from the ascending air stream inside of an aluminum reduction potroom and, prior to exiting the potroom roof monitor, into a specific cassette arrangement. The cassettes are connected by tubing to flowmeters and a manifold system that allows for the equal distribution of volume pulled through each cassette, and finally to a dry gas meter. The cassettes have a specific internal arrangement of one unaltered cellulose filter and support pad in the first section of the cassette for solid fluoride retention and two cellulose filters with support pads that are impregnated with sodium formate for the chemical absorption of gaseous fluorides in the following two sections of the cassette. A minimum of eight cassettes shall be used for a potline and shall be strategically located at equal intervals across the potroom roof so as to encompass a minimum of 8 percent of the total length of the potroom. A greater number of cassettes may be used should the regulated facility choose to do so. The mass flow rate of pollutants is determined with anemometers and temperature sensing devices located immediately below the opening of the roof monitor and spaced evenly within the cassette group.

**3.0 Definitions.**

3.1 **Cassette.** A segmented, styrene acrylonitrile cassette configuration with three separate segments and a base, for the purpose of this method, to capture and retain fluoride from potroom gases.

3.2 **Cassette arrangement.** The cassettes, tubing, manifold system, flowmeters, dry gas meter, and any other related equipment associated with the actual extraction of the sample gas stream.

3.3 **Cassette group.** That section of the potroom roof monitor where a distinct group of cassettes is located.

3.4 **Potline.** A single, discrete group of electrolytic reduction cells electrically connected in series, in which alumina is reduced to form aluminum.

3.5 **Potroom.** A building unit that houses a group of electrolytic reduction cells in which aluminum is produced.

3.6 **Potroom group.** An uncontrolled potroom, a potroom that is controlled individually, or a group of potrooms or potroom segments ducted to a common primary control system.

3.7 **Primary control system.** The equipment used to capture the gases and particulate matter generated during the reduction process and the emission control device(s) used to remove pollutants prior to discharge of the cleaned gas to the atmosphere.

3.8 **Roof monitor.** That portion of the roof of a potroom building where gases, not captured at the cell, exit from the potroom.

3.9 **Total fluorides (TF).** Elemental fluorine and all fluoride compounds as measured by Methods 13A or 13B of this

appendix or by an approved alternative method.

**4.0 Interferences and Known Limitations.**

4.1 There are two principal categories of limitations that must be addressed when using this method. The first category is sampling bias and the second is analytical bias. Biases in sampling can occur when there is an insufficient number of cassettes located along the roof monitor of a potroom or if the distribution of those cassettes is spatially unequal. Known sampling biases also can occur when there are leaks within the cassette arrangement and if anemometers and temperature devices are not providing accurate data. Applicable instruments must be properly calibrated to avoid sampling bias. Analytical biases can occur when instrumentation is not calibrated or fails calibration and the instrument is used out of proper calibration. Additionally, biases can occur in the laboratory if fusion crucibles retain residual fluorides over lengthy periods of use. This condition could result in falsely elevated fluoride values. Maintaining a clean work environment in the laboratory is crucial to producing accurate values.

4.2 Biases during sampling can be avoided by properly spacing the appropriate number of cassettes along the roof monitor, conducting leak checks of the cassette arrangement, calibrating the dry gas meter every 30 days, verifying the accuracy of individual flowmeters (so that there is no more than 5 percent difference in the volume pulled between any two flowmeters), and calibrating or replacing anemometers and temperature sensing devices as necessary to maintain true data generation.

4.3 Analytical biases can be avoided by calibrating instruments according to the manufacturer's specifications prior to conducting any analyses, by performing internal and external audits of up to 10 percent of all samples analyzed, and by rotating individual crucibles as the “blank” crucible to detect any potential residual fluoride carry-over to samples. Should any contamination be discovered in the blank crucible, the crucible shall be thoroughly cleaned to remove any detected residual fluorides and a “blank” analysis conducted again to evaluate the effectiveness of the cleaning. The crucible shall remain in service as long as no detectable residual fluorides are present.

**5.0 Safety.**

5.1 This method may involve the handling of hazardous materials in the analytical phase. This method does not purport to address all of the potential safety hazards associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 **Corrosive reagents.** The following reagents are hazardous. Personal protective equipment and safe procedures are useful in preventing chemical splashes. If contact occurs, immediately flush with copious amounts of water for at least 15 minutes. Remove clothing under shower and

decontaminate. Treat residual chemical burn as thermal burn.

5.3 Sodium Hydroxide (NaOH). Causes severe damage to eyes and skin. Inhalation causes irritation to nose, throat, and lungs. Reacts exothermically with limited amounts of water.

5.4 Perchloric Acid (HClO<sub>4</sub>). Corrosive to eyes, skin, nose, and throat. Provide ventilation to limit exposure. Very strong oxidizer. Keep separate from water and oxidizable materials to prevent vigorous evolution of heat, spontaneous combustion, or explosion. Heat solutions containing HClO<sub>4</sub> only in hoods specifically designed for HClO<sub>4</sub>.

#### 216.0 Equipment and Supplies.

##### 6.1 Sampling.

6.1.1 Cassette arrangement. The cassette itself is a three-piece, styrene acrylonitrile cassette unit (a Gelman Sciences product), 37 millimeter (mm), with plastic connectors. In the first section (the intake section), an untreated Gelman Sciences 37 mm, 0.8 micrometer (μm) DM-800 metricel membrane filter and cellulose support pad, or equivalent, is situated. In the second and third segments of the cassette there is placed one each of Gelman Sciences 37 mm, 5 μm GLA-5000 low-ash PVC filter with a cellulose support pad or equivalent product. Each of these two filters and support pads shall have been immersed in a solution of 10 percent sodium formate (volume/volume in an ethyl alcohol solution). The impregnated pads shall be placed in the cassette segments while still wet and heated at 50°C (122°F) until the pad is completely dry. It is important to check for a proper fit of the filter and support pad to the cassette segment to ensure that there are no areas where gases could bypass the filter. Once all of the cassette segments have been prepared, the cassette shall be assembled and a plastic plug shall be inserted into the exhaust hole of the cassette. Prior to placing the cassette into service, the space between each segment shall be taped with an appropriately durable tape to prevent the infiltration of gases through the points of connection, and an aluminum nozzle shall be inserted into the intake hole of the cassette. The aluminum nozzle shall have a short section of tubing placed over the opening of the nozzle, with the tubing plugged to prevent dust from entering the nozzle and to prepare the nozzle for the cassette arrangement leak check. An alternate nozzle type can be used if historical results or scientific demonstration of applicability can be shown.

6.1.2 Anemometers and temperature sensing devices. To calculate the mass flow rate of TF from the roof monitor under standard conditions, anemometers that meet the specifications in section 2.1.1 in Method 14 of this appendix or an equivalent device yielding equivalent information shall be used. A recording mechanism capable of accurately recording the exit gas temperature at least every 2 hours shall be used.

6.1.3 Barometer. To correct the volumetric flow from the potline roof monitor to standard conditions, a mercury (Hg), aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm [0.1 inch (in)] Hg shall be used.

**Note:** The barometric reading may be obtained from a nearby National Weather Service Station. In this case, the station value (which is absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and the sampling point shall be made at a rate of minus 2.5 mm (0.1 in) Hg per 30 meters (m) [100 feet (ft)] elevation increase or plus 2.5 mm (0.1 in) Hg per 30 m (100 ft) elevation decrease.

##### 6.2 Sample recovery.

6.2.1 Hot plate.

6.2.2 Muffle furnace.

6.2.3 Nickel crucible.

6.2.4 Stirring rod. Teflon<sup>®</sup>.

6.2.5 Volumetric flask. 50-milliliter (ml).

6.2.6 Plastic vial. 50-ml.

##### 6.3 Analysis.

6.3.1 Primary analytical method. An automated analyzer having the following components or equivalent: a multichannel proportioning pump, multiposition sampler, voltage stabilizer, colorimeter, instrument recording device, microdistillation apparatus, flexible Teflon<sup>®</sup> heating bath, vacuum pump, pulse suppressors and an air flow system.

6.3.2 Secondary analytical method. Specific Ion Electrode (SIE).

#### 7.0 Reagents and Standards.

7.1 Water. Deionized distilled to conform to ASTM Specification D 1193-77, Type 3 (incorporated by reference in § 60.17(a)(22) of this part). The KMnO<sub>4</sub> test for oxidizable organic matter may be omitted when high concentrations of organic matter are not expected to be present.

7.2 Calcium oxide.

7.3 Sodium hydroxide (NaOH). Pellets.

7.4 Perchloric acid (HClO<sub>4</sub>). Mix 1:1 with water. Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) may be used in place of HClO<sub>4</sub>.

7.5 Audit samples. The audit samples discussed in section 9.1 shall be prepared from reagent grade, water soluble stock reagents, or purchased as an aqueous solution from a commercial supplier. If the audit stock solution is purchased from a commercial supplier, the standard solution must be accompanied by a certificate of analysis or an equivalent proof of fluoride concentration.

#### 8.0 Sample Collection and Analysis.

8.1 Preparing cassette arrangement for sampling. The cassettes are initially connected to flexible tubing. The tubing is connected to flowmeters and a manifold system. The manifold system is connected to a dry gas meter (Research Appliance Company model 201009 or equivalent). The length of tubing is managed by pneumatically or electrically operated hoists located in the roof monitor, and the travel of the tubing is controlled by encasing the tubing in aluminum conduit. The tubing is lowered for cassette insertion by operating a control box at floor level. Once the cassette has been securely inserted into the tubing and the leak check performed, the tubing and cassette are raised to the roof monitor level using the floor level control box. Arrangements similar to the one described are acceptable if the scientific sample collection principles are followed.

8.2 Test run sampling period. A test run shall comprise a minimum of a 24-hour sampling event encompassing at least eight cassettes per potline (or four cassettes per potroom group). Monthly compliance shall be based on three test runs during the month. Test runs of greater than 24 hours are allowed; however, three such runs shall be conducted during the month.

##### 8.3 Leak-check procedures.

8.3.1 Pretest leak check. A pretest leak-check is recommended; however, it is not required. To perform a pretest leak-check after the cassettes have been inserted into the tubing, isolate the cassette to be leak-checked by turning the valves on the manifold to stop all flows to the other sampling points connected to the manifold and meter. The cassette, with the plugged tubing section securing the intake of the nozzle, is subjected to the highest vacuum expected during the run. If no leaks are detected, the tubing plug can be briefly removed as the dry gas meter is rapidly turned off.

8.3.2 Post-test leak check. A leak check is required at the conclusion of each test run for each cassette. The leak check shall be performed in accordance with the procedure outlined in section 8.3.1 of this method except that it shall be performed at a vacuum greater than the maximum vacuum reached during the test run. If the leakage rate is found to be no greater than 4 percent of the average sampling rate, the results are acceptable. If the leakage rate is greater than 4 percent of the average sampling rate, either record the leakage rate and correct the sampling volume as discussed in section 12.4 of this method or void the test run if the minimum number of cassettes were used. If the number of cassettes used was greater than the minimum required, discard the leaking cassette and use the remaining cassettes for the emission determination.

8.3.3 Anemometers and temperature sensing device placement. Install the recording mechanism to record the exit gas temperature. Anemometers shall be installed as required in section 6.1.2 of Method 14 of this appendix, except replace the word "manifold" with "cassette group" in section 6.1.2.3. These two different instruments shall be located near each other along the roof monitor. See conceptual configurations in Figures 14A-1, 14A-2, and 14A-3 of this method. Fewer temperature devices than anemometers may be used if at least one temperature device is located within the span of the cassette group. Other anemometer location siting scenarios may be acceptable as long as the exit velocity of the roof monitor gases is representative of the entire section of the potline being sampled.

8.4 Sampling. The actual sample run shall begin with the removal of the tubing and plug from the cassette nozzle. Each cassette is then raised to the roof monitor area, the dry gas meter is turned on, and the flowmeters are set to the calibration point, which allows an equal volume of sampled gas to enter each cassette. The dry gas meter shall be set to a range suitable for the specific potroom type being sampled that will yield valid data known from previous experience or a range determined by the use of the calculation in section 12 of this method.

Parameters related to the test run that shall be recorded, either during the test run or after the test run if recording devices are used, include: anemometer data, roof monitor exit gas temperature, dry gas meter temperature, dry gas meter volume, and barometric pressure. At the conclusion of the test run, the cassettes shall be lowered, the dry gas meter turned off, and the volume registered on the dry gas meter recorded. The post-test leak check procedures described in section 8.3.2 of this method shall be performed. All data relevant to the test shall be recorded on a field data sheet and maintained on file.

#### 8.5 Sample recovery.

8.5.1 The cassettes shall be brought to the laboratory with the intake nozzle contents protected with the section of plugged tubing previously described. The exterior of cassettes shall carefully be wiped free of any dust or debris, making sure that any falling dust or debris does not present a potential laboratory contamination problem.

8.5.2 Carefully remove all tape from the cassettes and remove the initial filter, support pad, and all loose solids from the first (intake) section of the cassette. Fold the filter and support pad several times and, along with all loose solids removed from the interior of the first section of the cassette, place them into a nickel crucible. Using water, wash the interior of the nozzle into the same nickel crucible. Add 0.1 gram (g) [ $\pm 0.1$  milligram (mg)] of calcium oxide and a sufficient amount of water to make a loose slurry. Mix the contents of the crucible thoroughly with a Teflon<sup>®</sup> stirring rod. After rinsing any adhering residue from the stirring rod back into the crucible, place the crucible on a hot plate or in a muffle furnace until all liquid is evaporated and allow the mixture to gradually char for 1 hour.

8.5.3 Transfer the crucible to a cold muffle furnace and ash at 600°C (1,112°F). Remove the crucible after the ashing phase and, after the crucible cools, add 3.0 g ( $\pm 0.1$  g) of NaOH pellets. Place this mixture in a muffle furnace at 600°C (1,112°F) for 3 minutes. Remove the crucible and roll the melt so as to reach all of the ash with the molten NaOH. Let the melt cool to room temperature. Add 10 to 15 ml of water to the crucible and place it on a hot plate at a low temperature setting until the melt is soft or suspended. Transfer the contents of the crucible to a 50-ml volumetric flask. Rinse the crucible with 20 ml of 1:1 perchloric acid or 20 ml of 1:1 sulfuric acid in two (2) 10 ml portions. Pour the acid rinse slowly into the volumetric flask and swirl the flask after each addition. Cool to room temperature. The product of this procedure is particulate fluorides.

8.5.4 Gaseous fluorides can be isolated for analysis by folding the gaseous fluoride filters and support pads to approximately 1/4 of their original size and placing them in a 50-ml plastic vial. To the vial add exactly 10 ml of water and leach the sample for a minimum of 1 hour. The leachate from this process yields the gaseous fluorides for analysis.

#### 9.0 Quality Control.

9.1 Laboratory auditing. Laboratory audits of specific and known concentrations

of fluoride shall be submitted to the laboratory with each group of samples submitted for analysis. An auditor shall prepare and present the audit samples as a "blind" evaluation of laboratory performance with each group of samples submitted to the laboratory. The audits shall be prepared to represent concentrations of fluoride that could be expected to be in the low, medium and high range of actual results. Average recoveries of all three audits must equal 90 to 110 percent for acceptable results; otherwise, the laboratory must investigate procedures and instruments for potential problems.

**Note:** The analytical procedure allows for the analysis of individual or combined filters and pads from the cassettes provided that equal volumes ( $\pm 10$  percent) are sampled through each cassette.

#### 10.0 Calibrations.

10.1 Equipment evaluations. To ensure the integrity of this method, periodic calibrations and equipment replacements are necessary.

10.1.1 Metering system. At 30-day intervals the metering system shall be calibrated. Connect the metering system inlet to the outlet of a wet test meter that is accurate to 1 percent. Refer to Figure 5-4 of Method 5 of this appendix. The wet-test meter shall have a capacity of 30 liters/revolution [1 cubic foot (ft<sup>3</sup>)/revolution]. A spirometer of 400 liters (14 ft<sup>3</sup>) or more capacity, or equivalent, may be used for calibration; however, a wet-test meter is usually more practical. The wet-test meter shall be periodically tested with a spirometer or a liquid displacement meter to ensure the accuracy. Spirometers or wet-test meters of other sizes may be used, provided that the specified accuracies of the procedure are maintained. Run the metering system pump for about 15 min. with the orifice manometer indicating a median reading as expected in field use to allow the pump to warm up and to thoroughly wet the interior of the wet-test meter. Then, at each of a minimum of three orifice manometer settings, pass an exact quantity of gas through the wet-test meter and record the volume indicated by the dry gas meter. Also record the barometric pressure, the temperatures of the wet test meter, the inlet temperatures of the dry gas meter, and the temperatures of the outlet of the dry gas meter. Record all calibration data on a form similar to the one shown in Figure 5-5 of Method 5 of this appendix and calculate Y, the dry gas meter calibration factor, and  $\Delta H_{\text{e}}$ , the orifice calibration factor at each orifice setting. Allowable tolerances for Y and  $\Delta H_{\text{e}}$  are given in Figure 5-6 of Method 5 of this appendix.

10.1.2 Estimating volumes for initial test runs. For a facility's initial test runs, the regulated facility must have a target or desired volume of gases to be sampled and a target range of volumes to use during the calibration of the dry gas meter. Use Equations 14A-1 and 14A-2 in section 12 of this method to derive the target dry gas meter volume (F<sub>v</sub>) for these purposes.

10.1.3 Calibration of anemometers and temperature sensing devices. If the standard anemometers in Method 14 of this appendix

are used, the calibration and integrity evaluations in sections 10.3.1.1 through 10.3.1.3 of Method 14 of this appendix shall be used as well as the recording device described in section 2.1.3 of Method 14. The calibrations or complete change-outs of anemometers shall take place at a minimum of once per year. The temperature sensing and recording devices shall be calibrated according to the manufacturer's specifications.

10.1.4 Calibration of flowmeters. The calibration of flowmeters is necessary to ensure that an equal volume of sampled gas is entering each of the individual cassettes and that no large differences, which could possibly bias the sample, exist between the cassettes.

10.1.4.1 Variable area, 65 mm flowmeters or equivalent shall be used. These flowmeters can be mounted on a common base for convenience. These flowmeters shall be calibrated by attaching a prepared cassette, complete with filters and pads, to the flowmeter and then to the system manifold. This manifold is an aluminum cylinder with valved inlets for connections to the flowmeters/cassettes and one outlet to a dry gas meter. The connection is then made to the wet-test meter and finally to a dry gas meter. All connections are made with tubing.

10.1.4.2 Turn the dry gas meter on for 15 min. in preparation for the calibration. Turn the dry gas meter off and plug the intake hole of the cassette. Turn the dry gas meter back on to evaluate the entire system for leaks. If the dry gas meter shows a leakage rate of less than 0.02 ft<sup>3</sup>/min at 10 in. of Hg vacuum as noted on the dry gas meter, the system is acceptable to further calibration.

10.1.4.3 With the dry gas meter turned on and the flow indicator ball at a selected flow rate, record the exact amount of gas pulled through the flowmeter by taking measurements from the wet test meter after exactly 10 min. Record the room temperature and barometric pressure. Conduct this test for all flowmeters in the system with all flowmeters set at the same indicator ball reading. When all flowmeters have gone through the procedure above, correct the volume pulled through each flowmeter to standard conditions. The acceptable difference between the highest and lowest flowmeter rate is 5 percent. Should one or more flowmeters be outside of the acceptable limit of 5 percent, repeat the calibration procedure at a lower or higher indicator ball reading until all flowmeters show no more than 5 percent difference among them.

10.1.4.4 This flowmeter calibration shall be conducted at least once per year.

10.1.5 Miscellaneous equipment calibrations. Miscellaneous equipment used such as an automatic recorder/ printer used to measure dry gas meter temperatures shall be calibrated according to the manufacturer's specifications in order to maintain the accuracy of the equipment.

#### 11.0 Analytical Procedure.

11.1 The preferred primary analytical determination of the individual isolated samples or the combined particulate and gaseous samples shall be performed by an automated methodology. The analytical

method for this technology shall be based on the manufacturer's instructions for equipment operation and shall also include the analysis of five standards with concentrations in the expected range of the actual samples. The results of the analysis of the five standards shall have a coefficient of correlation of at least 0.99. A check standard shall be analyzed as the last sample of the group to determine if instrument drift has occurred. The acceptable result for the check standard is 95 to 105 percent of the standard's true value.

11.2 The secondary analytical method shall be by specific ion electrode if the samples are distilled or if a TISAB IV buffer is used to eliminate aluminum interferences. Five standards with concentrations in the expected range of the actual samples shall be analyzed, and a coefficient of correlation of at least 0.99 is the minimum acceptable limit for linearity. An exception for this limit for linearity is a condition when low-level standards in the range of 0.01 to 0.48 µg fluoride/ml are analyzed. In this situation, a minimum coefficient of correlation of 0.97 is

required. TISAB II shall be used for low-level analyses.

12.0 Data Analysis and Calculations.

12.1 Carry out calculations, retaining at least one extra decimal point beyond that of the acquired data. Round off values after the final calculation. Other forms of calculations may be used as long as they give equivalent results.

12.2 Estimating volumes for initial test runs.

$$F_v = \frac{(F_d)(X)}{F_e} \quad \text{Eq. 14A-1}$$

Where

F<sub>v</sub> = Desired volume of dry gas to be sampled, ft<sup>3</sup>.

F<sub>d</sub> = Desired or analytically optimum mass of TF per cassette, micrograms of TF per cassette (µg/cassette).  
X = Number of cassettes used.

F<sub>e</sub> = Typical concentration of TF in emissions to be sampled, µg/ft<sup>3</sup>, calculated from Equation 14A-2.

$$F_e = \frac{(R_e)(R_p)(4.536 \times 10^8 \mu\text{g/lb})}{(A_r)(V_r)} \quad \text{Eq. 14A-2}$$

Where

R<sub>e</sub> = Typical emission rate from the facility, pounds of TF per ton (lb/ton) of aluminum.

R<sub>p</sub> = Typical production rate of the facility, tons of aluminum per minute (ton/min).

V<sub>r</sub> = Typical exit velocity of the roof monitor gases, feet per minute (ft/min).

A<sub>r</sub> = Open area of the roof monitor, square feet (ft<sup>2</sup>).

12.2.1 Example calculation. Assume that the typical emission rate (R<sub>e</sub>) is 1.0 lb TF/ton of aluminum, the typical roof vent gas exit velocity (V<sub>r</sub>) is 250 ft/min, the typical production rate (R<sub>p</sub>) is 0.10 ton/min, the known open area for the

roof monitor (A<sub>r</sub>) is 8,700 ft<sup>2</sup>, and the desired (analytically optimum) mass of TF per cassette is 1,500 µg. First calculate the concentration of TF per cassette (F<sub>e</sub>) in µg/ft<sup>3</sup> using Equation 14A-2. Then calculate the desired volume of gas to be sampled (F<sub>v</sub>) using Equation 14A-1.

$$F_e = 20.855 = \frac{(1.0 \text{ lb/ton})(0.1 \text{ tons/min})(4.536 \times 10^8 \mu\text{g/lb})}{(8,700 \text{ ft}^2)(250 \text{ ft/min})} \quad \text{Eq. 14A-3}$$

$$F_v = 575.40 \text{ ft}^3 = \frac{(1,500 \text{ } \mu\text{g})(8 \text{ cassettes})}{(20.855 \text{ } \mu\text{g}/\text{ft}^3)} \quad \text{Eq. 14A-4}$$

This is a total of 575.40 ft<sup>3</sup> for eight cassettes or 71.925 ft<sup>3</sup>/cassette.

12.3 Calculations of TF emissions from field and laboratory data that would yield a production related emission rate can be calculated as follows:

12.3.1 Obtain a standard cubic feet (scf) value for the volume pulled through the dry

gas meter for all cassettes by using the field and calibration data and Equation 5-1 of Method 5 of this appendix.

12.3.2 Derive the average quantity of TF per cassette (in  $\mu\text{g}$  TF/cassette) by adding all laboratory data for all cassettes and dividing this value by the total number of cassettes used. Divide this average TF value by the

corrected dry gas meter volume for each cassette; this value then becomes TF<sub>std</sub> ( $\mu\text{g}/\text{ft}^3$ ).

12.3.3 Calculate the production-based emission rate (R<sub>e</sub>) in lb/ton using Equation 14A-5.

$$R_e = \frac{(\text{TF}_{\text{std}})(V_r)(A_r)(2.2 \times 10^{-9} \text{ lb}/\mu\text{g})}{(R_p)} \quad \text{Eq. 14A-5}$$

12.3.4 As an example calculation, assume eight cassettes located in a potline were used to sample for 72 hours during the run. The analysis of all eight cassettes yielded a total of 3,000  $\mu\text{g}$  of TF. The dry gas meter volume

was corrected to yield a total of 75 scf per cassette, which yields a value for TF<sub>std</sub> of 3,000/75=5  $\mu\text{g}/\text{ft}^3$ . The open area of the roof monitor for the potline (A<sub>r</sub>) is 17,400 ft<sup>2</sup>. The exit velocity of the roof monitor gases (V<sub>r</sub>) is

250 ft/min. The production rate of aluminum over the previous 720 hours was 5,000 tons, which is 6.94 tons/hr or 0.116 ton/min (R<sub>p</sub>). Substituting these values into Equation 14A-5 yields:

$$R_e = \frac{(5 \text{ } \mu\text{g}/\text{ft}^3)(250 \text{ ft}/\text{min})(17,400 \text{ ft}^2)(2.2 \times 10^{-9} \text{ lb}/\mu\text{g})}{(0.116 \text{ ton}/\text{min})} \quad \text{Eq. 14A-6}$$

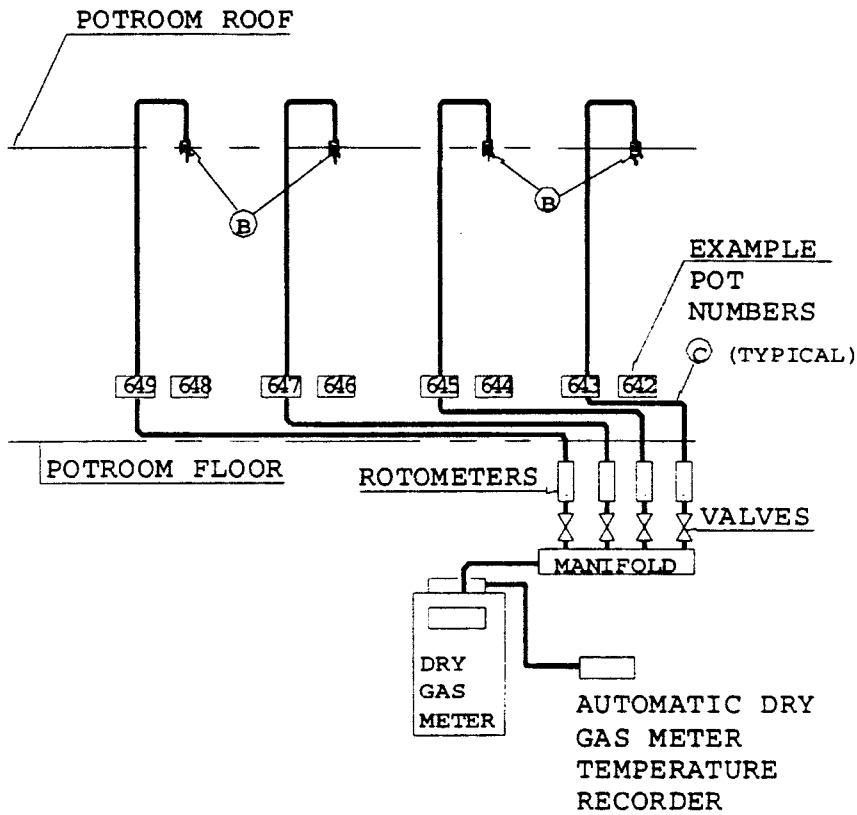
$$R_e = 0.41 \text{ lb}/\text{ton of aluminum produced.} \quad \text{Eq. 14A-7}$$

12.4 Corrections to volumes due to leakage. Should the post-test leak check

leakage rate exceed 4 percent as described in section 8.3.2 of this method, correct the

volume as detailed in Case I in section 6.3 of Method 5 of this appendix.

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- ⓑ ALCAN CASSETTE EXAMPLE METHOD SAMPLING POINTS
- ⓒ POLYETHYLENE TUBING ENCLOSED IN CONDUIT

Figure 14A-1. Conceptual side view of arrangement of 4 cassettes for one-half of a potroom.

Note: This drawing does not reflect an equally acceptable arrangement of 8 cassettes in a cassette group located along at least 8 percent of the potroom roof.

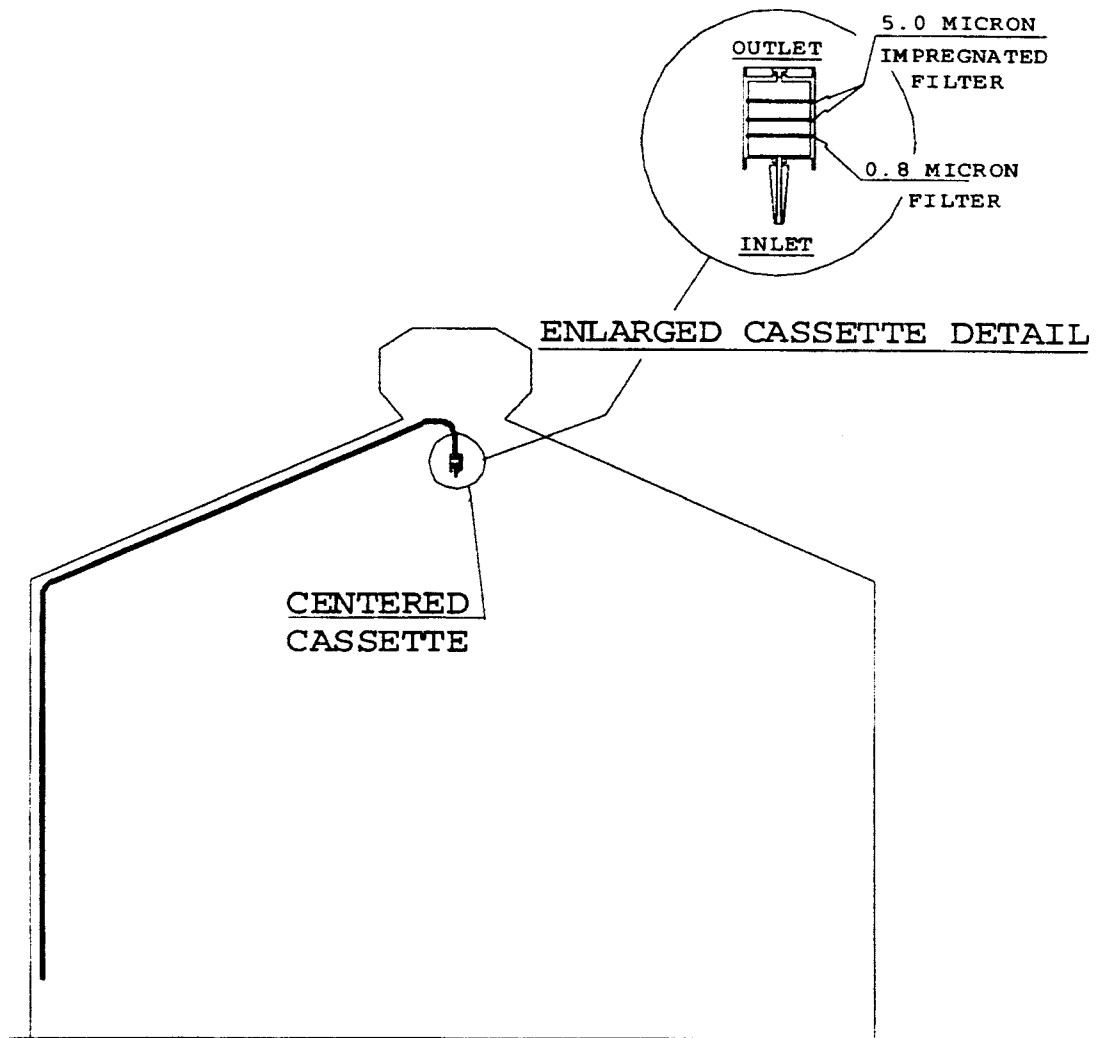


Figure 14A-2. Conceptual end view of cassette placement in a potroom roof.

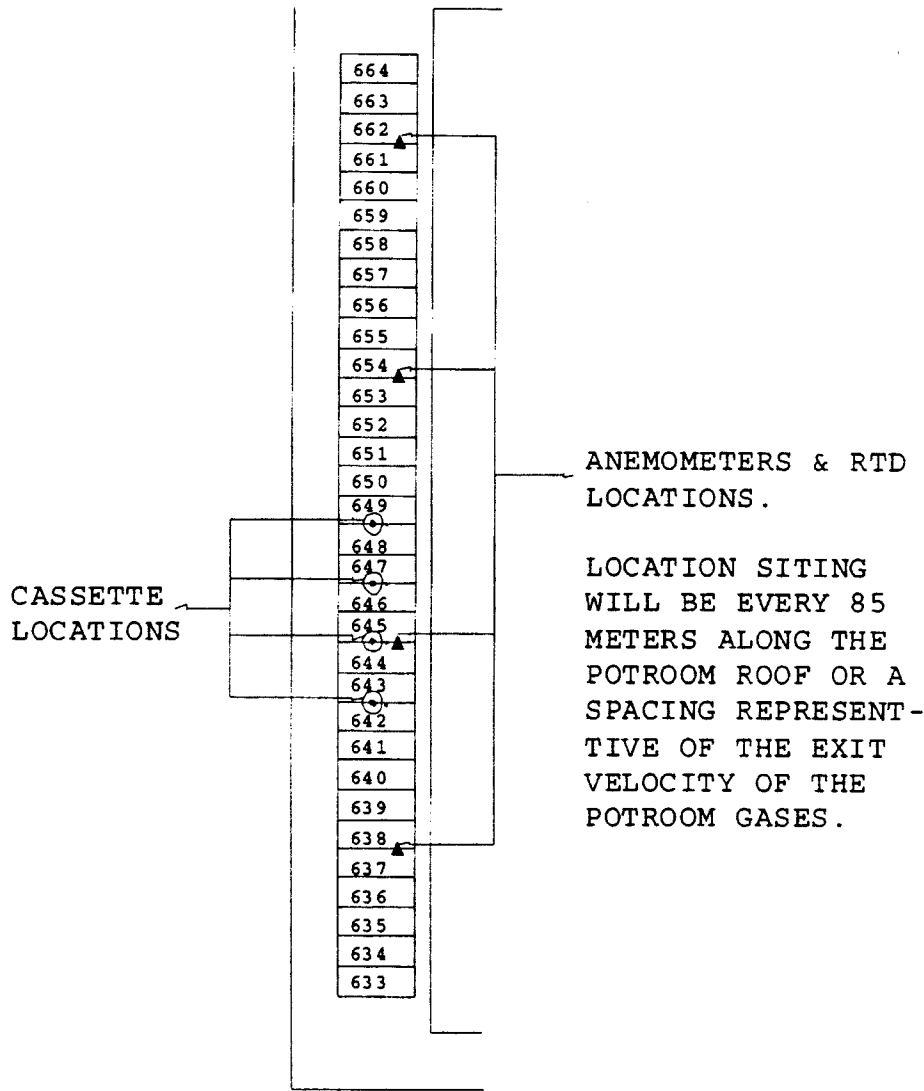


Figure 14A-3. Conceptual side view of positions of cassettes, anemometers, and RTDs in a typical half of a potroom.

Note: This drawing does not reflect other potentially acceptable arrangements.



\* \* \* \* \*

**PART 63—NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES**

7. The authority citation for part 63 continues to read as follows:

**Authority:** 42 U.S.C. 7401 *et seq.*

8. Part 63 is amended by adding subpart LL to read as follows:

**Subpart LL—National Emission Standards for Hazardous Air Pollutants for Primary Aluminum Reduction Plants**

Sec.

- 63.840 Applicability.
- 63.841 Incorporation by reference.
- 63.842 Definitions.
- 63.843 Emission limits for existing sources.
- 63.844 Emission limits for new or reconstructed sources.
- 63.845 Incorporation of new source performance standards for potroom groups.
- 63.846 Emission averaging.
- 63.847 Compliance provisions.
- 63.848 Emission monitoring requirements.
- 63.849 Test methods and procedures.
- 63.850 Notification, reporting, and recordkeeping requirements.
- 63.851 Regulatory authority review procedures.
- 63.852 Applicability of general provisions.
- 63.853 Delegation of authority.
- 63.854–63.859 [Reserved]

Table 1 to Subpart LL—Potline TF Limits for Emission Averaging

Table 2 to Subpart LL—Potline POM Limits for Emission Averaging

Table 3 to Subpart LL—Anode Bake Furnace Limits for Emission Averaging

**Appendix A to Subpart LL—Applicability of General Provisions (40 CFR Part 63, Subpart A) to Subpart LL**

**Subpart LL—National Emission Standards for Hazardous Air Pollutants for Primary Aluminum Reduction Plants**

**§ 63.840 Applicability.**

(a) Except as provided in paragraph (b) of this section, the requirements of this subpart apply to the owner or operator of each new pitch storage tank and new or existing potline, paste production plant, or anode bake furnace associated with primary aluminum production and located at a major source as defined in § 63.2.

(b) The requirements of this subpart do not apply to any existing anode bake furnace that is not located on the same site as a primary aluminum reduction plant. The owner or operator shall comply with the State MACT determination established by the applicable regulatory authority.

(c) An owner or operator of an affected facility (potroom group or

anode bake furnace) under § 60.190 of this chapter may elect to comply with either the requirements of § 63.845 of this subpart or the requirements of subpart S of part 60 of this chapter.

**§ 63.841 Incorporation by reference.**

(a) The following material is incorporated by reference in the corresponding sections noted. This incorporation by reference was approved by the Director of the Federal Register on October 7, 1997, in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on the date of approval, and notice of any change in the materials will be published in the **Federal Register**. Revisions to "Industrial Ventilation: A Manual of Recommended Practice" (22nd ed.) are applicable only after publication of a document in the **Federal Register** to amend subpart LL to require use of the new information.

(1) Chapter 3, "Local Exhaust Hoods" and Chapter 5, "Exhaust System Design Procedure" of "Industrial Ventilation: A Manual of Recommended Practice," American Conference of Governmental Industrial Hygienists, 22nd edition, 1995, IBR approved for §§ 63.843(b) and 63.844(b); and

(2) ASTM D 2986–95A, Standard Practice for Evaluation of Air Assay Media by the Monodisperse DOP (Diocetyl Phthalate) Smoke Test, IBR approved for section 7.1.1 of Method 315 in appendix A to this part.

(b) The materials incorporated by reference are available for inspection at the Office of the Federal Register, 800 North Capitol Street NW., Suite 700, 7th Floor, Washington, DC, and at the Air and Radiation Docket Center, U.S. EPA, 401 M Street, SW., Washington, DC. The materials also are available for purchase from one of the following addresses:

(1) Customer Service Department, American Conference of Governmental Industrial Hygienists (ACGIH), 1330 Kemper Meadow Drive, Cincinnati, Ohio 45240, telephone number (513) 742–2020; or

(2) American Society for Testing and Materials, 100 Bar Harbour Drive, West Conshohocken, Pennsylvania 19428, telephone number (610) 832–9500.

**§ 63.842 Definitions.**

Terms used in this subpart are defined in the Clean Air Act as amended (the Act), in § 63.2, or in this section as follows:

**Anode bake furnace** means an oven in which the formed green anodes are baked for use in a prebake process. This definition includes multiple anode bake furnaces controlled by a common

control device (bake furnaces controlled by a common control device are considered to be one source).

**Center-worked prebake (CWPB) process** means a method of primary aluminum reduction using the prebake process in which the alumina feed is added down the center of the reduction cell.

**Center-worked prebake one (CWPB1)** means all existing center-worked prebake potlines not defined as center-worked prebake two (CWPB2) or center-worked prebake three (CWPB3) potlines.

**Center-worked prebake two (CWPB2)** means all existing center-worked prebake potlines located at Alcoa in Rockdale, Texas; Kaiser Aluminum in Mead, Washington; Ormet Corporation in Hannibal, Ohio; Ravenswood Aluminum in Ravenswood, West Virginia; Reynolds Metals in Troutdale, Oregon; and Vanalco Aluminum in Vancouver, Washington.

**Center-worked prebake three (CWPB3)** means all existing center-worked prebake potlines that produce very high purity aluminum, have a wet scrubber for the primary control system, and are located at the NSA primary aluminum plant in Hawesville, Kentucky.

**Continuous parameter monitoring system** means the total equipment that may be required to meet the data acquisition and availability requirements of this subpart, used to sample, condition (if applicable), analyze, and provide a record of process or control system parameters.

**Horizontal stud Soderberg (HSS) process** means a method of primary aluminum reduction using the Soderberg process in which the electrical current is introduced to the anode by steel rods (studs) inserted into the side of a monolithic anode.

**Modified potroom group** means an existing potroom group to which any physical change in, or change in the method of operation of, results in an increase in the amount of total fluoride emitted into the atmosphere by that potroom group.

**Paste production plant** means the processes whereby calcined petroleum coke, coal tar pitch (hard or liquid), and/or other materials are mixed, transferred, and formed into briquettes or paste for vertical stud Soderberg (VSS) and HSS processes or into green anodes for a prebake process. This definition includes all operations from initial mixing to final forming (i.e., briquettes, paste, green anodes) within the paste plant, including conveyors and units managing heated liquid pitch.

**Pitch storage tank** means any fixed roof tank that is used to store liquid

pitch that is not part of the paste production plant.

*Polycyclic organic matter (POM)* means organic matter extractable by methylene chloride as determined by Method 315 in appendix A to this part or by an approved alternative method.

*Potline* means a single, discrete group of electrolytic reduction cells electrically connected in series, in which alumina is reduced to form aluminum.

*Potroom* means a building unit that houses a group of electrolytic cells in which aluminum is produced.

*Potroom group* means an uncontrolled potroom, a potroom that is controlled individually, or a group of potrooms or potroom segments ducted to a common control system.

*Prebake process* means a method of primary aluminum reduction that uses an anode that was baked in an anode bake furnace, which is introduced into the top of the reduction cell and consumed as part of the reduction process.

*Primary aluminum reduction plant* means any facility manufacturing aluminum by electrolytic reduction.

*Primary control system* means the equipment used to capture the gases and particulate matter evacuated directly from the reduction cell and the emission control device(s) used to remove pollutants prior to discharge of the cleaned gas to the atmosphere. A roof scrubber is not part of the primary control system.

*Primary emissions* means the emissions discharged from the primary control system.

*Reconstructed potroom group* means an existing potroom group for which the components are replaced to such an extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new potroom group, and for which it is technologically and economically feasible to meet the applicable emission limits for total fluoride set forth in this subpart.

*Reconstruction* means the replacement of components of a source to such an extent that:

(1) All of the major components of the source are replaced (for example, the major components of a potline include the raw material handling system, reduction cells, superstructure, hooding, ductwork, etc.); and

(2) It is technologically and economically feasible for the reconstructed source to meet the standards for new sources established in this subpart.

*Roof monitor* means that portion of the roof of a potroom building where gases not captured at the cell exit from the potroom.

*Secondary emissions* means the fugitive emissions that are not captured and controlled by the primary control system and that escape through the roof monitor or through roof scrubbers.

*Side-worked prebake (SWPB) process* means a method of primary aluminum reduction using the prebake process, in which the alumina is added along the sides of the reduction cell.

*Soderberg process* means a method of primary aluminum reduction in which the anode paste mixture is baked in the reduction pot by the heat resulting from the electrolytic process.

*Total fluorides (TF)* means elemental fluorine and all fluoride compounds as measured by Methods 13A or 13B in appendix A to part 60 of this chapter or by an approved alternative method.

*Vertical stud Soderberg (VSS) process* means a method of primary aluminum reduction using the Soderberg process, in which the electrical current is introduced to the anode by steel rods (studs) inserted into the top of a monolithic anode.

*Vertical stud Soderberg one (VSS1)* means all existing vertical stud Soderberg potlines located either at Northwest Aluminum in The Dalles, Oregon, or at Goldendale Aluminum in Goldendale, Washington.

*Vertical stud Soderberg two (VSS2)* means all existing vertical stud Soderberg potlines located at Columbia Falls Aluminum in Columbia Falls, Montana.

#### § 63.843 Emission limits for existing sources.

(a) *Potlines.* The owner or operator shall not discharge or cause to be discharged into the atmosphere any emissions of TF or POM in excess of the applicable limits in paragraphs (a)(1) and (a)(2) of this section.

(1) *TF limits.* Emissions of TF shall not exceed:

(i) 0.95 kg/Mg (1.9 lb/ton) of aluminum produced for each CWPB1 potline;

(ii) 1.5 kg/Mg (3.0 lb/ton) of aluminum produced for each CWPB2 potline;

(iii) 1.25 kg/Mg (2.5 lb/ton) of aluminum produced for each CWPB3 potline;

(iv) 0.8 kg/Mg (1.6 lb/ton) of aluminum produced for each SWPB potline;

(v) 1.1 kg/Mg (2.2 lb/ton) of aluminum produced for each VSS1 potline;

(vi) 1.35 kg/Mg (2.7 lb/ton) of aluminum produced for each VSS2 potline; and

(vii) 1.35 kg/Mg (2.7 lb/ton) of aluminum produced for each HSS potline.

(2) *POM limits.* Emissions of POM shall not exceed:

(i) 2.35 kg/Mg (4.7 lb/ton) of aluminum produced for each HSS potline;

(ii) 1.2 kg/Mg (2.4 lb/ton) of aluminum produced for each VSS1 potline; and

(iii) 1.8 kg/Mg (3.6 lb/ton) of aluminum produced for each VSS2 potline.

(3) *Change in subcategory.* Any potline, other than a reconstructed potline, that is changed such that its applicable subcategory also changes shall meet the applicable emission limit in this subpart for the original subcategory or the new subcategory, whichever is more stringent.

(b) *Paste production plants.* The owner or operator shall install, operate, and maintain equipment to capture and control POM emissions from each paste production plant.

(1) The emission capture system shall be installed and operated to meet the generally accepted engineering standards for minimum exhaust rates as published by the American Conference of Governmental Industrial Hygienists in Chapters 3 and 5 of "Industrial Ventilation: A Handbook of Recommended Practice" (incorporated by reference in § 63.841 of this part); and

(2) Captured emissions shall be routed through a closed system to a dry coke scrubber; or

(3) The owner or operator may submit a written request for use of an alternative control device to the applicable regulatory authority for review and approval. The request shall contain information and data demonstrating that the alternative control device achieves POM emissions less than 0.011 lb/ton of paste for plants with continuous mixers or POM emissions less than 0.024 lb/ton of paste for plants with batch mixers. The POM emission rate shall be determined by sampling using Method 315 in appendix A to this part.

(c) *Anode bake furnaces.* The owner or operator shall not discharge or cause to be discharged into the atmosphere any emissions of TF or POM in excess of the limits in paragraphs (c)(1) and (c)(2) of this section.

(1) *TF limit.* Emissions of TF shall not exceed 0.10 kg/Mg (0.20 lb/ton) of green anode; and

(2) *POM limit.* Emissions of POM shall not exceed 0.09 kg/Mg (0.18 lb/ton) of green anode.

**§ 63.844 Emission limits for new or reconstructed sources.**

(a) *Potlines.* The owner or operator shall not discharge or cause to be discharged into the atmosphere any emissions of TF or POM in excess of the limits in paragraphs (a)(1) and (a)(2) of this section.

(1) *TF limit.* Emissions of TF shall not exceed 0.6 kg/Mg (1.2 lb/ton) of aluminum produced; and

(2) *POM limit.* Emissions of POM from Soderberg potlines shall not exceed 0.32 kg/Mg (0.63 lb/ton) of aluminum produced.

(b) *Paste production plants.* The owner or operator shall meet the requirements in § 63.843(b) for existing paste production plants.

(c) *Anode bake furnaces.* The owner or operator shall not discharge or cause to be discharged into the atmosphere any emissions of TF or POM in excess of the limits in paragraphs (c)(1) and (c)(2) of this section.

(1) *TF limit.* Emissions of TF shall not exceed 0.01 kg/Mg (0.02 lb/ton) of green anode; and

(2) *POM limit.* Emissions of POM shall not exceed 0.025 kg/Mg (0.05 lb/ton) of green anode.

(d) *Pitch storage tanks.* Each pitch storage tank shall be equipped with an emission control system designed and operated to reduce inlet emissions of POM by 95 percent or greater.

**§ 63.845 Incorporation of new source performance standards for potroom groups.**

(a) *Applicability.* The provisions in paragraphs (a) through (i) of this section shall apply to any Soderberg, CWPB2, and CWPB3 potline that adds a new potroom group to an existing potline or that is associated with a potroom group that meets the definition of "modified potroom group" or "reconstructed potroom group."

(1) The following shall not, by themselves, be considered to result in a potroom group modification:

(i) Maintenance, repair, and replacement that the applicable regulatory authority determines to be routine for the potroom group;

(ii) An increase in production rate of an existing potroom group, if that increase can be accomplished without a capital expenditure on that potroom group;

(iii) An increase in the hours of operation;

(iv) Use of an alternative fuel or raw material if, prior to the effective date of this subpart, the existing potroom group was designed to accommodate that alternative use;

(v) The addition or use of any system or device whose primary function is the

reduction of air pollutants, except when an emission control system is removed or is replaced by a system that the applicable regulatory authority determines to be less environmentally beneficial; and

(vi) The relocation or change in ownership of an existing potroom group.

(2) The provisions in paragraphs (a)(2)(i) through (a)(2)(iv) of this section apply when the applicable regulatory authority must determine if a potroom group meets the definition of reconstructed potroom group.

(i) "Fixed capital cost" means the capital needed to provide all the depreciable components.

(ii) If an owner or operator of an existing potroom group proposes to replace components, and the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new potroom group, he/she shall notify the applicable regulatory authority of the proposed replacements. The notice must be postmarked 60 days (or as soon as practicable) before construction of the replacements is commenced and must include the following information:

(A) Name and address of the owner or operator;

(B) The location of the existing potroom group;

(C) A brief description of the existing potroom group and the components that are to be replaced;

(D) A description of the existing air pollution control equipment and the proposed air pollution control equipment;

(E) An estimate of the fixed capital cost of the replacements and of constructing a comparable entirely new potroom group;

(F) The estimated life of the existing potroom group after the replacements; and

(G) A discussion of any economic or technical limitations the potroom group may have in complying with the applicable standards of performance after the proposed replacements.

(iii) The applicable regulatory authority will determine, within 30 days of the receipt of the notice required by paragraph (a)(2)(ii) of this section and any additional information he/she may reasonably require, whether the proposed replacement constitutes a reconstructed potroom group.

(iv) The applicable regulatory authority's determination under paragraph (a)(2)(iii) of this section shall be based on:

(A) The fixed capital cost of the replacements in comparison to the fixed

capital cost that would be required to construct a comparable entirely new potroom group;

(B) The estimated life of the potroom group after the replacements compared to the life of a comparable entirely new potroom group;

(C) The extent to which the components being replaced cause or contribute to the emissions from the potroom group; and

(D) Any economic or technical limitations on compliance with applicable standards of performance that are inherent in the proposed replacements.

(b) *Lower TF emission limit.* The owner or operator shall calculate a lower TF emission limit for any potline associated with the modified potroom group, reconstructed potroom group, or new potroom group using the following equation:

$$L_1 = f_1 \times L_{PG1} + (1 - f_1) \times L_{PL}$$

Where

$L_1$  = the lower TF emission limit in kg/Mg (lb/ton);

$f_1$  = the fraction of the potline's total aluminum production capacity that is contained within all modified potroom groups, reconstructed potroom groups, and new potroom groups;

$L_{PG1}$  = 0.95 kg/Mg (1.9 lb/ton) for prebake potlines and 1.0 kg/Mg (2.0 lb/ton) for Soderberg potlines; and

$L_{PL}$  = the TF emission limit from § 63.843(a)(1) for the appropriate potline subcategory that would have otherwise applied to the potline.

(c) *Upper TF emission limit.* The owner or operator shall calculate an upper TF emission limit for any potline associated with the modified potroom group, reconstructed potroom group, or new potroom group using the following equation:

$$L_2 = f_1 \times L_{PG2} + (1 - f_1) \times L_{PL}$$

Where

$L_2$  = the upper TF emission limit in kg/Mg (lb/ton); and

$L_{PG2}$  = 1.25 kg/Mg (2.5 lb/ton) for prebake potlines and 1.3 kg/Mg (2.6 lb/ton) for Soderberg potlines.

(d) *Recalculation.* The TF emission limits in paragraphs (b) and (c) of this section shall be recalculated each time a new potroom group is added to the potline and each time an additional potroom group meets the definition of "modified potroom group" or "reconstructed potroom group."

(e) *Emission limitation.* The owner or operator shall not discharge or cause to be discharged into the atmosphere emissions of TF from any potline

associated with the modified potroom group, reconstructed potroom group, or new potroom group that exceed the lower emission limit calculated in paragraph (b) of this section, except that emissions less than the upper limit calculated in paragraph (c) of this section will be considered in compliance if the owner or operator demonstrates that exemplary operation and maintenance procedures were used with respect to the emission control system and that proper control equipment was operating at the potline during the performance test.

(f) *Report.* Within 30 days of any performance test that reveals emissions that fall between the lower limit calculated in paragraph (b) of this section and the upper limit calculated in paragraph (c) of this section, the owner or operator shall submit to the applicable regulatory authority a report indicating whether all necessary control devices were online and operating properly during the performance test, describing the operating and maintenance procedures followed, and setting forth any explanation for the excess emissions.

(g) *Procedures to determine TF emissions.* The owner or operator shall determine TF emissions for the potline using the following procedures:

(1) Determine the emission rate of TF in kg/Mg (lb/ton) from sampling secondary emissions and the primary control system for all new potroom groups, modified potroom groups, and reconstructed potroom groups using the procedures, equations, and test methods in §§ 63.847, 63.848, and 63.849.

(2) Determine the emission rate of TF in kg/Mg (lb/ton) from sampling secondary emissions and the primary control system for potroom groups or sections of potroom groups within the potline that are not new potroom groups, modified potroom groups, or reconstructed potroom groups according to paragraphs (g)(2)(i) or (g)(2)(ii) of this section.

(i) Determine the mass emission rate of TF in kg/Mg (lb/ton) from at least one potroom group within the potline that is not a new potroom group, modified potroom group, or reconstructed potroom group using the procedures, equations, and test methods in §§ 63.847, 63.848, and 63.849, or

(ii) Use the results of the testing required by paragraph (g)(1) of this section to represent the entire potline based on a demonstration that the results are representative of the entire potline. Representativeness shall be based on showing that all of the potroom groups associated with the potline are substantially equivalent in

terms of their structure, operability, type of emissions, volume of emissions, and concentration of emissions.

(3) Calculate the TF emissions for the potline in kg/Mg (lb/ton) based on the production-weighted average of the TF emission rates from paragraphs (g)(1) and (g)(2) of this section using the following equation:

$$E = f_1 \times E_{PG1} + (1 - f_1) \times E_{PL}$$

where

E = the TF emission rate for the entire potline, kg/Mg (lb/ton);

$f_1$  = the fraction of the potline's total aluminum production rate that is contained within all modified potroom groups, reconstructed potroom groups, and new potroom groups;

$E_{PG1}$  = the TF emission rate from paragraph (g)(1) of this section for all modified potroom groups, reconstructed potroom groups, and new potroom groups, kg/Mg (lb/ton); and

$E_{PL}$  = the TF emission rate for the balance of the potline from paragraph (g)(2) of this section, kg/Mg (lb/ton).

Compliance is demonstrated when TF emissions for the potline meet the requirements in paragraph (e) of this section.

(4) As an alternative to sampling as required in paragraphs (g)(1) and (g)(2) of this section, the owner or operator may perform representative sampling of the entire potline subject to the approval of the applicable regulatory authority. Such sampling shall provide coverage by the sampling equipment of both the new, modified, or reconstructed potroom group and the balance of the potline. The coverage for the new, modified, or reconstructed potroom group must meet the criteria specified in the reference methods in § 63.849. TF emissions shall be determined for the potline using the procedures, equations, and test methods in §§ 63.847, 63.848, and 63.849. Compliance is demonstrated when TF emissions for the potline meet the requirements in paragraph (e) of this section.

(h) *Opacity.* Except as provided in paragraph (i) of this section, the owner or operator shall not discharge or cause to be discharged into the atmosphere from the modified potroom group, reconstructed potroom group, or new potroom group any emissions of gases that exhibit 10 percent opacity or greater.

(i) *Alternative opacity limit.* An alternative opacity limit may be established in place of the opacity limit in paragraph (h) of this section using the following procedures:

(1) If the regulatory authority finds that a potline is in compliance with the applicable TF standard for which performance tests are conducted in accordance with the methods and procedures in § 63.849 but during the time such performance tests are being conducted fails to meet any applicable opacity standard, the regulatory authority shall notify and advise the owner or operator that he/she may petition the regulatory authority within 10 days of receipt of notification to make appropriate adjustment to the opacity standard.

(2) The regulatory authority will grant such a petition upon a demonstration by the owner or operator that the potroom group and associated air pollution control equipment were operated and maintained in a manner to minimize the opacity of emissions during the performance tests; that the performance tests were performed under the conditions established by the regulatory authority; and that the potroom group and associated air pollution control equipment were incapable of being adjusted or operated to meet the applicable opacity standard.

(3) As indicated by the performance and opacity tests, the regulatory authority will establish an opacity standard for any potroom group meeting the requirements in paragraphs (i)(1) and (i)(2) of this section such that the opacity standard could be met by the potroom group at all times during which the potline is meeting the TF emission limit.

(4) The alternative opacity limit established in paragraph (i)(3) of this section shall not be greater than 20 percent opacity.

#### § 63.846 Emission averaging.

(a) *General.* The owner or operator of an existing potline or anode bake furnace in a State that does not choose to exclude emission averaging in the approved operating permit program may demonstrate compliance by emission averaging according to the procedures in this section.

(b) *Potlines.* The owner or operator may average TF emissions from potlines and demonstrate compliance with the limits in Table 1 of this subpart using the procedures in paragraphs (b)(1) and (b)(2) of this section. The owner or operator also may average POM emissions from potlines and demonstrate compliance with the limits in Table 2 of this subpart using the procedures in paragraphs (b)(1) and (b)(3) of this section.

(1) Monthly average emissions of TF and/or quarterly average emissions of POM shall not exceed the applicable

emission limit in Table 1 of this subpart (for TF emissions) and/or Table 2 of this subpart (for POM emissions). The emission rate shall be calculated based on the total emissions from all potlines over the period divided by the quantity of aluminum produced during the period, from all potlines comprising the averaging group.

(2) To determine compliance with the applicable emission limit in Table 1 of this subpart for TF emissions, the owner or operator shall determine the monthly average emissions (in lb/ton) from each potline from at least three runs per potline each month for TF secondary emissions using the procedures and methods in §§ 63.847 and 63.849. The owner or operator shall combine the results of secondary TF monthly average emissions with the TF results for the primary control system and divide total emissions by total aluminum production.

(3) To determine compliance with the applicable emission limit in Table 2 of this subpart for POM emissions, the owner or operator shall determine the quarterly average emissions (in lb/ton) from each potline from at least one run each month for POM emissions using the procedures and methods in §§ 63.847 and 63.849. The owner or operator shall combine the results of secondary POM quarterly average emissions with the POM results for the primary control system and divide total emissions by total aluminum production.

(c) *Anode bake furnaces.* The owner or operator may average TF emissions from anode bake furnaces and demonstrate compliance with the limits in Table 3 of this subpart using the procedures in paragraphs (c)(1) and (c)(2) of this section. The owner or operator also may average POM emissions from anode bake furnaces and demonstrate compliance with the limits in Table 3 of this subpart using the procedures in paragraphs (c)(1) and (c)(2) of this section.

(1) Annual emissions of TF and/or POM from a given number of anode bake furnaces making up each averaging group shall not exceed the applicable emission limit in Table 3 of this subpart in any one year; and

(2) To determine compliance with the applicable emission limit in Table 3 of this subpart for anode bake furnaces, the owner or operator shall determine TF and/or POM emissions from the control device for each furnace at least once a year using the procedures and methods in §§ 63.847 and 63.849.

(d) *Implementation plan.* The owner or operator shall develop and submit an implementation plan for emission

averaging to the applicable regulatory authority for review and approval according to the following procedures and requirements:

(1) *Deadlines.* The owner or operator must submit the implementation plan no later than 6 months before the date that the facility intends to comply with the emission averaging limits.

(2) *Contents.* The owner or operator shall include the following information in the implementation plan or in the application for an operating permit for all emission sources to be included in an emissions average:

(i) The identification of all emission sources (potlines or anode bake furnaces) in the average;

(ii) The assigned TF or POM emission limit for each averaging group of potlines or anode bake furnaces;

(iii) The specific control technology or pollution prevention measure to be used for each emission source in the averaging group and the date of its installation or application. If the pollution prevention measure reduces or eliminates emissions from multiple sources, the owner or operator must identify each source;

(iv) The test plan for the measurement of TF or POM emissions in accordance with the requirements in § 63.847(b);

(v) The operating parameters to be monitored for each control system or device and a description of how the operating limits will be determined;

(vi) If the owner or operator requests to monitor an alternative operating parameter pursuant to § 63.848(l):

(A) A description of the parameter(s) to be monitored and an explanation of the criteria used to select the parameter(s); and

(B) A description of the methods and procedures that will be used to demonstrate that the parameter indicates proper operation of the control device; the frequency and content of monitoring, reporting, and recordkeeping requirements; and a demonstration, to the satisfaction of the applicable regulatory authority, that the proposed monitoring frequency is sufficient to represent control device operating conditions; and

(vii) A demonstration that compliance with each of the applicable emission limit(s) will be achieved under representative operating conditions.

(3) *Approval criteria.* Upon receipt, the regulatory authority shall review and approve or disapprove the plan or permit application according to the following criteria:

(i) Whether the content of the plan includes all of the information specified in paragraph (d)(2) of this section; and

(ii) Whether the plan or permit application presents sufficient information to determine that compliance will be achieved and maintained.

(4) *Prohibitions.* The applicable regulatory authority shall not approve an implementation plan or permit application containing any of the following provisions:

(i) Any averaging between emissions of differing pollutants or between differing sources. Emission averaging shall not be allowed between TF and POM, and emission averaging shall not be allowed between potlines and bake furnaces;

(ii) The inclusion of any emission source other than an existing potline or existing anode bake furnace or the inclusion of any potline or anode bake plant not subject to the same operating permit;

(iii) The inclusion of any potline or anode bake furnace while it is shut down; or

(iv) The inclusion of any periods of startup, shutdown, or malfunction, as described in the startup, shutdown, and malfunction plan required by § 63.850(c), in the emission calculations.

(5) *Term.* Following review, the applicable regulatory authority shall approve the plan or permit application, request changes, or request additional information. Once the applicable regulatory authority receives any additional information requested, the applicable regulatory authority shall approve or disapprove the plan or permit application within 120 days.

(i) The applicable regulatory authority shall approve the plan for the term of the operating permit;

(ii) To revise the plan prior to the end of the permit term, the owner or operator shall submit a request to the applicable regulatory authority; and

(iii) The owner or operator may submit a request to the applicable regulatory authority to implement emission averaging after the applicable compliance date.

(6) *Operation.* While operating under an approved implementation plan, the owner or operator shall monitor the operating parameters of each control system, keep records, and submit periodic reports as required for each source subject to this subpart.

#### § 63.847 Compliance provisions.

(a) *Compliance dates.* The owner or operator of a primary aluminum plant shall demonstrate initial compliance with the requirements of this subpart by:

(1) October 7, 1999, for an owner or operator of an existing plant or source;

(2) October 9, 2000, for an existing source, provided the owner or operator demonstrates to the satisfaction of the applicable regulatory authority that additional time is needed to install or modify the emission control equipment;

(3) October 8, 2001, for an existing source that is granted an extension by the regulatory authority under section 112(i)(3)(B) of the Act; or

(4) Upon startup, for an owner or operator of a new or reconstructed source.

(b) *Test plan.* The owner or operator shall prepare a site-specific test plan prior to the initial performance test according to the requirements of § 63.7(c) of this part. The test plan must include procedures for conducting the initial performance test and for subsequent performance tests required in § 63.848 for emission monitoring. In addition to the information required by § 63.7, the test plan shall include:

(1) Procedures to ensure a minimum of three runs are performed annually for the primary control system for each source;

(2) For a source with a single control device exhausted through multiple stacks, procedures to ensure that at least three runs are performed annually by a representative sample of the stacks satisfactory to the applicable regulatory authority;

(3) For multiple control devices on a single source, procedures to ensure that at least one run is performed annually for each control device by a representative sample of the stacks satisfactory to the applicable regulatory authority;

(4) Procedures for sampling single stacks associated with multiple anode bake furnaces;

(5) For plants with roof scrubbers, procedures for rotating sampling among the scrubbers or other procedures to obtain representative samples as approved by the applicable regulatory authority;

(6) For a VSS1 potline, procedures to ensure that one fan (or one scrubber) per potline is sampled for each run;

(7) For a SWPB potline, procedures to ensure that the average of the sampling

results for two fans (or two scrubbers) per potline is used for each run; and

(8) Procedures for establishing the frequency of testing to ensure that at least one run is performed before the 15th of the month, at least one run is performed after the 15th of the month, and that there are at least 6 days between two of the runs during the month, or that secondary emissions are measured according to an alternate schedule satisfactory to the applicable regulatory authority.

(c) *Initial performance test.* Following approval of the site-specific test plan, the owner or operator shall conduct an initial performance test during the first month following the compliance date in accordance with the procedures in paragraph (d) of this section. If a performance test has been conducted on the primary control system for potlines or for the anode bake furnace within the 12 months prior to the compliance date, the results of that performance test may be used to determine initial compliance.

(d) *Performance test requirements.* The initial performance test and all subsequent performance tests shall be conducted in accordance with the requirements of the general provisions in subpart A of this part, the approved test plan, and the procedures in this section.

(1) *TF emissions from potlines.* For each potline, the owner or operator shall measure and record the emission rate of TF exiting the outlet of the primary control system for each potline and the rate of secondary emissions exiting through each roof monitor, or for a plant with roof scrubbers, exiting through the scrubbers. Using the equation in paragraph (e)(1) of this section, the owner or operator shall compute and record the average of at least three runs each month for secondary emissions and at least three runs each year for the primary control system to determine compliance with the applicable emission limit. Compliance is demonstrated when the emission rate of TF is equal to or less than the applicable emission limit in §§ 63.843, 63.844, or 63.846.

(2) *POM emissions from Soderberg potlines.* For each Soderberg (HSS,

VSS1, and VSS2) potline, the owner or operator shall measure and record the emission rate of POM exiting the primary emission control system and the rate of secondary emissions exiting through each roof monitor, or for a plant with roof scrubbers, exiting through the scrubbers. Using the equation in paragraph (e)(2) of this section, the owner or operator shall compute and record the average of at least three runs each quarter (one run per month) for secondary emissions and at least three runs each year for the primary control system to determine compliance with the applicable emission limit. Compliance is demonstrated when the emission rate of POM is equal to or less than the applicable emission limit in §§ 63.843, 63.844, or 63.846.

(3) *Previous control device tests.* If the owner or operator has performed more than one test of primary emission control device(s) for a potline or for a bake furnace during the previous consecutive 12 months, the average of all runs performed in the previous 12-month period shall be used to determine the contribution from the primary emission control system.

(4) *TF and POM emissions from anode bake furnaces.* For each anode bake furnace, the owner or operator shall measure and record the emission rate of TF and POM exiting the exhaust stacks(s) of the primary emission control system for each anode bake furnace. Using the equations in paragraphs (e)(3) and (e)(4) of this section, the owner or operator shall compute and record the average of at least three runs each year to determine compliance with the applicable emission limits for TF and POM. Compliance is demonstrated when the emission rates of TF and POM are equal to or less than the applicable TF and POM emission limits in §§ 63.843, 63.844, or 63.846.

(e) *Equations.* The owner or operator shall determine compliance with the applicable TF and POM emission limits using the following equations and procedures:

(1) Compute the emission rate ( $E_p$ ) of TF from each potline using Equation 1:

$$E_p = \frac{[(C_{s1} \times Q_{sd})_1 + (C_{s2} \times Q_{sd})_2]}{(P \times K)} \quad \text{(Equation 1)}$$

Where

$E_p$ =emission rate of TF from a potline, kg/Mg (lb/ton);

$C_{s1}$ =concentration of TF from the primary control system, mg/dscm (mg/dscf);

$Q_{sd}$ =volumetric flow rate of effluent gas corresponding to the appropriate

subscript location, dscm/hr (dscf/hr);

$C_{s2}$ =concentration of TF as measured for roof monitor emissions, mg/dscm (mg/dscf);

P=aluminum production rate, Mg/hr (ton/hr);

K=conversion factor,  $10^6$  mg/kg (453,600 mg/lb);

$_1$  = subscript for primary control system effluent gas; and

$_2$  = subscript for secondary control system or roof monitor effluent gas.

(2) Compute the emission rate of POM from each potline using Equation 1, Where:

$E_p$  = emission rate of POM from the potline, kg/mg (lb/ton); and

$C_s$  = concentration of POM, mg/dscm (mg/dscf). POM emission data collected during the installation and startup of a cathode shall not be included in  $C_s$ .

(3) Compute the emission rate ( $E_b$ ) of TF from each anode bake furnace using Equation 2,

$$E_b = \frac{(C_s \times Q_{sd})}{(P_b \times K)} \quad (\text{Equation 2})$$

Where:

$E_b$  = emission rate of TF, kg/mg (lb/ton) of green anodes produced;

$C_s$  = concentration of TF, mg/dscm (mg/dscf);

$Q_{sd}$  = volumetric flow rate of effluent gas, dscm/hr (dscf/hr);

$P_b$  = quantity of green anode material placed in the furnace, mg/hr (ton/hr); and

K = conversion factor,  $10^6$  mg/kg (453,600 mg/lb).

(4) Compute the emission rate of POM from each anode bake furnace using Equation 2,

Where:

$C_s$  = concentration of POM, mg/dscm (mg/dscf).

(5) Determine the weight of the aluminum tapped from the potline and the weight of the green anode material placed in the anode bake furnace using the monitoring devices required in § 63.848(j).

(6) Determine the aluminum production rate (P) by dividing the number of hours in the calendar month into the weight of aluminum tapped from the potline during the calendar month that includes the three runs of a performance test.

(7) Determine the rate of green anode material introduced into the furnace by dividing the number of operating hours in the calendar month into the weight of green anode material used during the calendar month in which the performance test was conducted.

(f) *Paste production plants.* Initial compliance with the standards for existing and new paste production plants in §§ 63.843(b) and 63.844(b) will

be demonstrated through site inspection(s) and review of site records by the applicable regulatory authority.

(g) *Pitch storage tanks.* The owner or operator shall demonstrate initial compliance with the standard for pitch storage tanks in § 63.844(d) by preparing a design evaluation or by conducting a performance test. The owner or operator shall submit for approval by the regulatory authority the information specified in paragraph (g)(1) of this section, along with the information specified in paragraph (g)(2) of this section where a design evaluation is performed or the information specified in paragraph (g)(3) of this section where a performance test is conducted.

(1) A description of the parameters to be monitored to ensure that the control device is being properly operated and maintained, an explanation of the criteria used for selection of that parameter (or parameters), and the frequency with which monitoring will be performed; and

(2) Where a design evaluation is performed, documentation demonstrating that the control device used achieves the required control efficiency during reasonably expected maximum filling rate. The documentation shall include a description of the gas stream that enters the control device, including flow and POM content under varying liquid level conditions, and the information specified in paragraphs (g)(2)(i) through (g)(2)(vi) of this section, as applicable.

(i) If the control device receives vapors, gases, or liquids, other than fuels, from emission points other than pitch storage tanks, the efficiency demonstration is to include consideration of all vapors, gases, and liquids, other than fuels, received by the control device;

(ii) If an enclosed combustion device with a minimum residence time of 0.5 seconds and a minimum temperature of 760°C (1,400°F) is used to meet the emission reduction requirement specified in § 83.844(d), documentation that those conditions exist is sufficient to meet the requirements of § 83.844(d);

(iii) Except as provided in paragraph (g)(2)(ii) of this section, for thermal incinerators, the design evaluation shall include the autoignition temperature of the organic HAP, the flow rate of the organic HAP emission stream, the combustion temperature, and the residence time at the combustion temperature;

(iv) If the pitch storage tank is vented to the emission control system installed for control of emissions from the paste production plant pursuant to § 63.843(b), documentation of

compliance with the requirements of § 63.843(b) is sufficient to meet the requirements of § 63.844(d);

(v) For carbon adsorbers, the design evaluation shall include the affinity of the organic vapors for carbon, the amount of carbon in each bed, the number of beds, the humidity of the feed gases, the temperature of the feed gases, the flow rate of the organic HAP emission stream, and if applicable, the desorption schedule, the regeneration stream pressure or temperature, and the flow rate of the regeneration stream. For vacuum desorption, the pressure drop shall be included; and

(vi) For condensers, the design evaluation shall include the final temperature of the organic HAP vapors, the type of condenser, and the design flow rate of the organic HAP emission stream.

(3) If a performance test is conducted, the owner or operator shall determine the control efficiency for POM during tank loading using Method 315 in appendix A to this part. The owner or operator shall include the following information:

(i) Identification of the pitch storage tank and control device for which the performance test will be submitted; and

(ii) Identification of the emission point(s) that share the control device with the pitch storage tank and for which the performance test will be conducted.

(h) *Selection of monitoring parameters.* The owner or operator shall determine the operating limits and monitoring frequency for each control device that is to be monitored as required in § 63.848(f).

(1) For potlines and anode bake furnaces, the owner or operator shall determine upper and/or lower operating limits, as appropriate, for each monitoring device for the emission control system from the values recorded during each of the runs performed during the initial performance test and from historical data from previous performance tests conducted by the methods specified in this subpart.

(2) For a paste production plant, the owner or operator shall specify and provide the basis or rationale for selecting parameters to be monitored and the associated operating limits for the emission control device.

(3) The owner or operator may redetermine the upper and/or lower operating limits, as appropriate, based on historical data or other information and submit an application to the applicable regulatory authority to change the applicable limit(s). The redetermined limits shall become

effective upon approval by the applicable regulatory authority.

**§ 63.848 Emission monitoring requirements.**

(a) *TF emissions from potlines.* Using the procedures in § 63.847 and in the approved test plan, the owner or operator shall monitor emissions of TF from each potline by conducting monthly performance tests. The owner or operator shall compute and record the monthly average from at least three runs for secondary emissions and the previous 12-month average of all runs for the primary control system to determine compliance with the applicable emission limit. The owner or operator must include all valid runs in the monthly average. The duration of each run for secondary emissions must represent a complete operating cycle.

(b) *POM emissions from Soderberg potlines.* Using the procedures in § 63.847 and in the approved test plan, the owner or operator shall monitor emissions of POM from each Soderberg (HSS, VSS1, and VSS2) potline every three months. The owner or operator shall compute and record the quarterly (3-month) average from at least one run per month for secondary emissions and the previous 12-month average of all runs for the primary control systems to determine compliance with the applicable emission limit. The owner or operator must include all valid runs in the quarterly (3-month) average. The duration of each run for secondary emissions must represent a complete operating cycle. The primary control system must be sampled over an 8-hour period, unless site-specific factors dictate an alternative sampling time subject to the approval of the regulatory authority.

(c) *TF and POM emissions from anode bake furnaces.* Using the procedures in § 63.847 and in the approved test plan, the owner or operator shall monitor TF and POM emissions from each anode bake furnace on an annual basis. The owner or operator shall compute and record the annual average of TF and POM emissions from at least three runs to determine compliance with the applicable emission limits. The owner or operator must include all valid runs in the annual average.

(d) *Similar potlines.* As an alternative to monthly monitoring of TF or POM secondary emissions from each potline using the test methods in § 63.849, the owner or operator may perform monthly monitoring of TF or POM secondary emissions from one potline using the test methods in §§ 63.849 (a) or (b) to represent the performance of similar potline(s). The similar potline(s) shall

be monitored using an alternative method that meets the requirements of paragraphs (d)(1) through (d)(7) of this section. Two or more potlines are similar if the owner or operator demonstrates that their structure, operability, type of emissions, volume of emissions, and concentration of emissions are substantially equivalent.

(1) To demonstrate (to the satisfaction of the regulatory authority) that the level of emission control performance is the same or better, the owner or operator shall perform an emission test using an alternative monitoring procedure for the similar potline simultaneously with an emission test using the applicable test methods. The results of the emission test using the applicable test methods must be in compliance with the applicable emission limit for existing or new potlines in §§ 63.843 or 63.844. An alternative method:

(i) For TF emissions, must account for or include gaseous fluoride and cannot be based on measurement of particulate matter or particulate fluoride alone; and

(ii) For TF and POM emissions, must meet or exceed Method 14 criteria.

(2) An HF continuous emission monitoring system is an approved alternative for the monitoring of TF secondary emissions.

(3) An owner or operator electing to use an alternative monitoring procedure shall establish an alternative emission limit based on at least nine simultaneous runs using the applicable test methods and the alternative monitoring method. All runs must represent a full process cycle.

(4) The owner or operator shall derive an alternative emission limit for the HF continuous emission monitor or an alternative method using either of the following procedures:

(i) Use the highest value from the alternative method associated with a simultaneous run by the applicable test method that does not exceed the applicable emission limit; or

(ii) Correlate the results of the two methods (the applicable test method results and the alternative monitoring method results) and establish an emission limit for the alternative monitoring system that corresponds to the applicable emission limit.

(5) The owner or operator shall submit the results required in paragraph (d)(4) of this section and all supporting documentation to the applicable regulatory authority for review and approval.

(6) The regulatory authority shall review and approve or disapprove the request for an alternative method and alternative emission limit. The criterion for approval shall be a demonstration (to

the satisfaction of the regulatory authority) that the alternative method and alternative emission limit achieve a level of emission control that is the same as or better than the level that would have otherwise been achieved by the applicable method and emission limit.

(7) If the alternative method is approved by the applicable regulatory authority, the owner or operator shall perform monthly emission monitoring using the approved alternative monitoring procedure to demonstrate compliance with the alternative emission limit for each similar potline.

(e) *Reduced sampling frequency.* The owner or operator may submit a written request to the applicable regulatory authority to establish an alternative testing requirement to reduce the sampling of secondary TF emissions from potlines from monthly to quarterly.

(1) In the request, the owner or operator shall provide information and data demonstrating, to the satisfaction of the applicable regulatory authority, that secondary emissions of TF from potlines have low variability during normal operations using the procedures in paragraphs (e)(1)(i) or (e)(1)(ii) of this section.

(i) Submit data from 24 consecutive months of sampling that show the average TF emissions are less than 60 percent of the applicable limit and that no monthly performance test in the 24 months of sampling exceeds 75 percent of the applicable limit; or

(ii) Submit data and a statistical analysis that the regulatory authority may evaluate based on the approach used in "Primary Aluminum: Statistical Analysis of Potline Fluoride Emissions and Alternative Sampling Frequency" (EPA-450-86-012, October 1986), which is available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161.

(2) An approved alternative requirement must include a test schedule and the method to be used to measure emissions for performance tests.

(3) The owner or operator of a plant that has received approval of an alternative sampling frequency under § 60.194 of this chapter is deemed to have approval of the alternative sampling frequency under this subpart.

(4) If emissions in excess of the applicable TF limit occur while performing quarterly sampling approved under paragraph (e)(1)(i) of this section, the owner or operator shall return to monthly sampling for at least 12 months and may reduce to quarterly sampling when:



(i) The average of all tests performed over the most recent 24-month period does not exceed 60 percent of the applicable limit, and

(ii) No more than one monthly performance test in the most recent 24-month period exceeds 75 percent of the applicable limit.

(5) If emissions in excess of the applicable TF limit occur while performing quarterly sampling approved under paragraph (e)(1)(ii) of this section, the owner or operator shall immediately return to the monthly sampling schedule required by paragraph (a) of this section until another request for an alternative sampling frequency is approved by the applicable regulatory authority.

(f) *Monitoring parameters for emission control devices.* The owner or operator shall install, operate, calibrate, and maintain a continuous parameter monitoring system for each emission control device. The owner or operator shall submit for approval by the regulatory authority a description of the parameter(s) to be monitored, the operating limits, and the monitoring frequency to ensure that the control device is being properly operated and maintained. An explanation of the criteria used for selection of the parameter(s), the operating limits, and the monitoring frequency, including how these relate to emission control also shall be submitted to the regulatory authority. Except as provided in paragraph (l) of this section, the following monitoring devices shall be installed:

(1) For dry alumina scrubbers, devices for the measurement of alumina flow and air flow;

(2) For dry coke scrubbers, devices for the measurement of coke flow and air flow;

(3) For wet scrubbers as the primary control system, devices for the measurement of water flow and air flow;

(4) For electrostatic precipitators, devices for the measurement of voltage and secondary current; and

(5) For wet roof scrubbers for secondary emission control:

(i) A device for the measurement of total water flow; and

(ii) The owner or operator shall inspect each control device at least once each operating day to ensure the control device is operating properly and record the results of each inspection.

(g) *Visible emissions.* The owner or operator shall visually inspect the exhaust stack(s) of each control device on a daily basis for evidence of any visible emissions indicating abnormal operation.

(h) *Corrective action.* If a monitoring device for a primary control device measures an operating parameter outside the limit(s) established pursuant to § 63.847(h), if visible emissions indicating abnormal operation are observed from the exhaust stack of a control device during a daily inspection, or if a problem is detected during the daily inspection of a wet roof scrubber for potline secondary emission control, the owner or operator shall initiate the corrective action procedures identified in the startup, shutdown, and malfunction plan within 1 hour. Failure to initiate the corrective action procedures within 1 hour or to take the necessary corrective actions to remedy the problem is a violation.

(i) *Exceedances.* If the limit for a given operating parameter associated with monitoring a specific control device is exceeded six times in any semiannual reporting period, then any subsequent exceedance in that reporting period is a violation. For the purpose of determining the number of exceedances, no more than one exceedance shall be attributed in any given 24-hour period.

(j) *Weight of aluminum and green anodes.* The owner or operator of a new or existing potline or anode bake furnace shall install, operate, and maintain a monitoring device to determine the daily weight of aluminum produced and the weight of green anode material placed in the anode bake furnace. The weight of green anode material may be determined by monitoring the weight of all anodes or by monitoring the number of anodes placed in the furnace and determining an average weight from measurements of a representative sample of anodes.

(k) *Accuracy and calibration.* The owner or operator shall submit recommended accuracy requirements to the regulatory authority for review and approval. All monitoring devices required by this section must be certified by the owner or operator to meet the accuracy requirements and must be calibrated in accordance with the manufacturer's instructions.

(l) *Alternative operating parameters.* The owner or operator may monitor alternative control device operating parameters subject to prior written approval by the applicable regulatory authority.

(m) *Other control systems.* An owner or operator using a control system not identified in this section shall request that the applicable regulatory authority include the recommended parameters for monitoring in the facility's part 70 permit.

#### § 63.849 Test methods and procedures.

(a) The owner or operator shall use the following reference methods to determine compliance with the applicable emission limits for TF and POM emissions:

(1) Method 1 in appendix A to part 60 of this chapter for sample and velocity traverses;

(2) Method 2 in appendix A to part 60 of this chapter for velocity and volumetric flow rate;

(3) Method 3 in appendix A to part 60 of this chapter for gas analysis;

(4) Method 13A or Method 13B in appendix A to part 60 of this chapter, or an approved alternative, for the concentration of TF where stack or duct emissions are sampled;

(5) Method 13A or Method 13B and Method 14 or Method 14A in appendix A to part 60 of this chapter or an approved alternative method for the concentration of TF where emissions are sampled from roof monitors not employing wet roof scrubbers;

(6) Method 315 in appendix A to this part or an approved alternative method for the concentration of POM where stack or duct emissions are sampled; and

(7) Method 315 in appendix A to this part and Method 14 in appendix A to part 60 of this chapter or an approved alternative method for the concentration of POM where emissions are sampled from roof monitors not employing wet roof scrubbers.

(b) The owner or operator of a VSS potline or a SWPB potline equipped with wet roof scrubbers for the control of secondary emissions shall use methods that meet the intent of the sampling requirements of Method 14 in appendix A to part 60 of this chapter and that are approved by the State. Sample analysis shall be performed using Method 13A or Method 13B in appendix A to part 60 of this chapter for TF, Method 315 in appendix A to this part for POM, or an approved alternative method.

(c) Except as provided in § 63.845(g)(1), references to "potroom" or "potroom group" in Method 14 in appendix A to part 60 of this chapter shall be interpreted as "potline" for the purposes of this subpart.

(d) For sampling using Method 14 in appendix A to part 60 of this chapter, the owner or operator shall install one Method 14 manifold per potline in a potroom that is representative of the entire potline, and this manifold shall meet the installation requirements specified in section 2.2.1 of Method 14 in appendix A to part 60 of this chapter.

(e) The owner or operator may use an alternative test method for TF or POM emissions providing:

(1) The owner or operator has already demonstrated the equivalency of the alternative method for a specific plant and has received previous approval from the Administrator or the applicable regulatory authority for TF or POM measurements using the alternative method; or

(2) The owner or operator demonstrates to the satisfaction of the applicable regulatory authority that the results from the alternative method meet the criteria specified in §§ 63.848(d)(1) and (d)(3) through (d)(6). The results from the alternative method shall be based on simultaneous sampling using the alternative method and the following reference methods:

(i) For TF, Methods 13 and 14 or Method 14A in appendix A to part 60 of this chapter; or

(ii) For POM, Method 315 in appendix A to this part and Method 14 in appendix A to part 60 of this chapter.

**§ 63.850 Notification, reporting, and recordkeeping requirements.**

(a) *Notifications.* The owner or operator shall submit the following written notifications:

(1) Notification for an area source that subsequently increases its emissions such that the source is a major source subject to the standard;

(2) Notification that a source is subject to the standard, where the initial startup is before the effective date of the standard;

(3) Notification that a source is subject to the standard, where the source is new or has been reconstructed, the initial startup is after the effective date of the standard, and for which an application for approval of construction or reconstruction is not required;

(4) Notification of intention to construct a new major source or reconstruct a major source; of the date construction or reconstruction commenced; of the anticipated date of startup; of the actual date of startup, where the initial startup of a new or reconstructed source occurs after the effective date of the standard, and for which an application for approval of construction or reconstruction is required [see §§ 63.9(b)(4) and (b)(5)];

(5) Notification of initial performance test;

(6) Notification of initial compliance status;

(7) One-time notification for each affected source of the intent to use an HF continuous emission monitor; and

(8) Notification of compliance approach. The owner or operator shall

develop and submit to the applicable regulatory authority, if requested, an engineering plan that describes the techniques that will be used to address the capture efficiency of the reduction cells for gaseous hazardous air pollutants in compliance with the emission limits in §§ 63.843, 63.844, and 63.846.

(b) *Performance test reports.* The owner or operator shall report the results of the initial performance test as part of the notification of compliance status required in paragraph (a)(6) of this section. Except as provided in paragraph (d) of this section, the owner or operator shall submit a summary of all subsequent performance tests to the applicable regulatory authority on an annual basis.

(c) *Startup, shutdown, and malfunction plan and reports.* The owner or operator shall develop and implement a written plan as described in § 63.6(e)(3) that contains specific procedures to be followed for operating the source and maintaining the source during periods of startup, shutdown, and malfunction and a program of corrective action for malfunctioning process and control systems used to comply with the standard. The plan does not have to be submitted with the permit application or included in the operating permit. The permitting authority may review the plan upon request. In addition to the information required in § 63.6(e)(3), the plan shall include:

(1) Procedures, including corrective actions, to be followed if a monitoring device measures an operating parameter outside the limit(s) established under § 63.847(h), if visible emissions from an exhaust stack indicating abnormal operation of a control device are observed by the owner or operator during the daily inspection required in § 63.848(g), or if a problem is detected during the daily inspection of a wet roof scrubber for potline secondary emission control required in § 63.848(f)(5)(ii); and

(2) The owner or operator shall also keep records of each event as required by § 63.10(b) and record and report if an action taken during a startup, shutdown, or malfunction is not consistent with the procedures in the plan as described in § 63.6(e)(3)(iv).

(d) *Excess emissions report.* As required by § 63.10(e)(3), the owner or operator shall submit a report (or a summary report) if measured emissions are in excess of the applicable standard. The report shall contain the information specified in § 63.10(e)(3)(v) and be submitted semiannually unless quarterly reports are required as a result of excess emissions.

(e) *Recordkeeping.* The owner or operator shall maintain files of all information (including all reports and notifications) required by § 63.10(b) and by this subpart.

(1) The owner or operator must retain each record for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. The most recent 2 years of records must be retained at the facility. The remaining 3 years of records may be retained offsite;

(2) The owner or operator may retain records on microfilm, on a computer, on computer disks, on magnetic tape, or on microfiche;

(3) The owner or operator may report required information on paper or on a labeled computer disc using commonly available and compatible computer software; and

(4) In addition to the general records required by § 63.10(b), the owner or operator shall maintain records of the following information:

(i) Daily production rate of aluminum;

(ii) Daily production rate of green anode material placed in the anode bake furnace;

(iii) A copy of the startup, shutdown, and malfunction plan;

(iv) Records of design information for paste production plant capture systems;

(v) Records of design information for an alternative emission control device for a paste production plant;

(vi) Records supporting the monitoring of similar potlines

demonstrating that the performance of similar potlines is the same as or better than that of potlines sampled by manual methods;

(vii) Records supporting a request for reduced sampling of potlines;

(viii) Records supporting the correlation of emissions measured by a continuous emission monitoring system to emissions measured by manual methods and the derivation of the alternative emission limit derived from the measurements;

(ix) The current implementation plan for emission averaging and any subsequent amendments;

(x) Records, such as a checklist or the equivalent, demonstrating that the daily inspection of a potline with wet roof scrubbers for secondary emission control has been performed as required in § 63.848(f)(5)(ii), including the results of each inspection;

(xi) Records, such as a checklist or the equivalent, demonstrating that the daily visual inspection of the exhaust stack for each control device has been performed as required in § 63.848(g), including the results of each inspection;

(xii) For a potline equipped with an HF continuous emission monitor,

records of information and data required by § 63.10(c);

(xiii) Records documenting the corrective actions taken when the limit(s) for an operating parameter established under § 63.847(h) were exceeded, when visible emissions indicating abnormal operation were observed from a control device stack during a daily inspection required under § 63.848(g), or when a problem was detected during the daily inspection of a wet roof scrubber for potline secondary control required in § 63.848(f)(5)(ii);

(xiv) Records documenting any POM data that are invalidated due to the installation and startup of a cathode; and

(xv) Records documenting the portion of TF that is measured as particulate matter and the portion that is measured as gaseous when the particulate and gaseous fractions are quantified separately using an approved test method.

**§ 63.851 Regulatory authority review procedures.**

(a) The applicable regulatory authority shall notify the owner or operator in writing of the need for additional time to review the submissions in paragraphs (a)(1) through (a)(5) of this section or of approval or intent to deny approval of the submissions in paragraphs (a)(1) through (a)(5) of this section within 60 calendar days after receipt of sufficient information to evaluate the submission. The 60-day period begins after the owner or operator has been notified that the submission is complete.

- (1) The test plan in § 63.847(b);
- (2) Request to change limits for operating parameters in § 63.847(h)(3);
- (3) Request for similar potline monitoring in § 63.848(d)(5);
- (4) Request for reduced sampling frequency in § 63.848(e); and
- (5) Request for an alternative method in § 63.849(e)(2).

(b) The applicable regulatory authority shall notify the owner or operator in writing whether the

submission is complete within 30 calendar days of receipt of the original submission or within 30 days of receipt of any supplementary information that is submitted. When a submission is incomplete, the applicable regulatory authority shall specify the information needed to complete the submission and shall give the owner or operator 30 calendar days after receipt of the notification to provide the information.

**§ 63.852 Applicability of general provisions.**

The requirements of the general provisions in subpart A of this part that are not applicable to the owner or operator subject to the requirements of this subpart are shown in appendix A of this subpart.

**§ 63.853 Delegation of authority.**

In delegating implementation and enforcement authority to a State under section 112(d) of the Act, all authorities are transferred to the State.

**§§ 63.854–63.859 [Reserved]**

TABLE 1 TO SUBPART LL—POTLINE TF LIMITS FOR EMISSION AVERAGING

Type	Monthly TF limit (lb/ton) [for given number of potlines]						
	2 lines	3 lines	4 lines	5 lines	6 lines	7 lines	8 lines
CWPB1 .....	1.7	1.6	1.5	1.5	1.4	1.4	1.4
CWPB2 .....	2.9	2.8	2.7	2.7	2.6	2.6	2.6
CWPB3 .....	2.3	2.2	2.2	2.1	2.1	2.1	2.1
VSS1 .....	2	1.9	1.8	1.7	1.7	1.7	1.7
VSS2 .....	2.6	2.5	2.5	2.4	2.4	2.4	2.4
HSS .....	2.5	2.4	2.4	2.3	2.3	2.3	2.3
SWPB .....	1.4	1.3	1.3	1.2	1.2	1.2	1.2

TABLE 2 TO SUBPART LL—POTLINE POM LIMITS FOR EMISSION AVERAGING

Type	Quarterly POM limit (lb/ton) [for given number of potlines]						
	2 lines	3 lines	4 lines	5 lines	6 lines	7 lines	8 lines
HSS .....	4.1	3.8	3.7	3.5	3.5	3.4	3.3
VSS1 .....	2.1	2.0	1.9	1.9	1.8	1.8	1.8
VSS2 .....	3.2	3.0	2.9	2.9	2.8	2.8	2.7

TABLE 3 TO SUBPART LL—ANODE BAKE FURNACE LIMITS FOR EMISSION AVERAGING

Number of furnaces	Emission limit (lb/ton of anode)	
	TF	POM
2 .....	0.11	0.17
3 .....	0.090	0.17
4 .....	0.077	0.17
5 .....	0.070	0.17

APPENDIX A TO SUBPART LL—APPLICABILITY OF GENERAL PROVISIONS  
 [40 CFR part 63, subpart A to Subpart LL]

General provisions citation	Requirement	Applies to subpart LL	Comment
63.1(c)(2)		No	All are major sources.
63.2 Definition of "reconstruction"		No	Subpart LL defines "reconstruction."
63.6(c)(1)	Compliance date for existing sources.	No	Subpart LL specifies compliance date for existing sources.
63.6(h)	Opacity/VE standards	Only in § 63.845	Opacity standards applicable only when incorporating the NSPS requirements under § 63.845.
63.8(c)(4)–(c)(8)	CMS operation and maintenance	No	Subpart LL does not require COMS/CMS or CMS performance specifications.
63.8(d)	Quality control	No	Subpart LL does not require CMS or CMS performance evaluation.
63.8(e)	Performance evaluation for CMS	No	
63.9(e)	Notification of performance test	No	Subpart LL specifies notification of performance tests.
63.9(f)	Notification of VE or opacity test	Only in § 63.845	Notification is required only when incorporating the NSPS requirements under § 63.845.
63.9(g)	Additional CMS notification	No	
63.10(d)(2)	Performance test reports	No	Subpart LL specifies performance test reporting.
63.10(d)(3)	Reporting VE/opacity observations	Only in § 63.845	Reporting is required only when incorporating the NSPS requirements under § 63.845.
63.10(e)(2)	Reporting performance evaluations	No	Subpart LL does not require performance evaluation for CMS.
63.11(a)–(b)	Control device requirements	No	Flares not applicable.

9. Appendix A to part 63 is amended by adding, in numerical order, Method 315 to read as follows:

**Appendix A to Part 63—Test Methods**

\* \* \* \* \*

**Method 315—Determination of Particulate and Methylene Chloride Extractable Matter (MCEM) From Selected Sources at Primary Aluminum Production Facilities**

**Note:** This method does not include all of the specifications (e.g., equipment and supplies) and procedures (e.g., sampling and analytical) 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 methods: Method 1, Method 2, Method 3, and Method 5 of 40 CFR part 60, appendix A.

**1.0 Scope and Application.**

**1.1 Analytes.** Particulate matter (PM). No CAS number assigned. Methylene chloride extractable matter (MCEM). No CAS number assigned.

**1.2 Applicability.** This method is applicable for the simultaneous determination of PM and MCEM when specified in an applicable regulation. This method was developed by consensus with the Aluminum Association and the U.S. Environmental Protection Agency (EPA) and has limited precision estimates for MCEM; it should have similar precision to Method 5 for PM in 40 CFR part 60, appendix A since the procedures are similar for PM.

**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.**

Particulate matter and MCEM are withdrawn isokinetically from the source. PM is collected on a glass fiber filter maintained at a temperature in the range of 120 ± 14 °C (248 ± 25 °F) or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. The PM mass, which includes any material that condenses on the probe and is subsequently removed in an acetone rinse or on the filter at or above the filtration temperature, is determined gravimetrically after removal of uncombined water. MCEM is then determined by adding a methylene chloride rinse of the probe and filter holder, extracting the condensable hydrocarbons collected in the impinger water, adding an acetone rinse followed by a methylene chloride rinse of the sampling train components after the filter and before the silica gel impinger, and determining residue gravimetrically after evaporating the solvents.

**3.0 Definitions.** [Reserved]

**4.0 Interferences.** [Reserved]

**5.0 Safety.**

This method may involve hazardous materials, operations, and equipment. This method does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this 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.**

**Note:** Mention of trade names or specific products does not constitute endorsement by the EPA.

**6.1 Sample collection.** The following items are required for sample collection:

**6.1.1 Sampling train.** A schematic of the sampling train used in this method is shown in Figure 5–1, Method 5, 40 CFR part 60, appendix A. Complete construction details are given in APTD–0581 (Reference 2 in section 17.0 of this method); commercial models of this train are also available. For changes from APTD–0581 and for allowable modifications of the train shown in Figure 5–1, Method 5, 40 CFR part 60, appendix A, see the following subsections.

**Note:** The operating and maintenance procedures for the sampling train are described in APTD–0576 (Reference 3 in section 17.0 of this method). Since correct usage is important in obtaining valid results, all users should read APTD–0576 and adopt the operating and maintenance procedures outlined in it, unless otherwise specified herein. The use of grease for sealing sampling train components is not recommended because many greases are soluble in methylene chloride. The sampling train consists of the following components:

**6.1.1.1 Probe nozzle.** Glass or glass lined with sharp, tapered leading edge. The angle of taper shall be ≤30°, and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook or elbow design, unless otherwise specified by the Administrator. Other materials of construction may be used, subject to the approval of the Administrator. A range of nozzle sizes suitable for isokinetic sampling should be available. Typical nozzle

sizes range from 0.32 to 1.27 cm (1/8 to 1/2 in.) inside diameter (ID) in increments of 0.16 cm (5/16 in.). Larger nozzle sizes are also available if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in section 10.0 of this method.

6.1.1.2 Probe liner. Borosilicate or quartz glass tubing with a heating system capable of maintaining a probe gas temperature at the exit end during sampling of 120±14°C (248±25°F), or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. Because the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD-0581 and using the calibration curves of APTD-0576 (or calibrated according to the procedure outlined in APTD-0576) will be considered acceptable. Either borosilicate or quartz glass probe liners may be used for stack temperatures up to about 480°C (900°F); quartz liners shall be used for temperatures between 480 and 900°C (900 and 1,650°F). Both types of liners may be used at higher temperatures than specified for short periods of time, subject to the approval of the Administrator. The softening temperature for borosilicate glass is 820°C (1,500°F) and for quartz glass it is 1,500°C (2,700°F).

6.1.1.3 Pitot tube. Type S, as described in section 6.1 of Method 2, 40 CFR part 60, appendix A, or other device approved by the Administrator. The pitot tube shall be attached to the probe (as shown in Figure 5-1 of Method 5, 40 CFR part 60, appendix A) to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see Method 2, Figure 2-6b, 40 CFR part 60, appendix A) during sampling. The Type S pitot tube assembly shall have a known coefficient, determined as outlined in section 10.0 of Method 2, 40 CFR part 60, appendix A.

6.1.1.4 Differential pressure gauge. Inclined manometer or equivalent device (two), as described in section 6.2 of Method 2, 40 CFR part 60, appendix A. One manometer shall be used for velocity head (Dp) readings, and the other, for orifice differential pressure readings.

6.1.1.5 Filter holder. Borosilicate glass, with a glass frit filter support and a silicone rubber gasket. The holder design shall provide a positive seal against leakage from the outside or around the filter. The holder shall be attached immediately at the outlet of the probe (or cyclone, if used).

6.1.1.6 Filter heating system. Any heating system capable of maintaining a temperature around the filter holder of 120±14°C (248±25°F) during sampling, or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. Alternatively, the tester may opt to operate the equipment at a temperature lower than that specified. A temperature gauge capable of measuring temperature to within 3°C (5.4°F) shall be installed so that the temperature around the filter holder can be regulated and monitored during sampling. Heating systems other than the one shown in APTD-0581 may be used.

6.1.1.7 Temperature sensor. A temperature sensor capable of measuring temperature to within ±3°C (5.4°F) shall be installed so that the sensing tip of the temperature sensor is in direct contact with the sample gas, and the temperature around the filter holder can be regulated and monitored during sampling.

6.1.1.8 Condenser. The following system shall be used to determine the stack gas moisture content: four glass impingers connected in series with leak-free ground glass fittings. The first, third, and fourth impingers shall be of the Greenburg-Smith design, modified by replacing the tip with a 1.3 cm (1/2 in.) ID glass tube extending to about 1.3 cm (1/2 in.) from the bottom of the flask. The second impinger shall be of the Greenburg-Smith design with the standard tip. The first and second impingers shall contain known quantities of water (section 8.3.1 of this method), the third shall be empty, and the fourth shall contain a known weight of silica gel or equivalent desiccant. A temperature sensor capable of measuring temperature to within 1°C (2°F) shall be placed at the outlet of the fourth impinger for monitoring.

6.1.1.9 Metering system. Vacuum gauge, leak-free pump, temperature sensors capable of measuring temperature to within 3°C (5.4°F), dry gas meter (DGM) capable of measuring volume to within 2 percent, and related equipment, as shown in Figure 5-1 of Method 5, 40 CFR part 60, appendix A. Other metering systems capable of maintaining sampling rates within 10 percent of isokinetic and of determining sample volumes to within 2 percent may be used, subject to the approval of the Administrator. When the metering system is used in conjunction with a pitot tube, the system shall allow periodic checks of isokinetic rates.

6.1.1.10 Sampling trains using metering systems designed for higher flow rates than that described in APTD-0581 or APTD-0576 may be used provided that the specifications of this method are met.

6.1.2 Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm (0.1 in.) Hg.

**Note:** The barometric 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) elevation decrease.

6.1.3 Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 6.3 and 6.4 of Method 2, 40 CFR part 60, appendix A, and gas analyzer, if necessary, as described in Method 3, 40 CFR part 60, appendix A. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration, such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor

may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor must be placed in an interference-free arrangement with respect to the Type S pitot tube openings (see Method 2, Figure 2-4, 40 CFR part 60, appendix A). As a second alternative, if a difference of not more than 1 percent in the average velocity measurement is to be introduced, the temperature sensor need not be attached to the probe or pitot tube. (This alternative is subject to the approval of the Administrator.)

6.2 Sample recovery. The following items are required for sample recovery:

6.2.1 Probe-liner and probe-nozzle brushes. Nylon or Teflon® bristle brushes with stainless steel wire handles. The probe brush shall have extensions (at least as long as the probe) constructed of stainless steel, nylon, Teflon®, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

6.2.2 Wash bottles. Glass wash bottles are recommended. Polyethylene or tetrafluoroethylene (TFE) wash bottles may be used, but they may introduce a positive bias due to contamination from the bottle. It is recommended that acetone not be stored in polyethylene or TFE bottles for longer than a month.

6.2.3 Glass sample storage containers. Chemically resistant, borosilicate glass bottles, for acetone and methylene chloride washes and impinger water, 500 ml or 1,000 ml. Screw-cap liners shall either be rubber-backed Teflon® or shall be constructed so as to be leak-free and resistant to chemical attack by acetone or methylene chloride. (Narrow-mouth glass bottles have been found to be less prone to leakage.) Alternatively, polyethylene bottles may be used.

6.2.4 Petri dishes. For filter samples, glass, unless otherwise specified by the Administrator.

6.2.5 Graduated cylinder and/or balance. To measure condensed water, acetone wash and methylene chloride wash used during field recovery of the samples, to within 1 ml or 1 g. Graduated cylinders shall have subdivisions no greater than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any such balance is suitable for use here and in section 6.3.4 of this method.

6.2.6 Plastic storage containers. Air-tight containers to store silica gel.

6.2.7 Funnel and rubber policeman. To aid in transfer of silica gel to container; not necessary if silica gel is weighed in the field.

6.2.8 Funnel. Glass or polyethylene, to aid in sample recovery.

6.3 Sample analysis. The following equipment is required for sample analysis:

6.3.1 Glass or Teflon® weighing dishes.

6.3.2 Desiccator. It is recommended that fresh desiccant be used to minimize the chance for positive bias due to absorption of organic material during drying.

6.3.3 Analytical balance. To measure to within 0.1 mg.

6.3.4 Balance. To measure to within 0.5 g.

6.3.5 Beakers. 250 ml.

6.3.6 Hygrometer. To measure the relative humidity of the laboratory environment.

6.3.7 Temperature sensor. To measure the temperature of the laboratory environment.

6.3.8 Buchner fritted funnel. 30 ml size, fine (<50 micron)-porosity fritted glass.

6.3.9 Pressure filtration apparatus.

6.3.10 Aluminum dish. Flat bottom, smooth sides, and flanged top, 18 mm deep and with an inside diameter of approximately 60 mm.

#### 7.0 Reagents and Standards.

7.1 Sample collection. The following reagents are required for sample collection:

7.1.1 Filters. Glass fiber filters, without organic binder, exhibiting at least 99.95 percent efficiency (<0.05 percent penetration) on 0.3 micron dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM Method D 2986-95A (incorporated by reference in § 63.841 of this part). Test data from the supplier's quality control program are sufficient for this purpose. In sources containing SO<sub>2</sub> or SO<sub>3</sub>, the filter material must be of a type that is unreactive to SO<sub>2</sub> or SO<sub>3</sub>. Reference 10 in section 17.0 of this method may be used to select the appropriate filter.

7.1.2 Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175°C (350°F) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the Administrator.

7.1.3 Water. When analysis of the material caught in the impingers is required, deionized distilled water shall be used. Run blanks prior to field use to eliminate a high blank on test samples.

7.1.4 Crushed ice.

7.1.5 Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with Teflon™ sleeves, or similar, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the Administrator. [Caution: Many stopcock greases are methylene chloride-soluble. Use sparingly and carefully remove prior to recovery to prevent contamination of the MCEM analysis.]

7.2 Sample recovery. The following reagents are required for sample recovery:

7.2.1 Acetone. Acetone with blank values < 1 ppm, by weight residue, is required. Acetone blanks may be run prior to field use, and only acetone with low blank values may be used. In no case shall a blank value of greater than 1E-06 of the weight of acetone used be subtracted from the sample weight.

**Note:** This is more restrictive than Method 5, 40 CFR part 60, appendix A. At least one vendor (Supelco Incorporated located in Bellefonte, Pennsylvania) lists <1 mg/l as residue for its Environmental Analysis Solvents.

7.2.2 Methylene chloride. Methylene chloride with a blank value <1.5 ppm, by weight, residue. Methylene chloride blanks may be run prior to field use, and only methylene chloride with low blank values may be used. In no case shall a blank value of greater than 1.6E-06 of the weight of methylene chloride used be subtracted from the sample weight.

**Note:** A least one vendor quotes <1 mg/l for Environmental Analysis Solvents-grade methylene chloride.

7.3 Sample analysis. The following reagents are required for sample analysis:

7.3.1 Acetone. Same as in section 7.2.1 of this method.

7.3.2 Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the Administrator.

7.3.3 Methylene chloride. Same as in section 7.2.2 of this method.

#### 8.0 Sample Collection, Preservation, Storage, and Transport.

**Note:** The complexity of this method is such that, in order to obtain reliable results, testers should be trained and experienced with the test procedures.

8.11 Pretest preparation. It is suggested that sampling equipment be maintained according to the procedures described in APTD-0576.

8.1.1 Weigh several 200 g to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus container. As an alternative, the silica gel need not be preweighed but may be weighed directly in its impinger or sampling holder just prior to train assembly.

8.1.2 A batch of glass fiber filters, no more than 50 at a time, should be placed in a Soxhlet extraction apparatus and extracted using methylene chloride for at least 16 hours. After extraction, check filters visually against light for irregularities, flaws, or pinhole leaks. Label the shipping containers (glass or plastic petri dishes), and keep the filters in these containers at all times except during sampling and weighing.

8.1.3 Desiccate the filters at 20 ± 5.6°C (68 ± 10°F) and ambient pressure for at least 24 hours and weigh at intervals of at least 6 hours to a constant weight, i.e., <0.5 mg change from previous weighing; record results to the nearest 0.1 mg. During each weighing the filter must not be exposed to the laboratory atmosphere for longer than 2 minutes and a relative humidity above 50 percent. Alternatively (unless otherwise specified by the Administrator), the filters may be oven-dried at 104°C (220°F) for 2 to 3 hours, desiccated for 2 hours, and weighed. Procedures other than those described, which account for relative humidity effects, may be used, subject to the approval of the Administrator.

#### 8.2 Preliminary determinations.

8.2.1 Select the sampling site and the minimum number of sampling points according to Method 1, 40 CFR part 60, appendix A or as specified by the Administrator. Determine the stack pressure, temperature, and the range of velocity heads using Method 2, 40 CFR part 60, appendix A; it is recommended that a leak check of the pitot lines (see section 8.1 of Method 2, 40 CFR part 60, appendix A) be performed. Determine the moisture content using Approximation Method 4 (section 1.2 of Method 4, 40 CFR part 60, appendix A) or its alternatives to make isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in section 8.6 of Method 2, 40 CFR part 60, appendix A; if integrated Method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken

simultaneously with, and for the same total length of time as, the particulate sample run.

8.2.2 Select a nozzle size based on the range of velocity heads such that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size.

Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 8.2 of Method 2, 40 CFR part 60, appendix A).

8.2.3 Select a suitable probe liner and probe length such that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the required probe length.

8.2.4 Select a total sampling time greater than or equal to the minimum total sampling time specified in the test procedures for the specific industry such that: (1) The sampling time per point is not less than 2 minutes (or some greater time interval as specified by the Administrator); and (2) the sample volume taken (corrected to standard conditions) will exceed the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

8.2.5 The sampling time at each point shall be the same. It is recommended that the number of minutes sampled at each point be an integer or an integer plus one-half minute, in order to eliminate timekeeping errors.

8.2.6 In some circumstances (e.g., batch cycles), it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the Administrator's approval must first be obtained.

#### 8.3 Preparation of sampling train.

8.3.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin. Place 100 ml of water in each of the first two impingers, leave the third impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the fourth impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

8.3.2 Using a tweezer or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

8.3.3 When glass liners are used, install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260°C (500°F) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

8.3.4 Set up the train as in Figure 5-1 of Method 5, 40 CFR part 60, appendix A, using (if necessary) a very light coat of silicone grease on all ground glass joints, greasing

only the outer portion (see APTD-0576) to avoid possibility of contamination by the silicone grease. Subject to the approval of the Administrator, a glass cyclone may be used between the probe and filter holder when the total particulate catch is expected to exceed 100 mg or when water droplets are present in the stack gas.

8.3.5 Place crushed ice around the impingers.

8.4 Leak-check procedures.

8.4.1 Leak check of metering system shown in Figure 5-1 of Method 5, 40 CFR part 60, appendix A. That portion of the sampling train from the pump to the orifice meter should be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see Figure 5-2 of Method 5, 40 CFR part 60, appendix A): Close the main valve on the meter box. Insert a one-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing, and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, must be corrected.

8.4.2 Pretest leak check. A pretest leak-check is recommended but not required. If the pretest leak-check is conducted, the following procedure should be used.

8.4.2.1 After the sampling train has been assembled, turn on and set the filter and probe heating systems to the desired operating temperatures. Allow time for the temperatures to stabilize. If a Viton A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 380 mm (15 in.) Hg vacuum.

**Note:** A lower vacuum may be used, provided that it is not exceeded during the test.

8.4.2.2 If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first plugging the inlet to the filter holder (cyclone, if applicable) and pulling a 380 mm (15 in.) Hg vacuum. (See NOTE in section 8.4.2.1 of this method). Then connect the probe to the train and perform the leak check at approximately 25 mm (1 in.) Hg vacuum; alternatively, the probe may be leak-checked with the rest of the sampling train, in one step, at 380 mm (15 in.) Hg vacuum. Leakage rates in excess of 4 percent of the average sampling rate or 0.00057 m<sup>3</sup>/min (0.02 cfm), whichever is less, are unacceptable.

8.4.2.3 The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve, as this will cause water to back up into the filter holder. If the desired vacuum is

exceeded, either leak-check at this higher vacuum or end the leak check as shown below and start over.

8.4.2.4 When the leak check is completed, first slowly remove the plug from the inlet to the probe, filter holder, or cyclone (if applicable) and immediately turn off the vacuum pump. This prevents the water in the impingers from being forced backward into the filter holder and the silica gel from being entrained backward into the third impinger.

8.4.3 Leak checks during sample run. If, during the sampling run, a component (e.g., filter assembly or impinger) change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in section 8.4.2 of this method, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4 percent of the average sampling rate (whichever is less), the results are acceptable, and no correction will need to be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, either record the leakage rate and plan to correct the sample volume as shown in section 12.3 of this method or void the sample run.

**Note:** Immediately after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in section 8.4.2 of this method should be used.

8.4.4 Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be performed in accordance with the procedures outlined in section 8.4.2 of this method, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4 percent of the average sampling rate (whichever is less), the results are acceptable, and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, either record the leakage rate and correct the sample volume, as shown in section 12.4 of this method, or void the sampling run.

8.5 Sampling train operation. During the sampling run, maintain an isokinetic sampling rate (within 10 percent of true isokinetic unless otherwise specified by the Administrator) and a temperature around the filter of 120 to 14°C (248 to 25°F), or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator.

8.5.1 For each run, record the data required on a data sheet such as the one shown in Figure 5-2 of Method 5, 40 CFR part 60, appendix A. Be sure to record the initial reading. Record the DGM readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak-check, and when sampling is halted. Take other readings indicated by Figure 5-2 of Method 5, 40 CFR part 60, appendix A at least once at each sample point during each time increment and

additional readings when significant changes (20 percent variation in velocity head readings) necessitate additional adjustments in flow rate. 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.

8.5.2 Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the filter and probe heating systems are up to temperature and that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs are available, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations. These nomographs are designed for use when the Type S pitot tube coefficient ( $C_p$ ) is 0.85 ± 0.02 and the stack gas equivalent density (dry molecular weight) is 29 ± 4. APTD-0576 details the procedure for using the nomographs. If  $C_p$  and  $M_d$  are outside the above-stated ranges, do not use the nomographs unless appropriate steps (see Reference 7 in section 17.0 of this method) are taken to compensate for the deviations.

8.5.3 When the stack is under significant negative pressure (height of impinger stem), close the coarse adjust valve before inserting the probe into the stack to prevent water from backing into the filter holder. If necessary, the pump may be turned on with the coarse adjust valve closed.

8.5.4 When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

8.5.5 Traverse the stack cross-section, as required by Method 1, 40 CFR part 60, appendix A or as specified by the Administrator, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

8.5.6 During the test run, make periodic adjustments to keep the temperature around the filter holder at the proper level; add more ice and, if necessary, salt to maintain a temperature of less than 20°C (68°F) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

8.5.7 If the pressure drop across the filter becomes too high, making isokinetic sampling difficult to maintain, the filter may be replaced in the midst of the sample run. It is recommended that another complete filter assembly be used rather than attempting to change the filter itself. Before a new filter assembly is installed, conduct a leak check (see section 8.4.3 of this method). The total PM weight shall include the summation of the filter assembly catches.

8.5.8 A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates

a change of trains. In all other situations, the use of two or more trains will be subject to the approval of the Administrator.

**Note:** When two or more trains are used, separate analyses of the front-half and (if applicable) impinger catches from each train shall be performed, unless identical nozzle sizes were used in all trains, in which case the front-half catches from the individual trains may be combined (as may the impinger catches) and one analysis of the front-half catch and one analysis of the impinger catch may be performed.

8.5.9 At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final DGM reading, and then conduct a post-test leak check, as outlined in section 8.4.4 of this method. Also leak-check the pitot lines as described in section 8.1 of Method 2, 40 CFR part 60, appendix A. The lines must pass this leak check in order to validate the velocity head data.

8.6 Calculation of percent isokinetic. Calculate percent isokinetic (see Calculations, section 12.12 of this method) to determine whether a run was valid or another test run should be made. If there was difficulty in maintaining isokinetic rates because of source conditions, consult the Administrator for possible variance on the isokinetic rates.

#### 8.7 Sample recovery.

8.7.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

8.7.2 When the probe can be safely handled, wipe off all external PM near the tip of the probe nozzle and place a cap over it to prevent losing or gaining PM. Do not cap off the probe tip tightly while the sampling train is cooling down. This would create a vacuum in the filter holder, thus drawing water from the impingers into the filter holder.

8.7.3 Before moving the sample train to the cleanup site, remove the probe from the sample train, wipe off the silicone grease, and cap the open outlet of the probe. Be careful not to lose any condensate that might be present. Wipe off the silicone grease from the filter inlet where the probe was fastened and cap it. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the first impinger or condenser and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the impingers or condenser. After wiping off the silicone grease, cap off the filter holder outlet and impinger inlet. Ground-glass stoppers, plastic caps, or serum caps may be used to close these openings.

8.7.4 Transfer the probe and filter-impinger assembly to the cleanup area. This area should be clean and protected from the wind so that the chances of contaminating or losing the sample will be minimized.

8.7.5 Save a portion of the acetone and methylene chloride used for cleanup as blanks. Take 200 ml of each solvent directly from the wash bottle being used and place it in glass sample containers labeled "acetone blank" and "methylene chloride blank," respectively.

8.7.6 Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

8.7.6.1 Container No. 1. Carefully remove the filter from the filter holder, and place it in its identified petri dish container. Use a pair of tweezers and/or clean disposable surgical gloves to handle the filter. If it is necessary to fold the filter, do so such that the PM cake is inside the fold. Using a dry nylon bristle brush and/or a sharp-edged blade, carefully transfer to the petri dish any PM and/or filter fibers that adhere to the filter holder gasket. Seal the container.

8.7.6.2 Container No. 2. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover PM or any condensate from the probe nozzle, probe fitting, probe liner, and front half of the filter holder by washing these components with acetone and placing the wash in a glass container. Perform the acetone rinse as follows:

8.7.6.2.1 Carefully remove the probe nozzle and clean the inside surface by rinsing with acetone from a wash bottle and brushing with a nylon bristle brush. Brush until the acetone rinse shows no visible particles, after which make a final rinse of the inside surface with acetone.

8.7.6.2.2 Brush and rinse the inside parts of the Swagelok fitting with acetone in a similar way until no visible particles remain.

8.7.6.2.3 Rinse the probe liner with acetone by tilting and rotating the probe while squirting acetone into its upper end so that all inside surfaces are wetted with acetone. Let the acetone drain from the lower end into the sample container. A funnel (glass or polyethylene) may be used to aid in transferring liquid washes to the container. Follow the acetone rinse with a probe brush. Hold the probe in an inclined position, squirt acetone into the upper end as the probe brush is being pushed with a twisting action through the probe, hold a sample container under the lower end of the probe, and catch any acetone and PM that is brushed from the probe. Run the brush through the probe three times or more until no visible PM is carried out with the acetone or until none remains in the probe liner on visual inspection. With stainless steel or other metal probes, run the brush through in the above-described manner at least six times, since metal probes have small crevices in which PM can be entrapped. Rinse the brush with acetone and quantitatively collect these washings in the sample container. After the brushing, make a final acetone rinse of the probe as described above.

8.7.6.2.4 It is recommended that two people clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

8.7.6.2.5 After ensuring that all joints have been wiped clean of silicone grease, clean the inside of the front half of the filter holder by rubbing the surfaces with a nylon bristle brush and rinsing with acetone. Rinse each surface three times or more if needed to remove visible particulate. Make a final rinse of the brush and filter holder. Carefully rinse out the glass cyclone also (if applicable).

8.7.6.2.6 After rinsing the nozzle, probe, and front half of the filter holder with

acetone, repeat the entire procedure with methylene chloride and save in a separate No. 2M container.

8.7.6.2.7 After acetone and methylene chloride washings and PM have been collected in the proper sample containers, tighten the lid on the sample containers so that acetone and methylene chloride will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Label each container to identify clearly its contents.

8.7.6.3 Container No. 3. Note the color of the indicating silica gel to determine whether it has been completely spent, and make a notation of its condition. Transfer the silica gel from the fourth impinger to its original container and seal the container. A funnel may make it easier to pour the silica gel without spilling. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for Container No. 3 in section 11.2.3 of this method.

8.7.6.4 Impinger water. Treat the impingers as follows:

8.7.6.4.1 Make a notation of any color or film in the liquid catch. Measure the liquid that is in the first three impingers to within 1 ml by using a graduated cylinder or by weighing it to within 0.5 g by using a balance (if one is available). Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

8.7.6.4.2 Following the determination of the volume of liquid present, rinse the back half of the train with water, add it to the impinger catch, and store it in a container labeled 3W (water).

8.7.6.4.3 Following the water rinse, rinse the back half of the train with acetone to remove the excess water to enhance subsequent organic recovery with methylene chloride and quantitatively recover to a container labeled 3S (solvent) followed by at least three sequential rinsings with aliquots of methylene chloride. Quantitatively recover to the same container labeled 3S. Record separately the amount of both acetone and methylene chloride used to the nearest 1 ml or 0.5g.

**Note:** Because the subsequent analytical finish is gravimetric, it is okay to recover both solvents to the same container. This would not be recommended if other analytical finishes were required.

8.8 Sample transport. Whenever possible, containers should be shipped in such a way that they remain upright at all times.

#### 9.0 Quality Control.

9.1 Miscellaneous quality control measures.



Section	Quality control measure	Effect
8.4, 10.1–10.6.	Sampling and equipment leak check and calibration.	Ensure accurate measurement of stack gas flow rate, sample volume.

9.2 Volume metering system checks. The following quality control procedures are suggested to check the volume metering system calibration values at the field test site prior to sample collection. These procedures are optional.

9.2.1 Meter orifice check. Using the calibration data obtained during the calibration procedure described in section 10.3 of this method, determine the  $\Delta H_a$  for the metering system orifice. The  $\Delta H_a$  is the orifice pressure differential in units of in. H<sub>2</sub>O that correlates to 0.75 cfm of air at 528°R and 29.92 in. Hg. The  $\Delta H_a$  is calculated as follows:

$$\Delta H_a = 0.0319 \Delta H \frac{T_m \Theta^2}{P_{bar} Y^2 V_m}$$

Where

0.0319 = (0.0567 in. Hg/°R)(0.75 cfm)<sup>2</sup>;

$\Delta H$  = Average pressure differential across the orifice meter, in. H<sub>2</sub>O;

$T_m$  = Absolute average DGM temperature, °R;

$\Theta$  = Total sampling time, min;

$P_{bar}$  = Barometric pressure, in. Hg;

$Y$  = DGM calibration factor, dimensionless;

$V_m$  = Volume of gas sample as measured by DGM, dcf.

9.2.1.1 Before beginning the field test (a set of three runs usually constitutes a field test), operate the metering system (i.e., pump, volume meter, and orifice) at the  $\Delta H_a$  pressure differential for 10 minutes. Record the volume collected, the DGM temperature, and the barometric pressure. Calculate a DGM calibration check value,  $Y_c$ , as follows:

$$Y_c = \frac{10}{V_m} \left[ \frac{0.0319 T_m}{P_{bar}} \right]^{\frac{1}{2}}$$

Where

$Y_c$  = DGM calibration check value, dimensionless;

10 = Run time, min.

9.2.1.2 Compare the  $Y_c$  value with the dry gas meter calibration factor  $Y$  to determine that:  $0.97 Y < Y_c < 1.03 Y$ . If the  $Y_c$  value is not within this range, the volume metering system should be investigated before beginning the test.

9.2.2 Calibrated critical orifice. A calibrated critical orifice, calibrated against a wet test meter or spirometer and designed to be inserted at the inlet of the sampling meter box, may be used as a quality control check by following the procedure of section 16.2 of this method.

10.0 Calibration and Standardization.

**Note:** Maintain a laboratory log of all calibrations.

10.1 Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field.

Using a micrometer, measure the ID of the nozzle to the nearest 0.025 mm (0.001 in.). Make three separate measurements using different diameters each time, and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

10.2 Pitot tube assembly. The Type S pitot tube assembly shall be calibrated according to the procedure outlined in section 10.1 of Method 2, 40 CFR part 60, appendix A.

10.3 Metering system.

10.3.1 Calibration prior to use. Before its initial use in the field, the metering system shall be calibrated as follows: Connect the metering system inlet to the outlet of a wet test meter that is accurate to within 1 percent. Refer to Figure 5–5 of Method 5, 40 CFR part 60, appendix A. The wet test meter should have a capacity of 30 liters/revolution (1 ft<sup>3</sup>/rev). A spirometer of 400 liters (14 ft<sup>3</sup>) or more capacity, or equivalent, may be used for this calibration, although a wet test meter is usually more practical. The wet test meter should be periodically calibrated with a spirometer or a liquid displacement meter to ensure the accuracy of the wet test meter. Spirometers or wet test meters of other sizes may be used, provided that the specified accuracies of the procedure are maintained. Run the metering system pump for about 15 minutes with the orifice manometer indicating a median reading, as expected in field use, to allow the pump to warm up and to permit the interior surface of the wet test meter to be thoroughly wetted. Then, at each of a minimum of three orifice manometer settings, pass an exact quantity of gas through the wet test meter and note the gas volume indicated by the DGM. Also note the barometric pressure and the temperatures of the wet test meter, the inlet of the DGM, and the outlet of the DGM. Select the highest and lowest orifice settings to bracket the expected field operating range of the orifice. Use a minimum volume of 0.15 m<sup>3</sup> (5 cf) at all orifice settings. Record all the data on a form similar to Figure 5–6 of Method 5, 40 CFR part 60, appendix A, and calculate  $Y$  (the DGM calibration factor) and  $\Delta H_a$  (the orifice calibration factor) at each orifice setting, as shown on Figure 5–6 of Method 5, 40 CFR part 60, appendix A. Allowable tolerances for individual  $Y$  and  $\Delta H_a$  values are given in Figure 5–6 of Method 5, 40 CFR part 60, appendix A. Use the average of the  $Y$  values in the calculations in section 12 of this method.

10.3.1.1 Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm pumps, the normal leak check procedure will not detect leakages within the pump. For these cases the following leak check procedure is suggested: make a 10-minute calibration run at 0.00057 m<sup>3</sup>/min (0.02 cfm); at the end of the run, take the difference of the measured wet test meter and DGM volumes; divide the difference by 10 to get the leak rate. The leak rate should not exceed 0.00057 m<sup>3</sup>/min (0.02 cfm).

10.3.2 Calibration after use. After each field use, the calibration of the metering system shall be checked by performing three calibration runs at a single, intermediate orifice setting (based on the previous field test) with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet test meter and the inlet of the metering system. Calculate the average value of the DGM calibration factor. If the value has changed by more than 5 percent, recalibrate the meter over the full range of orifice settings, as previously detailed.

**Note:** Alternative procedures, e.g., rechecking the orifice meter coefficient, may be used, subject to the approval of the Administrator.

10.3.3 Acceptable variation in calibration. If the DGM coefficient values obtained before and after a test series differ by more than 5 percent, either the test series shall be voided or calculations for the test series shall be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

10.4 Probe heater calibration. Use a heat source to generate air heated to selected temperatures that approximate those expected to occur in the sources to be sampled. Pass this air through the probe at a typical sample flow rate while measuring the probe inlet and outlet temperatures at various probe heater settings. For each air temperature generated, construct a graph of probe heating system setting versus probe outlet temperature. The procedure outlined in APTD–0576 can also be used. Probes constructed according to APTD–0581 need not be calibrated if the calibration curves in APTD–0576 are used. Also, probes with outlet temperature monitoring capabilities do not require calibration.

**Note:** The probe heating system shall be calibrated before its initial use in the field.

10.5 Temperature sensors. Use the procedure in section 10.3 of Method 2, 40 CFR part 60, appendix A to calibrate in-stack temperature sensors. Dial thermometers, such as are used for the DGM and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

10.6 Barometer. Calibrate against a mercury barometer.

11.0 Analytical Procedure.

11.1 Record the data required on a sheet such as the one shown in Figure 315–1 of this method.

11.2 Handle each sample container as follows:

11.2.1 Container No. 1.

11.2.1.1 PM analysis. Leave the contents in the shipping container or transfer the filter and any loose PM from the sample container to a tared glass weighing dish. Desiccate for 24 hours in a desiccator containing anhydrous calcium sulfate. Weigh to a constant weight and report the results to the nearest 0.1 mg. For purposes of this section, the term “constant weight” means a difference of no more than 0.5 mg or 1 percent of total weight less tare weight, whichever is greater, between two consecutive weighings, with no less than 6 hours of desiccation time between weighings

(overnight desiccation is a common practice). If a third weighing is required and it agrees within  $\pm 0.5$  mg, then the results of the second weighing should be used. For quality assurance purposes, record and report each individual weighing; if more than three weighings are required, note this in the results for the subsequent MCEM results.

11.2.1.2 MCEM analysis. Transfer the filter and contents quantitatively into a beaker. Add 100 ml of methylene chloride and cover with aluminum foil. Sonicate for 3 minutes then allow to stand for 20 minutes. Set up the filtration apparatus. Decant the solution into a clean Buchner fritted funnel. Immediately pressure filter the solution through the tube into another clean, dry beaker. Continue decanting and pressure filtration until all the solvent is transferred. Rinse the beaker and filter with 10 to 20 ml methylene chloride, decant into the Buchner fritted funnel and pressure filter. Place the beaker on a low-temperature hot plate (maximum 40°C) and slowly evaporate almost to dryness. Transfer the remaining last few milliliters of solution quantitatively from the beaker (using at least three aliquots of methylene chloride rinse) to a tared clean dry aluminum dish and evaporate to complete dryness. Remove from heat once solvent is evaporated. Reweigh the dish after a 30-minute equilibrium in the balance room and determine the weight to the nearest 0.1 mg. Conduct a methylene chloride blank run in an identical fashion.

#### 11.2.2 Container No. 2.

11.2.2.1 PM analysis. Note the level of liquid in the container, and confirm on the analysis sheet whether leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Measure the liquid in this container either volumetrically to  $\pm 1$  ml or gravimetrically to  $1 \pm 0.5$  g. Transfer the contents to a tared 250 ml beaker and evaporate to dryness at ambient temperature and pressure. Desiccate for 24 hours, and weigh to a constant weight. Report the results to the nearest 0.1 mg.

11.2.2.2 MCEM analysis. Add 25 ml methylene chloride to the beaker and cover with aluminum foil. Sonicate for 3 minutes then allow to stand for 20 minutes; combine with contents of Container No. 2M and pressure filter and evaporate as described for Container 1 in section 11.2.1.2 of this method.

#### Notes for MCEM Analysis

1. Light finger pressure only is necessary on 24/40 adaptor. A Chemplast adapter #15055-240 has been found satisfactory.
2. Avoid aluminum dishes made with fluted sides, as these may promote solvent "creep," resulting in possible sample loss.
3. If multiple samples are being run, rinse the Buchner fritted funnel twice between samples with 5 ml solvent using pressure filtration. After the second rinse, continue the flow of air until the glass frit is completely dry. Clean the Buchner fritted funnels thoroughly after filtering five or six samples.

11.2.3 Container No. 3. Weigh the spent silica gel (or silica gel plus impinger) to the

nearest 0.5 g using a balance. This step may be conducted in the field.

#### 11.2.4 Container 3W (impinger water).

11.2.4.1 MCEM analysis. Transfer the solution into a 1,000 ml separatory funnel quantitatively with methylene chloride washes. Add enough solvent to total approximately 50 ml, if necessary. Shake the funnel for 1 minute, allow the phases to separate, and drain the solvent layer into a 250 ml beaker. Repeat the extraction twice. Evaporate with low heat (less than 40°C) until near dryness. Transfer the remaining few milliliters of solvent quantitatively with small solvent washes into a clean, dry, tared aluminum dish and evaporate to dryness. Remove from heat once solvent is evaporated. Reweigh the dish after a 30-minute equilibration in the balance room and determine the weight to the nearest 0.1 mg.

#### 11.2.5 Container 3S (solvent).

11.2.5.1 MCEM analysis. Transfer the mixed solvent to 250 ml beaker(s). Evaporate and weigh following the procedures detailed for container 3W in section 11.2.4 of this method.

11.2.6 Blank containers. Measure the distilled water, acetone, or methylene chloride in each container either volumetrically or gravimetrically. Transfer the "solvent" to a tared 250 ml beaker, and evaporate to dryness at ambient temperature and pressure. (Conduct a solvent blank on the distilled deionized water blank in an identical fashion to that described in section 11.2.4.1 of this method.) Desiccate for 24 hours, and weigh to a constant weight. Report the results to the nearest 0.1 mg.

**Note:** The contents of Containers No. 2, 3W, and 3M as well as the blank containers may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature must be below the boiling point of the solvent; also, to prevent "bumping," the evaporation process must be closely supervised, and the contents of the beaker must be swirled occasionally to maintain an even temperature. Use extreme care, as acetone and methylene chloride are highly flammable and have a low flash point.

#### 12.0 Data Analysis and Calculations.

12.1 Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used as long as they give equivalent results.

#### 12.2 Nomenclature.

$A_n$  = Cross-sectional area of nozzle,  $m^3$  ( $ft^3$ ).

$B_{ws}$  = Water vapor in the gas stream, proportion by volume.

$C_a$  = Acetone blank residue concentration, mg/g.

$C_s$  = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf).

$I$  = Percent of isokinetic sampling.

$L_a$  = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to  $0.00057 m^3/min$  ( $0.02$  cfm) or 4 percent of the average sampling rate, whichever is less.

$L_i$  = Individual leakage rate observed during the leak check conducted prior to the " $i^{th}$ " component change ( $i = 1, 2, 3, \dots$ ),  $m^3/min$  (cfm).

$L_p$  = Leakage rate observed during the post-test leak check,  $m^3/min$  (cfm).

$m_a$  = Mass of residue of acetone after evaporation, mg.

$m_n$  = Total amount of particulate matter collected, mg.

$M_w$  = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

$P_{bar}$  = Barometric pressure at the sampling site, mm Hg (in Hg).

$P_s$  = Absolute stack gas pressure, mm Hg (in Hg).

$P_{std}$  = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

$R$  = Ideal gas constant,  $0.06236 [(mm\ Hg)(m^3)]/[(^\circ K)(g\text{-mole})]$   $\{21.85 [(in.\ Hg)(ft^3)]/[(^\circ R)(lb\text{-mole})]\}$ .

$T_m$  = Absolute average dry gas meter (DGM) temperature (see Figure 5-2 of Method 5, 40 CFR part 60, appendix A),  $^\circ K$  ( $^\circ R$ ).

$T_s$  = Absolute average stack gas temperature (see Figure 5-2 of Method 5, 40 CFR part 60, appendix A),  $^\circ K$  ( $^\circ R$ ).

$T_{std}$  = Standard absolute temperature,  $293^\circ K$  ( $528^\circ R$ ).

$V_a$  = Volume of acetone blank, ml.

$V_{aw}$  = Volume of acetone used in wash, ml.

$V_i$  = Volume of methylene chloride blank, ml.

$V_{tw}$  = Volume of methylene chloride used in wash, ml.

$V_{ic}$  = Total volume liquid collected in impingers and silica gel (see Figure 5-3 of Method 5, 40 CFR part 60, appendix A), ml.

$V_m$  = Volume of gas sample as measured by dry gas meter, dcm (dcf).

$V_{m(std)}$  = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).

$V_{w(std)}$  = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).

$V_s$  = Stack gas velocity, calculated by Equation 2-9 in Method 2, 40 CFR part 60, appendix A, using data obtained from Method 5, 40 CFR part 60, appendix A, m/sec (ft/sec).

$W_a$  = Weight of residue in acetone wash, mg.

$Y$  = Dry gas meter calibration factor.

$\Delta H$  = Average pressure differential across the orifice meter (see Figure 5-2 of Method 5, 40 CFR part 60, appendix A), mm  $H_2O$  (in  $H_2O$ ).

$\rho_a$  = Density of acetone, 785.1 mg/ml (or see label on bottle).

$\rho_w$  = Density of water, 0.9982 g/ml (0.002201 lb/ml).

$\rho_t$  = Density of methylene chloride, 1316.8 mg/ml (or see label on bottle).

$\Theta$  = Total sampling time, min.

$\Theta_1$  = Sampling time interval, from the beginning of a run until the first component change, min.

$\Theta_1$  = Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, min.

$\Theta_p$  = Sampling time interval, from the final ( $n^{th}$ ) component change until the end of the sampling run, min.

13.6 = Specific gravity of mercury.

60 = Sec/min.

100 = Conversion to percent.

12.3 Average dry gas meter temperature and average orifice pressure drop. See data

sheet (Figure 5-2 of Method 5, 40 CFR part 60, appendix A).

12.4 Dry gas volume. Correct the sample volume measured by the dry gas meter to

standard conditions (20°C, 760 mm Hg or 68°F, 29.92 in Hg) by using Equation 315-1.

$$V = V_m Y \frac{T_{std} \left( P_{bar} + \frac{\Delta H}{13.6} \right)}{T_m P_{std}} = V = K_1 V_m Y \frac{P_{bar} + \left( \frac{\Delta H}{13.6} \right)}{T_m} \quad \text{Eq. 315-1}$$

Where

$K_1 = 0.3858 \text{ }^\circ\text{K/mm Hg}$  for metric units,  
 $= 17.64 \text{ }^\circ\text{R/in Hg}$  for English units.

**Note:** Equation 315-1 can be used as written unless the leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks

conducted prior to component changes) exceeds  $L_a$ . If  $L_p$  or  $L_i$  exceeds  $L_a$ , Equation 315-1 must be modified as follows:

(a) Case I. No component changes made during sampling run. In this case, replace  $V_m$  in Equation 315-1 with the expression:

$$[V_m - (L_p - L_a) \Theta]$$

(b) Case II. One or more component changes made during the sampling run. In this case, replace  $V_m$  in Equation 315-1 by the expression:

$$\left[ V_m - (L_1 - L_a) \Theta_1 - \sum_{i=2}^n (L_i - L_a) \Theta_i - (L_p - L_a) \Theta_p \right]$$

and substitute only for those leakage rates ( $L_i$  or  $L_p$ ) which exceed  $L_a$ .

12.5 Volume of water vapor condensed.

$$V_{w(std)} = V_{lc} \frac{\rho_w R T_{std}}{M_w P_{std}} = K_2 V_{lc} \quad \text{Eq. 315-2}$$

Where

$K_2 = 0.001333 \text{ m}^3/\text{ml}$  for metric units;

$= 0.04706 \text{ ft}^3/\text{ml}$  for English units.

12.6 Moisture content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \quad \text{Eq. 315-3}$$

**Note:** In saturated or water droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger analysis (Equation 315-3), and a second from the assumption of saturated conditions. The lower of the two

values of  $B_{ws}$  shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in section 4.0 of Method 4, 40 CFR part 60, appendix A. For the purposes of this method, the average stack

gas temperature from Figure 5-2 of Method 5, 40 CFR part 60, appendix A may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is  $\pm 1^\circ\text{C}$  ( $2^\circ\text{F}$ ).

12.7 Acetone blank concentration.

$$C_a = \frac{M_a}{V_a \rho_a} \quad \text{Eq. 315-4}$$

12.8 Acetone wash blank.

$$W_a = C_a V_{aw} \rho_a \quad \text{Eq. 315-5}$$

12.9 Total particulate weight. Determine the total PM catch from the sum of the weights obtained from Containers 1 and 2 less the acetone blank associated with these two containers (see Figure 315-1).

**Note:** Refer to section 8.5.8 of this method to assist in calculation of results involving

two or more filter assemblies or two or more sampling trains.

12.10 Particulate concentration.

$$c_s = K_3 m_n / V_{m(std)} \quad \text{Eq. 315-6}$$

where

$K = 0.001 \text{ g/mg}$  for metric units;  
 $= 0.0154 \text{ gr/mg}$  for English units.

12.11 Conversion factors.

From	To	Multiply by
ft <sup>3</sup> .....	m <sup>3</sup> .....	0.02832
gr .....	mg .....	64.80004
gr/ft <sup>3</sup> .....	mg/m <sup>3</sup> .....	2288.4
mg .....	g .....	0.001
gr .....	lb .....	1.429×10 <sup>-4</sup>

12.12 Isokinetic variation.

12.12.1 Calculation from raw data.

$$I = \frac{100 T_s \left[ K_4 V_{lc} + \left( \frac{V_m Y}{T_m} \right) \left( P_{bar} + \frac{\Delta H}{13.6} \right) \right]}{60 \Theta V_s P_s A_n} \quad \text{Eq. 315-7}$$

where

$K_4 = 0.003454$  [(mm Hg)(m<sup>3</sup>)/[(m1)(°K)] for metric units;  
 $= 0.002669$  [(in Hg)(ft<sup>3</sup>)/[(m1)(°R)] for English units.

12.12.2 Calculation from intermediate values.

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} V_s \Theta A_n P_s 60 (1 - B_{ws})} = K_5 \frac{T_s V_{m(std)}}{P_s V_s A_n \Theta (1 - B_{ws})} \quad \text{Eq. 315-8}$$

where

$K_5 = 4.320$  for metric units;  
 $= 0.09450$  for English units.

12.12.3 Acceptable results. If 90 percent  $\leq I \leq 110$  percent, the results are acceptable. If the PM or MCEM results are low in comparison to the standard, and "I" is over 110 percent or less than 90 percent, the Administrator may opt to accept the results. Reference 4 in the Bibliography may be used to make acceptability judgments. If "I" is judged to be unacceptable, reject the results, and repeat the test.

12.13 Stack gas velocity and volumetric flow rate. Calculate the average stack gas velocity and volumetric flow rate, if needed, using data obtained in this method and the equations in sections 5.2 and 5.3 of Method 2, 40 CFR part 60, appendix A.

12.14 MCEM results. Determine the MCEM concentration from the results from Containers 1, 2, 2M, 3W, and 3S less the acetone, methylene chloride, and filter blanks value as determined in the following equation:

$$m_{mcecm} = \Sigma \mu_{total} - W_a - W_i - f_b$$

13.0 Method Performance. [Reserved]

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

#### 16.0 Alternative Procedures.

16.1 Dry gas meter as a calibration standard. A DGM may be used as a calibration standard for volume measurements in place of the wet test meter specified in section 16.1 of this method, provided that it is calibrated initially and recalibrated periodically as follows:

##### 16.1.1 Standard dry gas meter calibration.

16.1.1.1. The DGM to be calibrated and used as a secondary reference meter should be of high quality and have an appropriately sized capacity, e.g., 3 liters/rev (0.1 ft<sup>3</sup>/rev). A spirometer (400 liters or more capacity), or equivalent, may be used for this calibration, although a wet test meter is usually more practical. The wet test meter should have a capacity of 30 liters/rev (1 ft<sup>3</sup>/rev) and be capable of measuring volume to within 1.0 percent; wet test meters should be checked against a spirometer or a liquid displacement meter to ensure the accuracy of the wet test meter. Spirometers or wet test meters of other sizes may be used, provided that the specified accuracies of the procedure are maintained.

16.1.1.2 Set up the components as shown in Figure 5-7 of Method 5, 40 CFR part 60, appendix A. A spirometer, or equivalent,

may be used in place of the wet test meter in the system. Run the pump for at least 5 minutes at a flow rate of about 10 liters/min (0.35 cfm) to condition the interior surface of the wet test meter. The pressure drop indicated by the manometer at the inlet side of the DGM should be minimized (no greater than 100 mm H<sub>2</sub>O [4 in. H<sub>2</sub>O] at a flow rate of 30 liters/min [1 cfm]). This can be accomplished by using large-diameter tubing connections and straight pipe fittings.

16.1.1.3 Collect the data as shown in the example data sheet (see Figure 5-8 of Method 5, 40 CFR part 60, appendix A). Make triplicate runs at each of the flow rates and at no less than five different flow rates. The range of flow rates should be between 10 and 34 liters/min (0.35 and 1.2 cfm) or over the expected operating range.

16.1.1.4 Calculate flow rate, Q, for each run using the wet test meter volume, V<sub>w</sub>, and the run time, q. Calculate the DGM coefficient, Y<sub>ds</sub>, for each run. These calculations are as follows:

$$Q = K_1 \frac{P_{bar} V_w}{(t_w + t_{std}) \Theta} \quad \text{Eq. 315-9}$$

$$Y_{ds} = \frac{V_w (T_{ds} + T_{std}) P_{bar}}{V_{ds} (T_w + T_{std}) \left( P_{bar} + \frac{\Delta P}{13.6} \right)} \quad \text{Eq. 315-10}$$

Where

$K_1 = 0.3858$  for international system of units (SI); 17.64 for English units;

$P_{bar}$  = Barometric pressure, mm Hg (in Hg);

$V_w$  = Wet test meter volume, liter (ft<sup>3</sup>);

$t_w$  = Average wet test meter temperature, °C (°F);

$t_{std}$  = 273°C for SI units; 460°F for English units;

$\Theta$  = Run time, min;

$t_{ds}$  = Average dry gas meter temperature, °C (°F);

$V_{ds}$  = Dry gas meter volume, liter (ft<sup>3</sup>);

$\Delta p$  = Dry gas meter inlet differential pressure, mm H<sub>2</sub>O (in H<sub>2</sub>O).

16.1.1.5 Compare the three Y<sub>ds</sub> values at each of the flow rates and determine the maximum and minimum values. The difference between the maximum and minimum values at each flow rate should be no greater than 0.030. Extra sets of triplicate

runs may be made in order to complete this requirement. In addition, the meter coefficients should be between 0.95 and 1.05. If these specifications cannot be met in three sets of successive triplicate runs, the meter is not suitable as a calibration standard and should not be used as such. If these specifications are met, average the three Y<sub>ds</sub> values at each flow rate resulting in five average meter coefficients, Y<sub>ds</sub>.

16.1.1.6 Prepare a curve of meter coefficient, Y<sub>ds</sub>, versus flow rate, Q, for the DGM. This curve shall be used as a reference when the meter is used to calibrate other DGMs and to determine whether recalibration is required.

16.1.2 Standard dry gas meter recalibration.

16.1.2.1 Recalibrate the standard DGM against a wet test meter or spirometer annually or after every 200 hours of operation, whichever comes first. This

requirement is valid provided the standard DGM is kept in a laboratory and, if transported, cared for as any other laboratory instrument. Abuse to the standard meter may cause a change in the calibration and will require more frequent recalibrations.

16.1.2.2 As an alternative to full recalibration, a two-point calibration check may be made. Follow the same procedure and equipment arrangement as for a full recalibration, but run the meter at only two flow rates (suggested rates are 14 and 28 liters/min [0.5 and 1.0 cfm]). Calculate the meter coefficients for these two points, and compare the values with the meter calibration curve. If the two coefficients are within 1.5 percent of the calibration curve values at the same flow rates, the meter need not be recalibrated until the next date for a recalibration check.

6.2 Critical orifices as calibration standards. Critical orifices may be used as

calibration standards in place of the wet test meter specified in section 10.3 of this method, provided that they are selected, calibrated, and used as follows:

16.2.1 Selection of critical orifices.

16.2.1.1 The procedure that follows describes the use of hypodermic needles or stainless steel needle tubing that has been found suitable for use as critical orifices. Other materials and critical orifice designs may be used provided the orifices act as true critical orifices; i.e., a critical vacuum can be obtained, as described in section 7.2.2.2.3 of Method 5, 40 CFR part 60, appendix A. Select five critical orifices that are appropriately sized to cover the range of flow rates between 10 and 34 liters/min or the expected operating range. Two of the critical orifices should bracket the expected operating range. A minimum of three critical orifices will be needed to calibrate a Method 5 DGM; the other two critical orifices can serve as spares and provide better selection for bracketing the range of operating flow rates. The needle sizes and tubing lengths shown in Table 315-1 give the approximate flow rates indicated in the table.

16.2.1.2 These needles can be adapted to a Method 5 type sampling train as follows: Insert a serum bottle stopper, 13 x 20 mm sleeve type, into a 0.5 in Swagelok quick connect. Insert the needle into the stopper as shown in Figure 5-9 of Method 5, 40 CFR part 60, appendix A.

16.2.2 Critical orifice calibration. The procedure described in this section uses the Method 5 meter box configuration with a

DGM as described in section 6.1.1.9 of this method to calibrate the critical orifices. Other schemes may be used, subject to the approval of the Administrator.

16.2.2.1 Calibration of meter box. The critical orifices must be calibrated in the same configuration as they will be used; i.e., there should be no connections to the inlet of the orifice.

16.2.2.1.1 Before calibrating the meter box, leak-check the system as follows: Fully open the coarse adjust valve and completely close the bypass valve. Plug the inlet. Then turn on the pump and determine whether there is any leakage. The leakage rate shall be zero; i.e., no detectable movement of the DGM dial shall be seen for 1 minute.

16.2.2.1.2 Check also for leakages in that portion of the sampling train between the pump and the orifice meter. See section 5.6 of Method 5, 40 CFR part 60, appendix A for the procedure; make any corrections, if necessary. If leakage is detected, check for cracked gaskets, loose fittings, worn O-rings, etc. and make the necessary repairs.

16.2.2.1.3 After determining that the meter box is leakless, calibrate the meter box according to the procedure given in section 5.3 of Method 5, 40 CFR part 60, appendix A. Make sure that the wet test meter meets the requirements stated in section 7.1.1.1 of Method 5, 40 CFR part 60, appendix A. Check the water level in the wet test meter. Record the DGM calibration factor, Y.

16.2.2.2 Calibration of critical orifices. Set up the apparatus as shown in Figure 5-10 of Method 5, 40 CFR part 60, appendix A.

16.2.2.2.1 Allow a warm-up time of 15 minutes. This step is important to equilibrate the temperature conditions through the DGM.

16.2.2.2.2 Leak-check the system as in section 7.2.2.1.1 of Method 5, 40 CFR part 60, appendix A. The leakage rate shall be zero.

16.2.2.2.3 Before calibrating the critical orifice, determine its suitability and the appropriate operating vacuum as follows: turn on the pump, fully open the coarse adjust valve, and adjust the bypass valve to give a vacuum reading corresponding to about half of atmospheric pressure. Observe the meter box orifice manometer reading, DH. Slowly increase the vacuum reading until a stable reading is obtained on the meter box orifice manometer. Record the critical vacuum for each orifice. Orifices that do not reach a critical value shall not be used.

16.2.2.2.4 Obtain the barometric pressure using a barometer as described in section 6.1.2 of this method. Record the barometric pressure, P<sub>bar</sub>, in mm Hg (in. Hg).

16.2.2.2.5 Conduct duplicate runs at a vacuum of 25 to 50 mm Hg (1 to 2 in. Hg) above the critical vacuum. The runs shall be at least 5 minutes each. The DGM volume readings shall be in increments of complete revolutions of the DGM. As a guideline, the times should not differ by more than 3.0 seconds (this includes allowance for changes in the DGM temperatures) to achieve ±0.5 percent in K'. Record the information listed in Figure 5-11 of Method 5, 40 CFR part 60, appendix A.

16.2.2.2.6 Calculate K' using Equation 315-11.

$$K' = \frac{K_1 V_m Y \left( P_{bar} + \frac{\Delta H}{13.6} \right) T_{amb}^{\frac{1}{2}}}{P_{bar} T_m \Theta} \quad \text{Eq. 315-11}$$

where

K' = Critical orifice coefficient, [m<sup>3</sup>](°K)<sup>1/2</sup>/[(mm Hg)(min)] {(ft<sup>3</sup>)(°R)<sup>1/2</sup>}/[(in. Hg)(min)];

T<sub>amb</sub> = Absolute ambient temperature, °K (°R).

16.2.2.2.7 Average the K' values. The individual K' values should not differ by more than ±0.5 percent from the average.

16.2.3 Using the critical orifices as calibration standards.

16.2.3.1 Record the barometric pressure.

16.2.3.2 Calibrate the metering system according to the procedure outlined in sections 7.2.2.2.1 to 7.2.2.2.5 of Method 5, 40 CFR part 60, appendix A. Record the information listed in Figure 5-12 of Method 5, 40 CFR part 60, appendix A.

16.2.3.3 Calculate the standard volumes of air passed through the DGM and the critical orifices, and calculate the DGM calibration factor, Y, using the equations below:

$$V_{m(std)} = K_1 V_m [P_{bar} + (\Delta H/13.6)]/T_m \quad \text{Eq. 315-12}$$

$$V_{cr(std)} = K' (P_{bar} \Theta)/T_{amb}^{1/2} \quad \text{Eq. 315-13}$$

$$Y = V_{cr(std)}/V_{m(std)} \quad \text{Eq. 315-14}$$

where

V<sub>cr(std)</sub> = Volume of gas sample passed through the critical orifice, corrected to standard conditions, dscm (dscf).

K' = 0.3858 °K/mm Hg for metric units = 17.64 °R/in Hg for English units.

16.2.3.4 Average the DGM calibration values for each of the flow rates. The calibration factor, Y, at each of the flow rates should not differ by more than ±2 percent from the average.

16.2.3.5 To determine the need for recalibrating the critical orifices, compare the DGM Y factors obtained from two adjacent orifices each time a DGM is calibrated; for example, when checking orifice 13/2.5, use orifices 12/10.2 and 13/5.1. If any critical orifice yields a DGM Y factor differing by more than 2 percent from the others, recalibrate the critical orifice according to section 7.2.2.2 of Method 5, 40 CFR part 60, appendix A.

17.0 References.

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 18.0 Tables, Diagrams, Flowcharts, and Validation Data

TABLE 315-1. FLOW RATES FOR VARIOUS NEEDLE SIZES AND TUBE LENGTHS.

Gauge/length (cm)	Flow rate (liters/min)	Gauge/length (cm)	Flow rate (liters/min)
12/7.6	32.56	14/2.5	19.54
12/10.2	30.02	14/5.1	17.27
13/2.5	25.77	14/7.6	16.14
13/5.1	23.50	15/3.2	14.16
13/7.6	22.37	15/7.6	11.61
13/10.2	20.67	115/10.2	10.48

Figure 315-1. Particulate and MCEM Analyses

Particulate Analysis						
Plant						
Date						
Run No.						
Filter No.						
Amount liquid lost during transport						
Acetone blank volume (ml)						
Acetone blank concentration (Eq. 315-4) (mg/mg)						
Acetone wash blank (Eq. 315-5) (mg)						
		Final weight (mg)	Tare weight (mg)	Weight gain (mg)		
Container No. 1						
Container No. 2						
Total						
Less Acetone blank						
Weight of particulate matter						
		Final volume (mg)	Initial volume (mg)	Liquid collected (mg)		
Moisture Analysis						
Impingers	Note 1	Note 1				
Silica gel						
Total						
<b>Note 1:</b> Convert volume of water to weight by multiplying by the density of water (1 g/ml).						
Container No.	Final weight (mg)	Tare of aluminum dish (mg)	Weight gain	Acetone wash volume (ml)	Methylene chloride wash volume (ml)	
MCEM Analysis						
1						
2+2M						
3W						
3S						
Total			$\sum m_{total}$	$\sum V_{aw}$	$\sum V_{tw}$	
Less acetone wash blank (mg) (not to exceed 1 mg/l of acetone used)			$w_a = c_a \rho_a \sum V_{aw}$			
Less methylene chloride wash blank (mg) (not to exceed 1.5 mg/l of methylene chloride used)			$w_t = c_t \rho_t \sum V_{tw}$			
Less filter blank (mg) (not to exceed . . . (mg/filter))			$F_b$			
MCEM weight (mg)			$m_{MCEM} = \sum m_{total} - w_a - w_t - f_b$			

[FR Doc. 97-25882 Filed 10-6-97; 8:45 am]