ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[IL–64–2–5807; FRL–5602–1]

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: Proposed rule and notice of public hearing.

SUMMARY: This action proposes national emission standards for each new or existing potline, paste production operation, and anode bake furnace associated with a primary aluminum reduction plant. The major hazardous air pollutants (HAPs) emitted by the facilities covered by this proposed 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 proposed 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 would be achieved.

The proposed 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 189 HAPs listed in section 112(b) of the Act from the various process operations found within the industry.

DATES: *Comments.* The EPA will accept comments on the proposed rule until November 25, 1996.

Public Hearing. If anyone contacts the EPA requesting to speak at a public hearing by October 17, 1996, a public hearing will be held on October 28, 1996, beginning at 10 a.m. For more information, see VII, B of the **SUPPLEMENTARY INFORMATION** section.

ADDRESSES: Interested parties may submit written comments (in duplicate, if possible) to Docket No. A–92–60 at the following address: Air and Radiation Docket and Information Center (6102), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460. The EPA requests that a separate copy of the comments also be sent to the contact person listed below. The docket is located at the above address in Room M–1500, Waterside Mall (ground floor) and may be inspected from 8:30 a.m. to noon, and from 1 to 3 p.m., Monday through Friday. The proposed regulatory text, proposed Method 315, the Basis and Purpose Document, Technical Support Document, and other materials related to this rulemaking are available for review in the docket. Copies of this information may be obtained by request from the Air Docket by calling (202) 260–7548. A reasonable fee may be charged for copying docket materials.

The public hearing will be held at the EPA Office of Administration Auditorium, Research Triangle Park, North Carolina.

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.

SUPPLEMENTARY INFORMATION:

Regulated Entities

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

Category	Examples of regulated entities
Industry	Primary aluminum reduction plants.

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 proposed 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.

Technology Transfer Network

A detailed evaluation and rationale for this notice of proposal are provided in the Basis and Purpose Document. The Basis and Purpose Document, proposed regulation, and this preamble also are available on the Technology Transfer Network (TTN), one of EPA's electronic bulletin boards. The TTN 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) 541–5742 with a modem of up to 14,400 baud per second (BPS). If more information on the TTN is needed, call the HELP line at (919) 541–5384.

Outline

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I. Statutory Authority

The statutory authority for this proposal 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. Introduction

A. Background

This proposed maximum achievable control technology (MACT) standard was developed as a pilot demonstration of EPA's Share-A-MACT program. Under this rulemaking approach, EPA works with State regulatory agencies and tribal governments to resolve major issues while working in a cooperative effort with industry and professional associations to identify data needs and

to collect, exchange, and analyze the information and data. For example, on this project emission tests were conducted with shared funding from EPA, the Washington State Department of Ecology, and the aluminum industry.

The proposed standard is based on a combination of control techniques that either prevent the escape of emissions or capture the pollutants and return them to the process. These pollution prevention measures include work practices, equipment modifications, operating practices, housekeeping measures, and in-process recycling. The overall effect of the proposed standard will be to raise the control performance of nearly half of the industry to the level of control achieved by the best performing plants. Currently, over 11,000 tpy of fluoride and POM are emitted nationwide; these emissions would be reduced by more than 50 percent, and higher reductions would be achieved at particular sites. Emissions of total particulate matter also would be reduced by 16,000 tpy. These reductions will lower ambient air concentrations of these pollutants and, consequently, lower levels of exposure. The deposition of fluorides and POM on waters, such as the Great Lakes, also would be reduced. These benefits will be achieved with no plant closures predicted and without any significant adverse economic impacts on the industry. According to the economic analysis, the price of aluminum is projected to increase by less than 1 percent, and total revenue and employment will decrease by less than 1 percent. Total capital expenditures are estimated as $160 million, with a total annualized cost of $40 million per year.

The proposed standard provides flexibility to the owner or operator with an incentive for improved performance. For example, the proposed monitoring requirements allow less frequent sampling at plants that show consistent performance below the level of the standard; provisions for similar potlines allow a reduction in manual sampling and the use of less expensive alternative sampling; and provisions are included for emission averaging. Additional time for achieving compliance also is allowed for existing sources, depending on the extent of changes needed to meet the standards.

B. NESHAP for Source Categories

Section 112(b) of the Act lists 189 HAPs and directs the EPA to develop rules to control all major and some area sources emitting 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 189 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.

C. Overview of the Industry

Primary aluminum plants produce aluminum metal through the electrolytic reduction of aluminum oxide (alumina) by direct current voltage in an electrolyte (called ''cryolite'') of sodium aluminum fluoride. There are 23 primary aluminum plants currently located in a total of 14 States. Many of these plants are concentrated in the Northwest in close proximity to hydroelectric power sources. The 23 plants have 91 potlines that produce aluminum, each plant has a paste production operation, and 17 of these plants have anode bake furnaces. The major HAPs emitted by these facilities are HF and POM.

Primary aluminum plants are subject to varying State emission limits for TF developed pursuant to section 111(d) of the Act. A total of 5 potlines at 4 plants are subject to New Source Performance Standards (NSPS) for primary aluminum reduction plants (40 CFR part 60, subpart S). The EPA is considering removing the NSPS and incorporating any necessary provisions into this proposed rule to avoid duplicative control requirements, eliminate redundant monitoring provisions, and to reduce paperwork. Removal of the NSPS would probably require certain changes to this rule for those specific cases that would have otherwise triggered the NSPS. For sources that would have been subject to the NSPS, these changes could include incorporating the part 60 provisions for modifications, establishing the NSPS limits when appropriate, and adopting the NSPS opacity limits. The EPA is requesting comments on the concept of removal of the NSPS and the specific additional provisions that would need to be incorporated into this proposed rule.

D. Health Effects of Pollutants

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 control technology-based program to reduce stationary source emissions of HAPs. 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 proposed rule is technology-based, i.e., based on MACT. The MACT strategy avoids depending on a detailed and comprehensive risk assessment for MACT standards for control of air toxics for the following reasons: (1) some of the HAPs emitted from stationary sources are unknown, and (2) many of the HAPs about which EPA has emissions information lack complete data with which to describe health hazards.

The EPA does recognize that the degree of adverse effects to health resulting from the most significant emissions identified can range from mild to severe. The extent to which the effects could be experienced depends upon the ambient concentrations and exposure time. The latter is further influenced by source-specific characteristics such as emission rates and local meteorological conditions. Human variability factors also influence the degree to which effects to health occur: genetics, age, pre-existing health conditions, and lifestyle.

Available emission data, in conjunction with development of the proposed standard, show that HF and POM are the HAPs that are most significant and that have the potential for reduction by implementation of the standard. The emission limits in the proposed standard would reduce emissions of both HF, a gaseous inorganic compound, and POM. The proposed standard also would reduce emissions of particulate matter (PM), which is controlled under the National Ambient Air Quality Standards (NAAQS) as a ''criteria'' pollutant. Following is a summary of the potential health effects caused by emissions of pollutants that would 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. 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. 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.

Emission test results reveal that primary aluminum reduction plants may 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 and cataracts in humans, and toxic effects on liver, blood, and the immune system in animal studies. Reproductive and developmental effects from benzo(a)pyrene have also been reported in animal studies.

The health effects of ''criteria'' pollutants reduced by this proposed standard (e.g., particulate matter smaller than 10 microns in diameter [PM_{10}]) are described in EPA's criteria documents that support the NAAQS. For example, particles addressed by the PM_{10} standard have been associated with aggravation of existing respiratory and cardiovascular disease and increased risk of premature death.

III. Summary of the Proposed Rule

A. Applicability

The proposed standard would apply to emissions of HF, measured using total fluorides (TF) as a surrogate, and POM (as measured by methylene chloride extractables) from each affected source associated with primary aluminum reduction. Affected sources are each potline of reduction cells, each anode bake furnace, and each paste production plant, except for one off-site anode bake furnace that is subject to the State MACT determination under section 112(l) of the Act.

B. Subcategories

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 states that ''the Administrator may distinguish among classes, types, and sizes of sources within a category * * * in establishing such standards * * *.'' In establishing subcategories, EPA has considered 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.

The EPA's analysis of existing aluminum production processes and operations resulted in the designation of seven subcategories for potlines. For the subcategories of potlines, the distinctions are based primarily on differences in the process operation, process equipment, emissions, and the applicability of control devices. Additional information on the subcategorization is included in the Basis and Purpose Document for Primary Aluminum Reduction Plants.

One of the subcategories was developed for center-worked prebake potlines with wet primary control systems. These potlines produce a high purity aluminum for a specialized market, and they can do so only because metal impurities are removed with the sludge from the wet scrubbers. If these potlines were required to be equipped with dry alumina scrubbers, the contaminants would be returned to the reduction cell and contaminate the aluminum. The company claims that if they must meet MACT for the prebake subcategory of modern potlines with dry alumina scrubbers, they could lose their market for high purity aluminum. The EPA is requesting comments on the issue of a separate subcategory for potlines that produce high purity aluminum.

C. Emission Control Technology

The control option for primary emissions from the reduction process for six of the seven subcategories of existing potlines and for all new potlines is the installation of a dry alumina scrubber (with a baghouse to collect the alumina and other particulate matter) at those plants that do not have them. The control option for prebake plants producing high purity aluminum is a wet scrubber that removes impurities that would otherwise contaminate the aluminum. The MACT technology used to establish the floor of performance for potline secondary emission control involves the use of wet roof scrubbers for side-worked prebake potlines and one type of Soderberg potline. Work practice programs, inspection procedures, and maintenance programs for repairing or replacing damaged hoods and seals provide the most efficient control for secondary emissions from other types of existing and new potlines. Based on EPA's MACT floor analyses, the dry alumina scrubber also is the MACT floor technology for new and existing anode bake furnaces, and a capture system vented to a dry coke scrubber is the MACT floor technology for new and existing paste production operations.

For the one bake furnace plant not located with a primary aluminum reduction plant, the MACT floor control technology (dry alumina scrubbers) does not apply because the plant does not have access to alumina as do other bake furnaces, and there are no potlines onsite to use the reacted alumina. Consequently, EPA placed this plant in a separate subcategory and proposes to adopt the State MACT determination for this facility. This approach is consistent with EPA's policy of working with the States, adopting MACT determinations from State programs when appropriate, and avoiding regulatory duplication.

No additional control options were identified that had been demonstrated to be more effective than the MACT floor technologies at a reasonable cost or that would achieve significant additional reductions in HAP emissions. Consequently, the technologies associated with the MACT floor were also determined to represent the MACT technology. Additional information on EPA's beyond-the-floor analysis is included in the Basis and Purpose Document.

D. Emission Limits

Analyses of available data led EPA to conclude that the emission levels shown in Table 1 for existing sources and Table 2 for new sources represent the MACT floor and MACT for each emission source.

TABLE 1.—SUMMARY OF PROPOSED EMISSION LIMITS FOR EXISTING SOURCES

Source	Emission limit
Potlines	*TF Emission Limits:* 0.95 kg/Mg (1.9 lb/ton) of aluminum produced for CWPB1 [1] potlines. 1.5 kg/Mg (3.0 lb/ton) of aluminum produced for CWPB2 [1] potlines. 1.25 kg/Mg (2.5 lb/ton) of aluminum produced for CWPB3 [1] potlines.

TABLE 1.—SUMMARY OF PROPOSED EMISSION LIMITS FOR EXISTING SOURCES—Continued

Source	Emission limit
	0.80 kg/Mg (1.6 lb/ton) of aluminum produced for SWPB [1] potlines. 1.1 kg/Mg (2.2 lb/ton) of aluminum produced for VSS1 [1] potlines. 1.35 kg/Mg (2.7 lb/ton) of aluminum produced for VSS2 [1] potlines. 1.35 kg/Mg (2.7 lb/ton) of aluminum produced for HSS [1] potlines. *POM Emission Limits:* 2.35 kg/Mg (4.7 lb/ton) of aluminum produced for HSS potlines. 1.2 kg/Mg (2.4 lb/ton) of aluminum produced for VSS1 potlines. 1.85 kg/Mg (3.7 lb/ton) of aluminum produced for VSS2 potlines.
Paste Production	*POM Emission Limit:* Install, operate, and maintain equipment for capture of emissions and vent emissions to a dry coke scrubber.
Anode Bake Furnace (located with a primary aluminum plant).	*TF Emission Limit:* 0.10 kg/Mg (0.20 lb/ton) of anode. *POM Emission Limit:* 0.09 kg/Mg (0.18 lb/ton) of anode.

[1] Abbreviations defined:
CWPB1=Center-worked prebake potline with the most modern reduction cells; includes all center-worked prebake potlines not specifically identified as CWPB2 or CWPB3.
CWPB2=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.
CWPB3=Center-worked prebake potline that produces very high purity aluminum, has wet scrubbers as the primary control system, and is located at the primary aluminum plant operated by NSA in Hawesville, Kentucky.
HSS=Horizontal stud Soderberg potline.
SWPB=Side-worked prebake potline.
VSS1=Vertical stud Soderberg potline at Northwest Aluminum in The Dalles, Oregon, or at Columbia Aluminum in Goldendale, Washington.
VSS2=Vertical stud Soderberg potlines at Columbia Falls Aluminum in Columbia Falls, Montana.

TABLE 2.—SUMMARY OF PROPOSED EMISSION LIMITS FOR NEW SOURCES

Source	Emission limit
Potlines	*TF Emission Limit:* 0.6 kg/Mg (1.2 lb/ton) of aluminum produced. *POM Emission Limit:* 0.32 kg/Mg (0.63 lb/ton) of aluminum produced.
Paste Production	*POM Emission Limit:* Install, operate, and maintain equipment for the capture of emissions and vent emissions to a dry coke scrubber.
Anode Bake Furnace	*TF Emission Limit*: 0.01 kg/Mg (0.02 lb/ton) of anode. *POM Emission Limit:* 0.025 kg/Mg (0.05 lb/ton) of anode.

The limits for potlines are in the same format as the NSPS (40 CFR part 60, subpart S)—kilogram of pollutant per megagram of aluminum (kg/Mg) or pound of pollutant per ton of aluminum (lb/ton). A similar format, lb/ton of anode, is used for emission limits for anode bake plants.

An equipment standard requiring installation of a capture system and the routing of emissions through a closed system to a dry coke scrubber or equivalent alternative control device is proposed for paste production. If an alternative to the dry coke scrubber is used, the control device must achieve a POM removal efficiency of at least 95 percent for continuous paste mixing operations and at least 90 percent for batch operations. The capture system must be designed and operated to meet generally accepted engineering standards for minimum exhaust rates.

E. Emission Monitoring and Compliance Provisions

The proposed standard requires 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 and quarterly sampling of POM for Soderberg potlines using proposed Method 315 or an approved alternative method. For secondary emissions, the owner or operator would perform at least three runs per month for TF and at least one run per month (three runs per quarter) for POM from Soderberg potlines.

Annual sampling of TF using Method 13 and POM (for Soderberg potlines) using Method 315 would be required for the primary emission control system for potlines. To demonstrate compliance, the owner or operator would compute a monthly average for TF and a quarterly average for POM using the results of at least three runs for secondary emissions of TF (or POM), the aluminum production rate, and the most recent compliance test for the primary control system. If the primary control system has been sampled more than once in the previous 12-month period, then the average of all runs during the 12-month period is to be used to determine the contribution from the primary system.

Annual sampling of TF using Method 13 and POM using proposed Method 315 would be required for the anode bake furnace stack. Compliance with the applicable emission limits for anode bake plants would be determined by the average of at least three runs annually.

The proposed standard also would require 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 would be 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 would be triggered if the control device is operating outside of the acceptable range for the specified parameters. Failure to initiate corrective actions within one hour after exceeding the limit is a violation. A violation also occurs if the operating limit for a parameter is exceeded more than 6

times in any semiannual reporting period. For the purpose of determining the number of exceedances, no more than one exceedance would be attributed in any given 24 hour period.

Typically, EPA has considered the exceedance of established operating parameters for the control device to be a violation. However, several factors indicated that triggering a corrective action program would be more appropriate for this application of control device monitoring. An important consideration was that a change in a control device's operating parameter does not directly correlate with an increase in emissions and does not provide reasonable assurance that the emission limit was exceeded when the parameter changed. The acceptable range for the operating parameter that is monitored is established during performance testing. However, if the source is performing well below the emission limit during the performance test, the range established for the monitoring parameter would not be representative of operation at a level when actual emissions are close to (but still below) the applicable emission limit. In other words, the operating parameter may be outside the limit established during the performance test while emissions are still below the applicable limit. The primary value of monitoring the control device parameters is to detect a potential problem with the device's operation as soon as possible and to promptly investigate and correct the cause.

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. This information is needed to determine the average production rate used in compliance equations. 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.

Similar Potlines. Provisions also are included in the proposed standard to allow the owner or operator to perform manual sampling of only one potline in a group of similar potlines and to use less expensive monitoring techniques for the other similar potlines. To show that a potline is similar, the owner or operator must demonstrate that the level of emission control is equivalent for all of the potlines in the group according to the requirements included in the proposed standard. Hydrogen fluoride continuous emission monitors (CEMs) and Alcan cassette samplers are approved to show that the performance of similar potlines is the same as or better than that of the potline sampled using Methods 13 and 14. 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.

The EPA is also considering work practice inspections as an option to show similar performance among potlines. However, this issue is unresolved because every specific work practice and its corresponding effect on emissions are difficult to identify and quantify, and there is no evidence that a work practice ''score'' is relatable to emission rates. For this approach to be acceptable, the owner or operator must demonstrate the validity of the approach and correlate the results of work practice inspections to measured emissions. The EPA specifically requests comments on the acceptability of work practice inspections as a measure of emission control performance.

Reduced Sampling. 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.

Alternative Method. Under the proposed standard, the owner or operator can use an approved alternative method for measuring emissions. An approved alternative may include an HF CEM or the Alcan cassette sampling system. Continuous emission monitors are currently being evaluated at several plants and have shown promise as a process control tool as well as for monitoring secondary emissions at a lower cost than manual methods. The EPA decided not to require the use of an HF CEM, but is including provisions for its use in the rule. However, the new HF monitors do not operate on the same principles as other CEMs for which EPA has developed performance specifications and quality assurance/quality control provisions. Until these specifications are developed, EPA does not believe the new monitors should be required. However, the Agency encourages their development and use by accepting the use of the monitors as an approved alternative to monthly sampling on a case-by-case basis for those plants that show it to be an acceptable alternative to Methods 13 and 14.

To show that another method is an acceptable alternative, the owner or operator would be required to 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 EPA and industry are currently investigating the use of Alcan cassettes as an alternative to Methods 13 and 14. If this method development is completed successfully, the Alcan cassette will be approved as an applicable method for TF under this proposed rule.

F. Emission Averaging

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

The emission limits for emission averaging are summarized in Table 3. This approach requires that the monthly average of TF emissions from the group of sources not exceed the average performance demonstrated as the MACT level of control (increased by a small amount to account for variability).

TABLE 3.—POTLINE TF AND POM LIMITS FOR EMISSION AVERAGING

Type	2 lines	3 lines	4 lines	5 lines	6 lines	7 lines	8 lines
Monthly TF limit (lb/ton) for given number of potlines							
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	2.0	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
Quarterly POM limit (lb/ton) for number of potlines							
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	3.4	3.2	3.2	3.1	3.1	3.0	3.0

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 would sample 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. The sum of emissions from each potline would be 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.

Emission averaging limits for TF and POM from anode bake furnaces were also developed and allow the annual testing of bake furnaces to be averaged across multiple bake furnaces. The applicable emission limits are given in Table 4.

To implement emissions averaging, the owner or operator would be required to include the information specified in the rule in the application for a part 70 permit or in an Implementation Plan (if the application has already been submitted) for approval by the applicable regulatory authority. The regulatory authority would review and approve or disapprove the plan within a specified time period based on the criteria included in the standard.

TABLE 4.—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

The information to be provided in the permit or plan would include the type of plan selected, the emission sources to be averaged, and the applicable limit assigned to each source. 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.

The emissions averaging system in this rule is intended to provide a facility with flexibility to achieve the required emissions reductions in the most cost effective way. Consistent with EPA policy on regulatory flexibility expressed in the economic incentive program rule (59 FR 16690, April 7, 1994), the use of emissions averaging under this rule should reduce pollution as well as benefit regulated entities. Compliance through averaging is expected to achieve somewhat greater emissions reductions than would occur without averaging.

G. 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). The proposed standard would incorporate 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 proposed requirements would include one-time notifications of applicability, intent to construct or reconstruct, anticipated startup date, actual startup date, date of performance test, compliance status, and, if applicable, the intent to use an HF CEM. The owner or operator also would submit a report of performance test results (which can be sent as part of the compliance status notification) 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 section 63.10(b) of the General Provisions. In addition to these requirements, the proposed standard would specifically require plants to maintain records of the corrective actions taken when a control device's operating parameter is exceeded and the daily production rate for aluminum and anodes.

If an HF CEM were used as an alternative monitoring method, the owner or operator would be required to submit a report to the applicable regulatory authority containing the correlation and information showing how the correlation was derived.

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 on site; records for the remaining 3 years may be retained off site 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.

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 plants would be allowed at least 2 years. The EPA

believes that additional time beyond the 2-year period should be allowed for sources that must make major capital investments to achieve compliance. An extension for a fourth year may be granted by the regulatory authority under section 112(i)(3)(B) of the Act.

IV. Summary of Impacts

A. Environmental Impacts

Nationwide emissions from primary aluminum potlines are estimated at 6,400 tpy of TF. After implementation of the proposed standards, these emissions would decrease by almost 50 percent to 3,400 tpy. Polycyclic organic matter emissions would 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 would be reduced by 97 percent and an 84-percent reduction would be achieved for POM emissions. Polycyclic organic matter emissions from paste production plants, estimated at 147 tpy at baseline, would 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 would also be reduced, as would non-HAP pollutants such as PM. For example, PM emissions would 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.

B. Cost and Economic Impacts

The total capital cost of the proposed rule is estimated as about $160 million with a total annualized cost of $40 million per year. The estimated nationwide capital and annual costs of the proposed standards for potlines are estimated at $104 million and $23 million per year, respectively. The major cost impacts expected arise from the installation of dry alumina scrubbers for the primary control system at one plant and 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 the control of POM emissions will each install one. However, some plants may be able to meet the proposed 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 total capital cost is estimated at $26 million and the estimated total annualized cost is $6.1 million per year. The total capital cost for control of anode bake furnaces, estimated at $20.6 million, assumes that the 5 of 17 plants without a dry alumina scrubber must each install one. The total annualized cost is estimated at $6.2 million per year.

Currently, about one-third of existing potlines are sampled for TF on a regular basis. 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 proposed rule will not result in significant economic impacts for the primary aluminum industry.

V. Selection of Proposed Standard

A. Selection of Pollutants

Total Fluoride. Historically, the combination of gaseous and particulate fluorides emitted from aluminum plants have been measured and regulated as emissions of TF. Methods 13A and 13B, originally promulgated in 1975, have been used for TF sampling and analyses, along with Method 14, which specifies the equipment and sampling procedures for emission testing of potroom roof monitors.

Traditionally, fluoride captured by the front-half filter has been called ''particulate fluoride,'' and fluoride captured in the back-half impingers has been called ''gaseous fluoride'' (GF). However, the method has been validated only as a measure of TF expressed as the sum of the front-half and back-half catches. Thus, TF has been used for many years as a surrogate to represent this mixture of gaseous and particulate fluorides, and most emissions data currently available result from sampling and analysis for TF.

During the development of the proposed standards, EPA discussed with State and industry representatives various options for measuring gaseous HF, the listed HAP, and the use of GF or TF as surrogate measures for HF. Several factors were considered in these discussions that led to the choice of TF as a measure of emission control performance. A major consideration was the absence of a validated, accurate method for measuring HF or GF. Studies by EPA in the development of Method 13 identified problems in attempts to obtain an accurate split between particulate and gaseous fluoride. Hydrogen fluoride is highly reactive and reacts with glass in the sampling probe to form silicon tetrafluoride. The reactivity of HF has also been a problem in developing an analytical standard; currently, there is no EPA analytical standard that can be used to determine the accuracy of attempts to measure HF. During sampling, particulate matter in the front half of the train adsorbs GF, where it is then measured as particulate fluoride. Fine particulate matter that passes through the filter is measured as GF in the back half of the train. These factors produce confounding effects in attempts to measure HF or GF with biases in different directions. In addition, the quantity of HF or GF that is formed is affected by humidity and the water content of raw materials.

A large historical database for TF was available to characterize the emission control performance of the industry, to identify the best controlled potlines, and to develop the MACT floor and MACT level of control. There was a discussion among many different parties as to whether the MACT performance standard should be based on TF or GF, and EPA concluded that TF provides the most defensible basis to ensure that the MACT level of control is achieved. However, EPA recognizes the importance of identifying the contribution of gaseous HF to adverse health effects when exposure modeling

is performed in the future. Consequently, the split between particulate and gaseous fluoride from Methods 13A and 13B will continue to be reported, and an attempt will be made to improve the accuracy and consistency of this determination. In addition, EPA is encouraging the development and application of HF CEMs as an improved monitoring tool for HF emissions.

Comments are requested on EPA's understanding of the issue of emission limits based on TF versus GF and on the potential to use back-half measurements from Method 13 to establish GF limits, even after considering the uncertainty described above. Any comments should be accompanied by information and data supporting the commenter's position. If public comments change EPA's perspective on this issue, EPA will announce the availability of data or additional information and will ask for comment on it.

POM. The choices for measuring POM included expensive sampling and analysis to identify and quantify each of the numerous individual compounds that might be present or to develop a reasonable surrogate measure for POM. During the MACT test program jointly funded by the EPA, the State of Washington Department of Ecology, and the industry, sampling and analysis were performed for both individual species and for a surrogate measure. The surrogate approach uses methylene chloride extractables from both the front and back halves of a modified Method 5 procedure. The testing program indicated that methylene chloride extractables provided an adequate surrogate measure of the total POM species at a fraction of the cost associated with speciation. The various parties involved in the rulemaking agreed that proposed Method 315 was the most feasible approach for measuring POM emissions. Consequently, the MACT level of POM control was defined from data for methylene chloride extractables, and Method 315, developed during the test program, is being proposed for POM compliance determinations for the primary aluminum industry.

B. Selection of Emission Limits

Potlines. The data analysis for each median potline, representing the average emission limitation achieved by the top five performing potlines, was based generally on the monthly averages of total fluoride emissions. The data for each of the MACT floor potlines were evaluated to determine the monthly average limit that had been achieved by the potline and to establish the MACT floor level of emission control. There are no monthly averages in the data set that exceed the proposed emission limits. Additional details on the derivation of emission limits and a complete listing of the data are given in the Basis and Purpose Document.

An exception to this procedure was developed for the CWPB3 subcategory (potlines producing very high purity aluminum and using wet scrubbers for the primary emission control system). For the CWPB3 subcategory, the MACT level was determined to be a level of control achieved by upgrading existing emission control equipment and procedures rather than the higher emission levels associated with historical performance. After considering improvements in control to date at these potlines and projected future improvements based on data for emissions and costs provided by the affected facility, the MACT level for CWPB3 was determined to be 2.5 lb TF/ton, which is the level of control that has been required historically for prebake potlines subject to the NSPS.

The POM limits for Soderberg potlines were determined from the data collected during the MACT test program. Because of the absence of valid POM data for the VSS2 subcategory, emissions data from the VSS1 subcategory measured before control by wet roof scrubbers were used. The VSS2 subcategory does not have wet roof scrubbers; consequently, this approach provides MACT emission limits that have been achieved for VSS2 potlines.

Anode Bake Furnaces. For anode bake furnaces, POM limits were developed from the best performing furnaces in the industry with the MACT technology (dry alumina scrubbers), which were the only ones for which EPA had adequate data to determine the MACT level of control. The TF limit for bake furnaces is based on emissions data that were used to determine the MACT level of control, which is equivalent to the level associated with the NSPS. The NSPS limit applies to eight existing anode bake furnaces.

Paste Production. Based on the POM data for paste plants, the EPA concluded that it was not practical to set an emission limit because there were too few data to characterize the control performance that could be achieved by the various types of paste plants and because of uncertainty in the limited existing data. The high level of uncertainty would cause EPA to set a standard that could be impractical on a technological basis. The EPA considered drafting a standard that would require each owner or operator to conduct measurements to set limits on a case-by-case basis; however, the cost of this approach was not considered to be reasonable, especially given the reasonableness and effectiveness of specifying a design and equipment standard. Consequently, the proposed rule requires the installation of a capture system that collects and vents emissions to a dry coke scrubber (or equivalent alternative control device) for all paste production plants.

New Source MACT. The emission limits proposed for new and reconstructed sources are based on the data for the best-controlled potline and anode bake furnace. The limit applies to all new potlines, and no distinction is made for the different subcategories that were developed for existing potlines. As provided in the definition of ''reconstruction'' in the proposed rule, two criteria must be met for a source to be considered reconstructed and subject to new source MACT: (1) All of the major components of the source must be replaced (for example, the major components of a potline include the raw material handling system, reduction cells, superstructure, hooding, ductwork, etc.), and (2) it must be technically and economically feasible for the reconstructed source to meet new source MACT.

The EPA believes that it is unlikely that an existing potline could be reconstructed in such a manner that it would be technically feasible for the potline to meet new source MACT unless the criteria described above are met. For example, the conversion of a Soderberg potline to a prebake potline, while retaining some of the major components of the original potline, is expected to subject the source to emission limits for existing prebake potlines rather than triggering new source MACT. Similarly, if an existing potline is modified to increase capacity (e.g., by adding more reduction cells), the modified potline would continue to be subject to MACT for existing sources.

VI. Public Participation

The EPA seeks full public participation in arriving at its final decisions and strongly encourages comments on all aspects of this proposal from all interested parties. Whenever applicable, full supporting data and detailed analyses should be submitted to allow EPA to make maximum use of the comments. All comments should be directed to the Air and Radiation Docket and Information Center, Docket No. A–92–60 (see **ADDRESSES**). Comments on this notice must be submitted on or before the date specified in ''DATES.''

Commenters wishing to submit proprietary information for

consideration should clearly distinguish such information from other comments and clearly label it ''Confidential Business Information'' (CBI). Submissions containing such proprietary information should be sent directly to the Emission Standards Division CBI Office, U.S. Environmental Protection Agency (MD–13), Research Triangle Park, North Carolina 27711, with a copy of the cover letter directed to the contact person listed above. Confidential business information should not be sent to the public docket. Information covered by such a claim of confidentiality will be disclosed by EPA only to the extent allowed and by the procedures set forth in 40 CFR part 2. If no claim of confidentiality accompanies the submission when it is received by EPA, it may be made available to the public without further notice to the commenter.

VII. Administrative Requirements

A. Docket

The docket is an organized and complete file of all the information considered by EPA in developing this rulemaking. The docket is a dynamic file, because material is added throughout the rulemaking development. 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.)

B. Public Hearing

A public hearing will be held, if requested, to discuss the proposed standards in accordance with section 307(d)(5) of the Act. Persons wishing to attend or to make oral presentations on the proposed standards should contact EPA (see **FOR FURTHER INFORMATION CONTACT**). To provide an opportunity for all who may wish to speak, oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement for the public hearing on or before October 28, 1996. Written statements should be addressed to the Air and Radiation Docket and Information Center (see **ADDRESSES**), and refer to Docket No. A–92–60. A verbatim transcript of the hearing and written statements will be placed in the docket and be available for public inspection and copying, or be mailed upon request, at the Air and Radiation Docket and Information Center (see **ADDRESSES**).

C. Executive Order 12866

Under Executive Order 12866 (58 FR 51735, October 4, 1993), 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.

The OMB has classified this rule as potentially significant and has requested review. Under the current regulatory agenda, this proposed rule will be submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record. Any written EPA response to those comments will be included in the docket listed at the beginning of today's notice under **ADDRESSES**. The docket is available for public inspection at EPA's Air Docket Section, the location of which is listed in the **ADDRESSES** section of this preamble.

D. Enhancing the Intergovernmental Partnership Under Executive Order 12875

In compliance with Executive Order 12875, EPA has involved State, local, and tribal Governments in the development of this proposed rule. These governments are not directly affected by the rule; i.e., they are not required to purchase control systems to meet the requirements of this rule. However, they will be required to implement the rule; e.g., incorporate the rule into permits and enforce the rule. They will collect permit fees that will be used to offset the resources burden of implementing the rule. State representatives and one tribal Government have been included in rule development meetings with EPA under the Share-A-MACT approach. Comments have been solicited from the State and tribal partners and have been carefully considered in the rule development process. In addition, all States are encouraged to comment on this proposed rule during the public comment period, and EPA intends to fully consider these comments in developing of the final rule.

E. Unfunded Mandates Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory 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 the 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 the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

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. In addition, EPA has determined that small governments will not be significantly or

uniquely affected by this proposed rule because it contains no regulatory requirements that apply to such governments or impose obligations upon them. Therefore, this proposed rule is not subject to the requirements of the Unfunded Mandates Reform Act.

F. Regulatory Flexibility Act

Pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), as amended, Pub. L. 104–121, 110 Stat. 847, EPA certifies that this rule will not have a significant economic impact on a substantial number of small businesses and therefore no initial regulatory flexibility analysis under section 604(a) of the Act is required. EPA has determined that none of the 23 facilities in this industry could be classified as a small entity.

G. Paperwork Reduction Act

The information collection requirements in this proposed rule 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 EPA (ICR No. ____), and a copy may be obtained from Sandy Farmer, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136); 401 M Street SW; Washington, DC 20460, or by calling (202) 260–2740.

The proposed 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 this collection of information (averaged over the first 3 years after the effective date of the rule) is estimated to total 54,600 hours for the 23 respondents and to average 2,400 hours per respondent (i.e., per plant). Each respondent would 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.

Comments are requested on the Agency's need for this information, the accuracy of the burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques. Send comments on the ICR to the Director, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136); 401 M Street SW; Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503, marked ''Attention: Desk Office for EPA.'' Include the ICR number in any correspondence. Because OMB is required to make a decision concerning the ICR between 30 and 60 days after September 26, 1996, a comment to OMB is best assured of having its full effect if OMB receives it by October 28, 1996. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

H. Clean Air Act

In accordance with section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. This regulation will be reviewed 8 years from the date of promulgation. This review will include an assessment of such factors as evaluation of the residual health risks, any overlap with other programs, the existence of alternative methods, enforceability, improvements in emission control technology and health data, and the recordkeeping and reporting requirements.

List of Subjects in 40 CFR Part 63

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

Dated: August 22, 1996.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, part 63 of title 40, chapter I, of the Code of Federal Regulations is proposed to be amended as follows:

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

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

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

2. 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 Emission averaging.
63.846 Performance tests.
63.847 Emission monitoring requirements.
63.848 Test methods and procedures.
63.849 Notification, reporting, and recordkeeping requirements.
63.850 Applicability of general provisions.
63.851 Delegation of authority.
63.852–63.859 [Reserved]

Appendix A to Subpart LL of Part 63—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 or existing potline, paste production plant, or anode bake furnace associated with primary aluminum production and located at a major source as defined in § 63.3.

(b) The requirements of this subpart do not apply to the owner or operator

of an 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 MACT determinations established by the applicable regulatory authority pursuant to section 112(l) of the Act.

§ 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 ____ [Insert date of approval] 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'' (22 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) Chapters 3 and 5 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 2986–95, Standard Practice for Evaluation of Air Assay Media by the Monodisperse DOP (Dioctyl 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 (i.e., 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.

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.

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.

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.

Prebake process means a method of primary aluminum reduction that utilizes a baked anode, 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.

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.

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 Method 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 Columbia 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) 1.85 kg/Mg (3.7 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 for the capture and control of 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 ''Industrial Ventilation: A Handbook of Recommended Practice'' (incorporated by reference in § 63.841); 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 a POM emission reduction efficiency of at least 95 percent for plants with continuous mixers and a POM emission reduction efficiency of at least 90 percent for plants with batch mixers.

(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 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 paragraph (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.

§ 63.845 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)(2) of this section.

(1) Monthly average emissions of TF and/or quarterly average emissions of POM, calculated from the total emissions from all potlines over the period divided by the quantity of aluminum produced for the period, from a given number of potlines making up each averaging group, 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).

(2) To determine compliance with the applicable emission limit in Table 1 of this subpart (for TF emissions) and/or Table 2 of this subpart (for POM emissions), the owner or operator shall determine the monthly average emissions (in lb/ton) from all potlines from at least three runs each month for TF secondary emissions and/or the quarterly average emissions from at least one run each month for POM emissions.

TABLE 1.—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	2.0	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.—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	3.4	3.2	3.2	3.1	3.1	3.0	3.0

The owner or operator shall combine the results of secondary TF monthly average emissions with the TF results for the primary control system and/or the results of quarterly average POM 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 §§ 63.846 and 63.848.

TABLE 3.—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

(d) *Implementation Plan.* Unless an operating permit application has been submitted, 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 applicable compliance date.

(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) Results of an initial performance test conducted according to the procedures and methods in §§ 63.846 and 63.848 to determine the TF or POM emissions and emission reduction from each source in the averaging group, and supporting documentation (all equations, calculations, procedures, measurement data, and quality assurance/quality control procedures);

(v) The operating parameters to be monitored for each control system or device and the operating limits established according to § 63.846(g)(1);

(vi) If the owner or operator requests to monitor an alternative operating parameter pursuant to § 63.847(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 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 shutdown; or

(iv) The inclusion of any periods of startup, shutdown, or malfunction, as described in the Startup, Shutdown, and Malfunction Plan required by § 63.6(e)(3), in the emission calculations for the Implementation Plan.

(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.

§ 63.846 Performance tests.

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

(1) ____ [Insert date 2 years following the effective date of the final rule], for an owner or operator of an existing plant or source;

(2) ____ [Insert date 3 years following the effective date of the final rule], 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) ____ [Insert date 4 years following the effective date of the final rule], 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) *Potlines and anode bake furnaces.* During the first month following the compliance date, the owner or operator shall conduct an initial performance test to determine and demonstrate compliance with the applicable TF and POM emission limits for each new or existing potline and anode bake furnace. The owner or operator shall conduct the initial performance test (and subsequent performance tests) according to the requirements in § 63.7 and in this section.

(c) *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)(2). The test plan must include procedures for conducting the initial performance test and for subsequent performance tests required in § 63.847 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;

(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.

(d) *Initial performance test.* Following approval of the site-specific test plan, the owner or operator shall conduct an initial performance test 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 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 63.845.

(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 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 63.845.

(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 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 stack(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 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 63.845.

(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 2:

$$E_p = \frac{\left[\left(C_{s1} \times Q_{sd}\right)_1 + \left(C_{s2} \times Q_{sd}\right)_2\right]}{(P \times K)} \qquad \text{(Equation 2)}$$

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, 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 2, 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 3,

$$E_b = \frac{(C_s \times Q_{sd})}{(P_b \times K)} \qquad \text{(Equation 3)}$$

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 3,

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 § 63.847(j).

(6) Determine the aluminum production rate (P) by dividing 720 hours into the weight of aluminum tapped from the potline during a period of 30 days before and including the final run of a performance test.

(7) Determine the rate of green anode material introduced into the furnace by dividing the number of operating hours into the weight of green anode material used during an operating cycle.

(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) *Parameter operating range for control devices.* The owner or operator shall determine the operating limits for each of the control devices that is to be monitored as described in § 63.847(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 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 parameters to be monitored and operating limits for the capture and control devices in the application for a part 70 operating permit (or an administrative amendment to the part 70 operating permit if a permit has already been issued).

(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.

§ 63.847 Emission monitoring requirements.

(a) *TF emissions from potlines.* Using the procedures in § 63.846 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.

(b) *POM emissions from existing Soderberg potlines.* Using the procedures in § 63.846 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.

(c) *TF and POM emissions from anode bake furnaces.* Using the procedures in § 63.846 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, the owner or operator may perform a monthly performance test for one potline to represent a similar potline(s). A similar potline must be in the same operating condition, have the same cell and hooding design, share the same work practices, and have the same or better level of emission control performance than the potline tested by the applicable test methods.

(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 emissions 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) The following methods are approved alternatives for the monitoring of TF secondary emissions:

(i) An HF continuous emission monitoring system; and

(ii) The Alcan cassette sampling system.

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

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

(i) Use the highest value associated with a simultaneous run by the applicable test methods 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) 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 of the correlated value or the highest value that does not exceed the applicable emission limit and all supporting documentation to the applicable regulatory authority for approval along with a request for a part 70 operating permit (or an administrative amendment to the part 70 operating permit if a permit has already been issued).

(6) Following approval 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 equivalent alternative emission limit for each similar potline rather than the applicable TF emission limit.

(e) *Reduced sampling frequency.* The owner or operator may submit a written request to the applicable regulatory authority to establish an alternative testing requirement that requires less frequent testing for TF and POM emissions from potlines or anode bake furnaces.

(1) In the request, the owner or operator shall provide information and data demonstrating, to the satisfaction of the applicable regulatory authority, that the emissions from these sources have low variability during normal operations.

(2) The regulatory authority may evaluate the alternative testing requirement 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.

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

(4) The applicable regulatory authority shall publish the approved alternative monitoring requirement in the Federal Register.

(5) 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.

(6) If emissions in excess of the applicable TF or POM limit occur, the approved alternative sampling frequency is no longer in effect and the owner or operator shall immediately return to the monthly sampling schedule required by paragraph (a), (b), or (c) of this section until another request for an alternative sampling frequency is approved by the applicable regulatory authority.

(f) *Monitoring devices.* The owner or operator shall install, operate, calibrate, and maintain a monitoring device(s) for each emission control system as follows:

(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 § 63.846(g); 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 6 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 during an operating cycle. 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.* All monitoring devices required by this section must be certified by the manufacturer to meet the accuracy requirements specified by the applicable regulatory authority in the part 70 operating permit 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.

§ 63.848 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 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 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 by an approved alternative method.

(c) 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 alternative method results are correlated to the sampling results from simultaneously sampling using Methods 13 and 14 in appendix A to part 60 of this chapter and the alternative method for TF or Method 315 in appendix A to this part, Method 14 in appendix A to part 60 of this chapter, and the alternative method for POM.

§ 63.849 Notification, reporting, and recordkeeping requirements.

(a) *Notifications.* As required by § 63.9 (b) through (d), 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 special compliance obligations;

(6) Notification of performance test;

(7) Notification of compliance status. 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 63.845; and

(8) Notification for continuous emission monitor.

(b) *Performance test report.* As required by § 63.10(d)(2), 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)(7) of this section.

(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. In addition to the information required in § 63.6(e)(2), 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 § 63.846(g), 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 § 63.847(g), or if a problem is detected during the daily inspection of a wet roof scrubber for potline secondary emission control required in § 63.847(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 off site;

(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) Production rate of green anode material placed in the anode bake furnace for each operating cycle;

(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 the performance of similar potlines is the same 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 the daily inspection of a potline with wet roof scrubbers for secondary emission control has been performed as required in § 63.847(f)(5)(ii), including the results of each inspection;

(xi) Records, such as a checklist or the equivalent, demonstrating the daily visual inspection of the exhaust stack for each control device has been performed as required in § 63.847(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 § 63.846(g) were exceeded, when visible emissions indicating abnormal operation were observed from a control device stack during a daily inspection required under § 63.847(g), or when a problem was detected during the daily inspection of a wet roof scrubber for potline secondary control required in § 63.847(f)(5)(ii); and

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

§ 63.850 Applicability of general provisions.

(a) 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.

§ 63.851 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 112(d) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authorities which will not be delegated to States: No authorities are retained by the Administrator.

(c) Each State may elect to exclude the provisions of § 63.845, Emission Averaging, from their permitting program and the operating permits issued under that program.

§ 63.852–63.859 [Reserved]

Appendix A to Subpart LL of Part 63—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	No	Subpart LL does not require COMS, VE or opacity standards.
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(f)	Notification of VE or Opacity Test	No	Subpart LL does not include VE/opacity standard.
63.9(g)	Additional CMS Notification	No	
63.10(d)(3)	VE/Opacity Observations	No	Subpart LL does not require COM or include VE/opacity standard.
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.

3. 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

1.0 Scope and Application

1.1 Analyte. 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 as Method 5 for PM in 40 CFR part 60, appendix A since the procedures are similar for PM.

2.0 Summary of Method

Particulate matter (PM) and MCEM is withdrawn isokinetically from the source. PM is collected on a glass fiber filter maintained at a temperature in the range of l20 ± 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

$_n$=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...n), 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)]/[(°K) (g-mole)] {21.85 [(in. Hg) (ft^3)]/[(°R) (lb-mole)]}.

T_m=Absolute average DGM temperature (see Figure 5–2 of Method 5, 40 CFR part 60, appendix A), °K (°R).

T_s=Absolute average stack gas temperature (see Figure 5–2 of Method 5, 40 CFR part 60, appendix A), °K(°R).

T_{std}=Standard absolute temperature, 293°K (528°R).

V_a=Volume of acetone blank, ml.

V_{aw}=Volume of acetone used in wash, ml.

V_t=Volume of methylene chloride blank, ml.

V_{tw}=Volume of methylene chloride used in wash, ml.

V_{lc}=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.

ΔH=Average pressure differential across the orifice meter (see Figure 5–2 of Method 5, 40 CFR part 60, appendix A), mm H_20 (in. H_30).

ρa=Density of acetone, 785.1 mg/ml (or see label on bottle).

ρw=Density of water, 0.9982 g/ml (0.002201 lb/ml).

ρt=Density of methylene chloride, 1316.8 mg/ml (or see label on bottle).

θ=Total sampling time, min.

θ_l=Sampling time interval, from the beginning of a run until the first component change, min.

θ_i=Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, min.

θ_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.

l00=Conversion to percent.

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 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 sampling train consists of the following components:

6.1.1 *Probe nozzle.*

6.1.1.1 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.

6.1.1.2 A range of nozzle sizes suitable for isokinetic sampling should be available. Typical nozzle sizes range from 0.32 to 1.27 cm (⅛ to ½ in.) inside diameter (ID) in increments of 0.16 cm (1⁄16 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.

6.1.2 *Probe liner.*

6.1.2.1 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. Since the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD–0581 and utilizing the calibration curves of APTD–0576 (or calibrated according to the procedure outlined in APTD–0576) will be considered acceptable.

6.1.2.2 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).

6.1.3 *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.

6.1.4 *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.

6.1.5 *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).

6.1.6 *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–058l may be used.

6.1.7 *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 (½ in.) ID glass tube extending to about 1.3 cm (½ 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 4.1.3 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 purposes.

6.1.8 *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. Sampling trains utilizing 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.

6.1.9 *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.

6.1.10 *Gas density determination equipment.* Temperature sensor and pressure gauge, as described in section 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 needed:

6.2.1 *Probe-liner and probe-nozzle brushes.* Nylon 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 wash bottles may be used; however this may introduce a positive bias due to contamination from the bottle. It is recommended that acetone not be stored in polyethylene 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 1000-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 *Analysis.* For analysis, the following equipment is needed:

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 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 *Allihin tubes.* 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. Approximately 60 mm inside diameter and 18 mm deep.

7.0 Reagents.

7.1 *Sampling.* The reagents used in sampling are as follows:

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 2986–95 (Reapproved 1995) (incorporated by reference in § 63.841). Test data from the supplier's quality control program are sufficient for this purpose. In sources containing S_{02} or S_{03}, the filter material must be of a type that is unreactive to S_{02} or S_{03}. 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.

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 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 their 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 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: At least one vendor quotes <1 mg/l for Environmental Analysis Solvents grade methylene chloride.

7.3 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 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.

8.1 Sampling.

8.1.1 *Pretest preparation.* It is suggested that sampling equipment be maintained according to the procedures described in APTD–0576.

8.1.1.1 Weigh several 200- to 300-g portions of silica gel in air-tight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container, on each 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.

8.1.1.2 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.

8.1.1.3 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 a period greater 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.

8.1.2 *Preliminary determinations.*

8.1.2.1 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 for the purpose of making 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.

8.1.2.2 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).

8.1.2.3 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.

8.1.2.4 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.

8.1.2.5 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 avoid timekeeping errors.

8.1.2.6 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.

8.1.3 *Preparation of sampling train.*

8.1.3.1 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.

8.1.3.2 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.

8.1.3.3 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.

8.1.3.4 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.

8.1.3.5 Place crushed ice around the impingers.

8.1.4 *Leak-check procedures.*

8.1.4.1 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.

8.1.4.1.1 After the sampling train has been assembled, turn on and set the filter and probe heating systems at 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.

8.1.4.1.2 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 8.1.4.1.1 of this method). Then connect the probe to the train, and 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^3/min (0.02 cfm), whichever is less, are unacceptable.

8.1.4.1.3 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.

8.1.4.1.4 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.

8.1.4.2 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 8.1.4.1 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^3/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 8.1.4.1 of this method should be used.

8.1.4.3 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 8.1.4.1 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^3/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 12.3 of this method, or void the sampling run.

8.1.5 *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±14° C (248 ± 25° F), or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator.

8.1.5.1 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.

8.1.5.2 Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap, 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 equal to 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.

8.1.5.3 When the stack is under significant negative pressure (height of impinger stem), take care to 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.

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

8.1.5.5 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.

8.1.5.6 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.

8.1.5.7 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 8.1.4.2 of this method). The total PM weight shall include the summation of the filter assembly catches.

8.1.5.8 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.

8.1.5.9 Note that 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.

8.1.5.10 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 8.1.4.3 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.

8.1.6 *Calculation of percent isokinetic.* Calculate percent isokinetic (see calculations, section 12.11 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.

8.2 Sample recovery.

8.2.1 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.

8.2.1.1 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.

8.2.1.2 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. Either ground-glass stoppers, plastic caps, or serum caps may be used to close these openings.

8.2.1.3 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.

8.2.1.4 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.

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

8.2.1.5.1 *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.

8.2.1.5.2 *Container No. 2.*

8.2.1.5.2.1 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.

8.2.1.5.2.2 Perform the acetone rinse as follows: 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. Brush and rinse the inside parts of the Swagelok fitting with acetone in a similar way until no visible particles remain.

8.2.1.5.2.3 Rinse the probe liner with acetone by tilting and rotating the probe while squirting acetone into its upper end so that all inside surfaces will be 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 underneath the lower end of the probe, and catch any acetone and particulate matter 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 prescribed manner at least six times since metal probes have small crevices in which particulate matter 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 in this section. It is recommended that two people clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

8.2.1.5.2.4 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).

8.2.1.5.2.5 After rinsing the nozzle, probe and front half of the filter holder with acetone, the entire procedure is to be repeated with methylene chloride and saved in a separate Container No. 2M.

8.2.1.5.2.6 After acetone and methylene chloride washings and particulate matter have been collected in the proper sample container, tighten the lid on the sample container 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 occurred during transport. Label each container to identify clearly its contents.

8.2.1.5.3 *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. 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 11.3 of this method.

8.2.1.5.4 *Impinger water.* Treat the impingers as follows:

8.2.1.5.4.1 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.

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

8.2.1.5.4.3 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 0.5 gram.

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.

8.3 Transport. Whenever possible, containers should be shipped in such a way that they remain upright at all times.

9.0 Quality Control

9.1 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.

9.1.1 *Meter orifice check.* Using the calibration data obtained during the calibration procedure described in section 5.3 of this method, determine the $\Delta H_@$ for the metering system orifice. The $\Delta H_@$ is the orifice pressure differential in units of in. H_2O that correlates to 0.75 cfm of air at 528°R and 29.92 in. Hg. The $\Delta H_@$ is calculated as follows:

$$\Delta H_@ = 0.0319\ \Delta H \frac{T_m \Theta^2}{P_{bar} Y^2 V_m^2}$$

where

ΔH=Average pressure differential across the orifice meter, in. H_2O;
T_m=Absolute average DGM temperature, °R;
P_{bar}=Barometric pressure, in. Hg;
θ=Total sampling time, min;
Y=DGM calibration factor, dimensionless;
V_m=Volume of gas sample as measured by DGM, dcf;
0.0319=(0.0567 in. Hg/°R) (0.75 cfm)^2.

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 $\Delta H_@$ 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.

Compare the Y_c value with the dry gas meter calibration factor Y to determine that: $0.97\ Y<Y_c< 1.03Y$. If the Y_c value is not within this range, the volume metering system should be investigated before beginning the test.

9.2 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 7.2 of this method.

9.3 Miscellaneous quality control measures. [Reserved]

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/rev (1 ft^3/rev). A spirometer of 400 liters (14 ft^3) 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^3 (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 $\Delta H_@$, 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 $\Delta H_@$ 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^3/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^3/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, the test series shall either 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.

Note: The probe heating system shall be calibrated before its initial use in the field. 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 temperatures monitoring capabilities do not require calibration.

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 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 5–4 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 one minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, must be corrected.

10.7 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. Handle each sample container as follows:

11.1.1 *Container No. 1.*

11.1.1.1 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).

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			

Moisture Analysis

	Final volume (mg)	Initial volume (mg)	Liquid collected (mg)
Impingers	Note 1	Note 1	
Silica gel			
Total			

Note 1: Convert volume of water to weight by multiplying by the density of water (1 g/ml).

MCEM Analysis

Container No.	Final weight (mg)	Tare of aluminum dish (mg)	Weight gain	Acetone wash volume (ml)	Methylene chloride wash volume (ml)
1					
2+2M					
3W					
3S					
Total			Σm_{total}	Σv_{aw}	Σv_{tw}

Less acetone wash blank (mg) (not to exceed 1 mg/l of acetone used)	$w_a = c_a \rho_a \Sigma v_{aw}$
Less methylene chloride wash blank (mg) (not to exceed 1.5 mg/l of methylene chloride used).	$w_t = c_t \rho_t \Sigma v_{tw}$
Less filter blank (mg) (not to exceed . . . mg/filter)	F_b
MCEM weight (mg)	$m_{MCEOM} = \Sigma m_{total} - w_a - w_t - f_b$

If a third weighing is required and it agrees within ±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 3 weighings are required, note this in the results for the subsequent MCEM results.

11.1.1.2 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 Allihin tube. 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 10–20 mls of methylene chloride, decant into the Allihin tube 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. Re-weigh 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.

11.1.2 *Container No. 2.*

11.1.2.1 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 ±1 ml or gravimetrically to ±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.

11.1.2.2 MCEM analysis. Add 25 mls of 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 11.1.1.2 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 Allihin tube twice between samples with 5 mls of solvent using pressure filtration. After the second rinse, continue the flow of air until the glass frit is completely dry. Clean the Allihin tubes thoroughly after filtering 5 or 6 samples.

11.1.3 *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.

11.1.4 *Container 3W (impinger water).*

11.1.4.1 MCEM analysis. Transfer the solution into a 1000 ml separatory funnel quantitatively with methylene chloride washes. Add enough solvent to total approximately 50 mls, if necessary. Shake the funnel for one minute, allow the phases to separate and drain the solvent layer into a 250 ml beaker. Repeat the extraction twice again. 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. Re-weigh the dish after a 30-minute equilibration in the balance room and determine the weight to the nearest 0.1 mg.

11.1.5 *Container 3S (solvent).*

11.1.5.1 MCEM analysis. Transfer the mixed solvent to 250 ml beaker(s). Evaporate and weigh following the procedures detailed for container 3W in section 11.1.4 of this method.

11.1.6 *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 8.4.4.1 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 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).

12.3 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.

$$V = V_m Y \frac{T_{std}\left(P_{bar} + \frac{\Delta H}{13.6}\right)}{T_m P_{std}} = V = K_1 V_m Y \frac{P_{bar} + \left(\frac{\Delta H}{13.6}\right)}{T_m} \qquad (\text{Eq. } 315-1)$$

where

K_1=0.3858°K/mm Hg for metric units;
=17.64°R/in. Hg for English units.

Note: Equation 315–1 can be used as written unless 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:

$$\left[V_m - \left(L_p - L_a\right)\theta\right]$$

(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:

$$\left[V_m - \left(L_1 - L_a\right)\Theta_1 - \sum_{i=2}^{n}\left(L_i - L_a\right)\Theta_i - \left(L_p - L_a\right)\Theta_p\right]$$

and substitute only for those leakage rates (L_i or L_p) which exceed L_a.

12.4 Volume of water vapor.

$$V_{w(std)} = V_{lc}\frac{\rho_w R T_{std}}{M_w P_{std}} = K_2 V_{lc} \qquad (\text{Eq. } 315-2)$$

where

K_2=0.001333 m^3/ml for metric units;
=0.04706 ft^3/ml for English units.

12.5 Moisture content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \qquad (\text{Eq. } 315-3)$$

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 ±1°C (2°F).

12.6 Acetone blank concentration.

$$C_a = \frac{M_a}{V_a \rho_a} \qquad (\text{Eq. } 315-4)$$

12.7 Acetone wash blank.

$$W_a = C_a V_{aw} \rho_a \qquad (\text{Eq. } 315-5)$$

12.8 Total particulate weight. Determine the total particulate matter 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 4.1.5 of this method to assist in calculation of results involving two or more filter assemblies or two or more sampling trains.

12.9 Particulate concentration.

$$c_s = K_3\, m_n / V_{m(std)} \qquad (\text{Eq. } 315-6)$$

where

K=0.001 g/mg for metric units;
=0.0154 gr/mg for English units.

12.10 Conversion factors. Use the factors in Table 315–1 to convert from English to metric units.

12.11 Isokinetic variation.

12.11.1 *Calculation from raw data.*

$$I = \frac{100\, T_s\left[K_4 V_{lc} + \left(\frac{V_m Y}{T_m}\right)\left(P_{bar} + \frac{\Delta H}{13.6}\right)\right]}{60\, \Theta\, v_s P_s A_n} \qquad (\text{Eq. } 315-7)$$

where

K_4=0.003454 [(mm Hg)(m^3)]/[(ml) (°K)] for metric units;

=0.002669 [(in. H g)(ft^3)]/[(ml) (°R)] for English units.

12.11.2 *Calculation from intermediate values.*

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} v_s \Theta A_n P_s 60 \left(1 - B_{ws}\right)} = K_5 \frac{T_s V_{m(std)}}{P_s v_s A_n \Theta \left(1 - B_{ws}\right)} \qquad \text{(Eq. 315-8)}$$

where

K_5=4.320 for metric units;

=0.09450 for English units.

TABLE 315–1.—CONVERSION FACTORS

From	To	Multiply by
ft^3	m^3	0.02832
gr	mg	64.80004
gr/ft^3	mg/m^3	2288.4
gr	lb	1.429×10^{-4}
mg	g	0.001

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.

$$m_{mcem} = \Sigma m_{total} - w_a - w_t - f_b$$

13.0 Method Performances

13.1 Acceptable results. If 90 percent ≤ I ≤ 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.

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 5.3 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^3/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^3/rev) and 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_2O (4 in. H_2O) 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_w, and the run time, q. Calculate the DGM coefficient, Y_{ds}, for each run. These calculations are as follows:

$$Q = K_1 \frac{P_{bar} V_w}{\left(t_w + t_{std}\right) \Theta}$$

$$Y_{ds} = \frac{V_w \left(t_{ds} + t_{std}\right) P_{bar}}{V_{ds} \left(t_w + t_{std}\right) \left(P_{bar} + \frac{\Delta p}{13.6}\right)}$$

where

K_1=0.3858 for international system of units (SI); 17.64 for English units;

V_w=Wet test meter volume, liter (ft^3);

V_{ds}=Dry gas meter volume, liter (ft^3);

t_{ds}=Average dry gas meter temperature, °C (°F);

t_{std}=273° C for SI units; 460° F for English units;

t_w=Average wet test meter temperature, °C (°F);

P_{bar}=Barometric pressure, mm Hg (in. Hg);

Δp=Dry gas meter inlet differential pressure, mm H_2O (in. H_2O);

θ=Run time, min.

16.1.1.5 Compare the three Y_{ds} 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_{ds} values at each flow rate resulting in five average meter coefficients, Y_{ds}.

16.1.1.6 Prepare a curve of meter coefficient, Y_{ds}, versus flow rate, Q, for the DGM. This curve shall be used as a reference when the meter is used to calibrate other DGM's 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.

16.2 Critical orifices as calibration standards. Critical orifices may be used as calibration standards in place of the wet test meter specified in section 5.3 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 which have 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 this method. 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 315–2 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- by 20-mm sleeve type, into a ½ inch 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 2.1.8 of this method to calibrate the critical orifices. Other schemes may be used, subject to the approval of the Administrator.

TABLE 315–2.—APPROXIMATE FLOW RATES

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	15/10.2	10.48

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 by-pass 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 0-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 this method. 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 by-pass 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 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 2.1.9 of this method. Record the barometric pressure, P_{bar}, 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 315–9.

$$K' = \frac{K_1 V_m Y \left(P_{bar} + \frac{\Delta H}{13.6} \right) T_{amb}^{\frac{1}{2}}}{P_{bar} T_m \Theta} \qquad (\text{Eq. } 315-9)$$

where

K′=Critical orifice coefficient, [m³)(°K)½]/[(mm Hg)(min)] {[(ft³)(°R)½)]/[(in. Hg)(min)]};

T_{amb}=Absolute ambient temperature, °K (°R).

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:

$$V_{m(std)} = K_1 V_m \left[P_{bar} + (\Delta H/13.6) \right] / T_m \qquad (\text{Eq. } 315-10)$$

$$V_{cr(std)} = K' \left(P_{bar} \Theta \right) / T_{amb}^{\frac{1}{2}} \qquad (\text{Eq. } 315-11)$$

$$Y = V_{cr(std)} / V_{m(std)} \qquad \text{(Eq. 315-12)}$$

where

$V_{cr(std)}$=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.

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