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ENVIRONMENTAL PROTECTION AGENCY**40 CFR Part 60****[AD-FRL-2741-6]****Standards of Performance for New Stationary Sources; Wool Fiberglass Insulation Manufacturing****AGENCY:** Environmental Protection Agency (EPA).**ACTION:** Final rule.

SUMMARY: A standard of performance for wool fiberglass insulation manufacturing was proposed in the *Federal Register* on February 7, 1984 (49 FR 4590). This action promulgates the standard of performance for wool fiberglass insulation manufacturing and Reference Method 5E. The standard applies to new, modified, and reconstructed wool fiberglass insulation manufacturing lines for which construction was commenced after February 7, 1984. The standard implements section 111 of the Clean Air Act and is based on a determination that fiberglass manufacturing causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. The intended effect of the standard is to require all new, modified, and reconstructed wool fiberglass insulation manufacturing lines to control emissions to the level achievable through use of the best demonstrated system of continuous emission reduction, considering costs, nonair quality health and environmental impacts, and energy requirements.

EFFECTIVE DATE: February 25, 1985.

Under section 307(b)(1) of the Clean Air Act, judicial review of the actions taken by this notice is available *only* by the filing of a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of today's publication of this rule. Under section 307(b)(2) of the Clean Air Act, the requirements that are the subject of today's notice may not be challenged later in civil or criminal proceedings initiated to enforce these requirements.

Incorporation by Reference. The incorporation by reference of certain publications in these standards will be approved by the Director of the Federal Register as of the date of publication of the final rule.

ADDRESSES: *Background Information Document.* No background information document (BID) for the promulgated standard has been prepared. This preamble contains (1) a summary of the public comments made on the proposed

standard along with the responses to the comments, and (2) the final Environmental Impact Statement that summarizes the impact of the standard.

Docket. Docket number A-80-27, containing information considered in development of the promulgated standard, is available for public inspection between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section (LE-131), West Tower Lobby, Gallery 1, 401 M Street, SW., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Mr. Doug Bell or Ms. Shirley Tabler, (919) 541-5624, Standards Development Branch, concerning the standard and Mr. Kenneth Durkee, (919) 541-5595, Industrial Studies Branch, concerning technical aspects of the industry. The address for both parties is Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

SUPPLEMENTARY INFORMATION:**The Standard**

Standards of performance for new sources established under section 111 of the Clean Air Act reflect:

... application of the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, any nonair quality health and environmental impact and energy requirements) the Administrator determined has been adequately demonstrated [Section 111(a)(1)].

For convenience, this will be referred to as "best demonstrated technology" or "BDT."

The promulgated standard would limit particulate emissions from new, modified, or reconstructed wool fiberglass insulation manufacturing lines that use the rotary spin forming process. The specific unit to which the standard applies, referred to as the "affected facility," is the manufacturing line. The manufacturing line is defined to include the equipment comprising the forming section, where molten glass is fiberized and a fiberglass mat is formed; the curing section, where the binder resin in the mat is thermally "set;" and the cooling section, where the mat is cooled.

Construction, reconstruction, or modification of the wool fiberglass insulation manufacturing line must have commenced after February 7, 1984 (date of proposal) for the standard to be applicable. Existing facilities are not subject to the standard unless modified or reconstructed as defined in 40 CFR 60.14 or 60.15.

The particulate mass emission limit is 5.5 kg/Mg (11.0 lb/ton) of molten glass used to manufacture the product. This limit is based on the demonstrated performance of a wet electrostatic precipitator (ESP) preceded by water sprays and a low-pressure-drop wet scrubber to control total particulate emissions from the manufacturing line. This limit would apply during the production of any wool fiberglass insulation product.

A wet ESP preceded by water sprays and a low-pressure-drop wet scrubber was determined to be BDT for this industry based on an analysis of emission test results, costs, and environmental and energy impacts. However, this is a standard of performance and does not require the use of specific control equipment. Any control technique that would meet the emission limit could be used.

If a wet control device (wet ESP or wet scrubber) is used by an owner or operator of an affected facility to meet the particulate emission limit, the standard would require measurement and recording of certain control device operating parameters to indicate when maintenance of the control device is required. For wet ESP's the owner or operator would be required to measure and record the following: voltage and amperage in each electrical field and wash water flow rate. In addition, daily determination of the total solids content of the wash water entering the ESP would be required. For wet scrubbers, the owner or operator of an affected facility would be required to measure and record the operating pressure drop and scrubbing liquid flow rate. The owner or operator of an affected facility who uses a wet control device to meet the emission limit would be required to submit semiannual reports to the EPA of any monitoring data that are less than 70 percent of the lowest value or greater than 130 percent of the highest value of each operating parameter recorded during the most recent performance test. The owner or operator would also be required to calibrate each monitoring device on a quarterly basis and submit semiannually documentation of, and a report of corrective maintenance required as a result of, quarterly calibrations of monitoring devices. These data and the performance test data collected in determining a facility's compliance with the standard must be retained at the source for a period of 2 years.

The test method for determining compliance with the standard for particulate emissions will be Reference Method 5E. Reference Method 5E is a

variation of Reference Method 5 that determines the amount of material caught in the front half (nozzle, probe, and filter) of an EPA Reference Method 5 sampling train plus the amount of condensed particulate material caught in the impinger train as determined by measuring total organic carbon (TOC) using a TOC analyzer. Reference Method 5E will be used for determining compliance because it reflects the performance of BDT for this industry more accurately than does Reference Method 5. Reference Method 5E is being promulgated along with the standard.

Since proposal, a minor technical adjustment to ensure that the sample collection portion of the sampling train is free of organic solvent before sampling has been incorporated into Method 5E. The method now notes that after rinsing with an organic solvent, the sampling apparatus must be flushed with water or dilute NaOH or, for nonwater soluble solvents, the apparatus must be dried in an oven.

Summary of Environmental, Energy, and Economic Impacts

There has been no change in the environmental, energy, economic, or urban and community impacts since proposal. These impacts are discussed in detail in Chapters 7, 8, and 9 of "Wool Fiberglass Insulation Manufacturing—Background Information for Proposed Standards," (EPA-450/3-83-022a) (BID).

The environmental, energy, and economic impacts of the standard were estimated based on conditions that would exist in the absence of the standard. These conditions are referred to as the baseline. The estimates of these impacts are presented below for a "typical" new wool fiberglass insulation manufacturing plant that installs wet ESP controls to meet the standard. The results of the impact analysis for facilities other than the typical new plant may be found in the BID and in docket item II-B-50 of docket A-80-27. Also presented below are the industry-wide impacts in the fifth year after the standard is proposed. This information is included to provide an indication of the longer term impacts of the standard but is not meant to imply that the benefits or impacts of the standard are limited to 5 years.

Environmental Impacts

A typical (medium size) manufacturing plant contains three production lines and produces 104,300 Mg (115,000 tons/yr) of insulation per year. This plant would emit 1,650 Mg/yr (1,820 tons) of particulate matter if it were controlled to the baseline level, which is assumed to be the degree of

control required by a typical State implementation plan (SIP).

Implementation of the proposed standard would reduce particulate emissions from the typical plant by about 1,075 Mg/yr (1,185 tons/yr), or 65 percent, to about 575 Mg/yr (635 tons/yr).

It is projected that the equivalent of 3 new medium-size wool fiberglass insulation manufacturing plants (each containing 3 production lines) and 17 new medium-size production line additions or replacements at existing plants will be constructed in the 5-year period from 1984 to 1989. In the absence of the standard, it is estimated that new facilities constructed from 1984 to 1989 and controlled to the level required by a typical SIP would emit approximately 14,200 Mg (15,660 tons) of particulate matter in the fifth year (1989). Implementation of the standard would reduce particulate emissions from these wool fiberglass insulation manufacturing facilities by approximately 9,250 Mg (10,200 tons) to 4,950 Mg (5,460 tons) in 1989.

For a typical plant, implementation of the proposed standard would increase solid waste production by approximately 1,080 Mg/yr (1,190 tons/yr). Implementation of the standard would result in an increase in solid waste production nationwide over baseline levels of approximately 9,240 Mg (10,190 tons) in the fifth year after the standard is proposed. This waste is not hazardous and would be deposited in landfills.

No impact on water quality is expected from implementation of the standard because standards of performance for new sources (as determined under the Clean Water Act) allow no discharge of process wastewaters to navigable waterways (40 CFR Part 426). The costs of treating wastewater from the air pollution control equipment are included in the capital and annualized costs of pollution control equipment described below.

A review of the environmental impacts discussed in the proposal BID indicated that no changes were necessary, and therefore, the impacts remain unchanged since proposal. This review constitutes the final Environmental Impact Statement.

Energy Impacts

For a typical plant, implementation of the proposed standard would decrease energy demand by approximately 114 terajoules per year (TJ/yr) (1.1×10^{11} Btu/yr) relative to a plant controlled to baseline levels. Implementation of the standard would decrease the national energy demand below baseline levels by

approximately 1,300 TJ (1.2×10^{12} Btu) in the fifth year after proposal. This decrease in energy demand occurs because baseline control technology, which includes the use of thermal incineration, requires more energy than does the technology on which the standard is based.

Economic Impacts

The capital and annualized costs for air pollution controls for a typical plant required to meet a typical SIP emission level are \$3.1 million and \$2.0 million, respectively. The total capital and annualized costs for air pollution controls that would be incurred by the same plant to comply with the standard would be \$7.7 million and \$2.5 million, respectively. Therefore, compliance with the standard would require an increase in capital expenditures for control equipment of \$4.6 million and an increase in annualized control costs of \$0.5 million for a typical wool fiberglass insulation manufacturing plant. The total capital and annualized costs of control equipment used to meet the standard would represent 9 percent and 3 percent, respectively, of the initial capital and annualized costs of the manufacturing plant. Capital costs for industry compliance with the standard over the first 5 years would be \$41.4 million above the baseline capital costs. Fifth-year annualized costs for industry compliance would be \$3.1 million above baseline annualized costs. These costs are based on achieving the standard with only the use of add-on control devices. However, many facilities are expected to use process modifications to achieve or help achieve the standard. Thus, the estimated economic impacts are overstated, and most facilities are expected to incur lower costs to achieve the standard.

The additional emission control costs of the standard would not be expected to have any impact on expansion in the wool fiberglass insulation manufacturing industry because it is expected that firms would pass all costs associated with implementation of the standard through to the consumer. Assuming the costs of the standard are passed through, it is estimated that the price of wool fiberglass insulation could increase by 0.63 percent as a result of implementation of the standard. This increase would raise the estimated cost to insulate a 139 m² (1,500 ft²) wood frame house by approximately \$14.

Other Considerations

The regulatory alternatives investigated during development of the wool fiberglass insulation

manufacturing NSPS are discussed in detail in Chapter 6 of the proposal BID. These regulatory alternatives reflect the different levels of emission control from which one alternative is selected that represents the best demonstrated technology, considering costs, nonair quality health, and environmental and economic impacts, for the wool fiberglass insulation manufacturing industry. No changes have been made to these alternatives since proposal. The regulatory alternatives would not preclude the development of future control options nor would they curtail any beneficial use of resources. The alternatives do not involve short-term environmental gains at the expense of long-term environmental losses, and the alternatives yield successively greater short- and long-term environmental benefits. Further, none of the alternatives result in the irreversible and irretrievable commitment of resources. No change in these considerations has resulted since proposal of the standard.

Public Participation

Prior to proposal of the standards, interested parties were advised by public notice in the *Federal Register* (48 FR 12825, March 28, 1983) of a meeting of the National Air Pollution Control Techniques Advisory Committee to discuss the Wool Fiberglass Insulation Manufacturing NSPS recommended for proposal. This meeting was held on April 26, 1983. The meeting was open to the public and each attendee was given an opportunity to comment on the standards recommended for proposal. The proposed standards were published in the *Federal Register* on February 7, 1984 (49 FR 4590). The preamble to the proposed standards discussed the availability of the BID, "Wool Fiberglass Insulation Manufacturing—Background Information for the Proposed Standards," EPA-450/3-83-22a, which described in detail the regulatory alternatives considered and the impacts of those alternatives. Public comments were solicited at the time of proposal and, when requested, copies of the BID were distributed to interested parties. No public hearing was held because no hearing was requested. The public comment period was from February 7, 1984, to April 23, 1984.

One written comment, which addressed several issues, was received from the New Jersey Department of Environmental Protection (docket entry IV-D-1). All of the issues raised in the comment were carefully considered; however, no changes have been made to the proposed standard.

Responses to Comments on the Proposed Standard

A detailed discussion of the issues raised in the comment and the Agency's responses are summarized in this preamble under the following five topics: Selection of Best Demonstrated Technology, Selection of Emission Limits, Selection of Baseline, Selection of Pollutants, and Test Methods.

Selection of Best Demonstrated Technology

Commenter IV-D-1 believes that the EPA should consider process modifications, in addition to add-on control devices, in the determination of BDT. The commenter states that there are two categories of process modifications (those that produce a return on investment and those that do not) and that modifications in both categories reduce emissions. The commenter believes it is reasonable to assume that process modifications that produce a return on investment (e.g., efficient rotary spinners, modified resins, and efficient binder spray applicator systems) would be used on any new production lines. However, the use of process modifications that do not produce a return on investment (e.g., use of advanced resins) would be discouraged by the proposed standard.

As explained in the preamble to the proposed standard (49 FR 4593), the Agency did consider the use of process modifications in the determination of BDT for the wool fiberglass insulation manufacturing industry. The Agency agrees that use of these modifications, alone or in combination with add-on control devices, can achieve lower emissions than those allowed by the standard. However, process modifications are considered confidential by the companies that comprise the fiberglass industry and are not generally available to the entire industry. For these reasons, and because the emission reduction potential of individual process modifications is very difficult to measure, the effect of one or more process modifications on emissions, by themselves or in combination with add-on control devices, could not be assessed. Even if this were not the case, because of different design, operating, and product specifications, process modifications that are applicable to one plant may not be a feasible alternative for another plant. Also, the relationship between known process modifications and reductions in air emissions has proven difficult to determine. Even in cases where an emission reduction is expected, these modifications may not

always reduce air emissions. For these reasons, the Administrator has determined that process modifications are not an appropriate candidate for BDT in this industry.

The promulgated standard is not expected to discourage the use of any process modifications that the commenter believes do not produce a direct return on investment. If modifications can help achieve the standard, thereby eliminating the need for or reducing the required size (and, thus, cost) of the add-on control device (which also does not provide a return on investment in this industry), the modifications are expected to be used.

Selection of Emission Limits

Commenter IV-D-1 believes that the EPA, in determining the emission level of the standard, used the highest particulate emission level (5.1 kg/Mg) from a single test run at the worst-controlled line tested (A) and added 10 percent to that figure, which the Agency then considered representative of the performance of BDT. The commenter believes that this worst-case condition of demonstrated technology is not appropriate as the basis for the standard. The commenter recommends an emission limit of 2.2 kg/Mg, which would be based on the average emission levels from three lines (B, D, and L) that use process modifications to achieve some emission reduction in addition to the emission reduction achieved by add-on control devices.

In establishing emission limits, sources that are believed to be representative of modern practice in one or more segments of the industry to be regulated are selected for emission testing. Moreover, the operational status of the source is documented and monitored continuously during testing to ensure that the test data reflect an emission control level representative of BDT. Standards are generally set so that well-designed, operated, and maintained plants, using BDT, can achieve the standards over the range of conditions likely to recur in the industry.

As stated in the proposal preamble (49 FR 4597), the proposed 5.5 kg/Mg (11.0 lb/ton) emission limit was based on measured emissions from Line A. Line A met all of the above criteria for selecting a source for emission testing and was controlled with a commercially available wet ESP. Lines B, D, and L, although well-designed, operated, and maintained, used process modifications that are not generally available for use or that may not be feasible for all plants. Although the average of three test runs could have been considered as the basis

for establishing an emission level for an NSPS and is used to determine compliance with standards, the highest single test run at Line A was used as the basis of the wool fiberglass insulation manufacturing standard. This procedure ensured that the standard would be achievable under all normal operating conditions. The Administrator determined that this procedure was appropriate because of the large variation in test results that occurred between different products manufactured on the same line and between different lines producing the same product. The highest emission level measured under typical operating conditions was 5.1 kg/Mg (10.2 lb/ton) at Line A, which included uncontrolled cooling emissions of 0.1 kg/Mg (0.2 lb/ton). However, Line D had an uncontrolled cooling emission level of 0.3 kg/Mg (0.6 lb/ton). Thus, it is possible that a line could have a total emission level of at least 5.3 kg/Mg (10.6 lb/ton). The 5.5 kg/Mg (11.0 lb/ton) standard is believed to be achievable for all lines, including those that do not control cooling emissions. In the Administrator's judgment, a standard set at the level suggested by the commenter would not necessarily be achievable by a facility controlled with technology similar to that used at line A.

Selection of Baseline

Commenter IV-D-1, after reviewing the wool fiberglass insulation regulations from the 14 States and air quality control regions presented in Table 3-10 of the BID, calculated the allowable emissions for the typical (medium size) plant (115,000 tons of insulation produced per year) specified by the EPA and determined that:

a. The highest allowable total particulate emission rate (Texas) is 1,367 tons per year;

b. The lowest allowable total particulate emission rate (New Jersey) is 255 tons per year; and

c. The average allowable total particulate emission rate is 593 tons per year.

The commenter concluded that the baseline level of control (1,820 tons of particulate matter per year) presented in the proposal preamble (49 FR 4590) is erroneous and that the commenter's calculated baseline (593 tons of particulate matter per year) is correct and should be used as the basis for environmental, energy, and economic impacts. The commenter points out that the proposed EPA standard would allow 635 tons of particulate matter to be emitted per year, and, thus, the standard is stricter than only one of the State standards presented in the BID. The

commenter, therefore, believes the proposed standard does not reflect most of the existing technology.

Determining baseline emissions from wool fiberglass insulation manufacturing plants directly from the State regulations is inappropriate because a different test method was used in developing the standard than was used to determine allowable SIP emission limits. This modified test method is the reference method for determining compliance with the standard of performance for wool fiberglass insulation manufacturing plants. Most State regulations are based on a "front-half catch" test method and the standard is based on a test method that measures total catch. The total catch test method was developed and proposed along with the standard to account for certain factors that are peculiar to the wool fiberglass insulation manufacturing industry.

The typical wool fiberglass production line consists of three continuous operations in series: Forming, in which glass fibers are generated, sprayed with a chemical binder, and collected to form a mat; curing, in which the binder resin is thermally "set" to hold the fibers together; and cooling, in which the temperature of the fiberglass mat is reduced. Emissions generated during the manufacture of wool fiberglass insulation include solid particles of glass and resin, droplets of binder, and components of the binder that have been vaporized. Glass particles may be entrained in the exhaust gas stream during the forming, curing, or cooling operations. Solid particles of resin may be entrained in the gas stream in either the curing or cooling sections. Droplets of organic binder may be entrained in the gas stream in the forming section or may result from condensation of gaseous pollutants, as the gas stream is cooled. Some of the liquid binder used in the forming section is vaporized by the elevated temperatures in the forming and curing processes. Much of the vaporized material will condense when the gas stream is cooled in the ductwork, in the emission control device, or upon release to the atmosphere.

Particulate matter is the principal pollutant that has been identified and measured at wool fiberglass insulation manufacturing facilities. It was known that some fraction of the particulate emissions results from the condensation of organic compounds used in the binder. Therefore, in evaluating emissions and control device performance, a sampling method was used that could collect and measure both solid particles and condensable

particulate material. Test data show that 10 to 47 percent of the particulate emissions from wool fiberglass facilities are condensed particulate material, which were in a gas phase at the test sampling site. Test data also show that emissions of both solid particles and condensable particulate material can be effectively reduced by using certain control techniques. Therefore, the standard would limit particulate emissions based on the measurement of both solid particles and condensable particulate material. Specifically, particulate matter as regulated under the standard includes material caught in the front half (nozzle, probe, and filter) of a standard EPA Reference Method 5 sampling train plus the condensed material caught in the impinger train measured as total organic carbon (TOC).

The Reference Method 5E sampling train is a modified version of the standard Reference Method 5 sampling train. The modifications include maintaining the temperature of the filtered gas stream, rather than the filter compartment air temperature, at $120^{\circ} \pm 14^{\circ} \text{C}$ ($248^{\circ} \pm 25^{\circ} \text{F}$) and the use of 0.1 N sodium hydroxide (NaOH) instead of water in each of the first two impingers. The first modification ensures that the sample gas stream is maintained at the desired temperature to prevent the condensation of material on the probe and filter. The second modification improves the capture efficiency of the impingers because the solubility of many organic compounds is greater in dilute NaOH than in water. The condensable emission captured by the impingers are measured as TOC using a TOC analyzer.

Total particulate catch (filter catch plus condensable fraction) is recommended as the test method because it best assesses performance that reflects the use of BDT for this industry. Wet control devices can effectively reduce the levels of solid and condensable particulate matter present in the emission stream from wool fiberglass insulation manufacturing facilities. However, because of the high moisture content of the exhaust gas stream from wet control devices, the sample gas stream must be heated to a temperature considerably higher than that of the exhaust gas stream to vaporize the water droplets and prevent clogging of the front half of the sampling train. This heating may also vaporize compounds that are aerosols at the stack gas temperature. These vaporized compounds are then cooled to a temperature below that of the exhaust gas stream and are condensed and collected in the impinger train.

For the above reasons, using State regulations to determine baseline emissions does not accurately portray the total emissions emitted by wool fiberglass insulation plants. Therefore, another method to determine the baseline emission level was developed. This method is mentioned in the proposal preamble (49 FR 4593) and is described completely on pages 3-25 and 3-29 in the BID for the proposed standard. To establish the baseline, it was assumed that the most frequently used control devices currently in use would be installed to comply with SIP's. Control devices that are currently used in the industry and the efficiencies of these devices were found by surveying operating fiberglass production lines. The most common control device found on the forming process was a low-pressure-drop scrubber, which was assumed to have an efficiency of 50 percent. The curing process was most commonly equipped with a low-temperature incinerator that was used to limit visible emissions but had no effect on mass emissions. The cooling process typically was uncontrolled. The results from the survey were used with the uncontrolled emission data from the testing program to determine baseline emissions. This approach is representative of emissions presently occurring under State regulations on a total catch basis.

Selection of Pollutants

Commenter IV-D-1 believes that, rather than defining and regulating phenol and formaldehyde as condensibles in the particulate standard, phenol and formaldehyde monomers should be regulated separately as volatile organic compounds (VOC). To support this recommendation, the commenter points out that the organic emissions from the wool fiberglass insulation industry are well defined and the use of phenol-formaldehyde resins is almost universal. Furthermore, the commenter points out that phenol and formaldehyde emissions can cause odor problems around manufacturing sites, both compounds have relatively low threshold limit values (TLV), and formaldehyde is a suspect carcinogen.

The Agency's goal is to establish a standard that reflects the performance of BDT for control of emissions from fiberglass plants. As described in the previous comment, the Agency focused on pollutants that occur in particulate and condensible forms. However, the Agency is not attempting to identify each condensible compound for possible individual regulation. Phenol and formaldehyde comprise only a portion of the total condensibles, and the standard

will result in some reduction in these emissions with the use of BDT. The Agency, at this time, has not identified a health or other problem that would warrant singling out phenol or formaldehyde air emissions from wool fiberglass insulation manufacturing facilities for regulation as individual pollutants.

Formaldehyde has recently been designated as a priority pollutant under the Toxic Substances Control Act and is being considered for investigation under section 112 of the Clean Air Act. If a decision were made to list formaldehyde under section 112, the formaldehyde test data collected during the test program can be used in the future.

Incineration, which is the only demonstrated technology that has been used to control these compounds fully, was not found to be cost effective for particulate matter control for this industry during development of the standard (approximately \$6,100 per ton of pollutant removed). However, the EPA recognizes that local considerations pertaining to visible emissions or odors may warrant the use of such equipment on a case-by-case basis.

Test Methods

Commenter IV-D-1 believes that measuring phenol and formaldehyde as TOC by Reference Method 5E is inappropriate because the total amount of phenol and formaldehyde in the sample is not accurately represented by measuring TOC and because all other particulates in the impingers are ignored. The commenter believes that the analysis of phenol should be by the 4-amino-antipyrene method and that formaldehyde should be collected in a 1-percent sodium bisulfite solution and analyzed by the chromotropic acid method.

The testing method was not designed to measure phenol or formaldehyde specifically. The testing method is the best approach to determine the total particulate catch (filter catch plus condensable fraction) in a sample. This total catch method more accurately represents BDT than does Reference Method 5, and it is the method upon which the standard is based. During the testing program, the Agency did explore the commenter's recommended approaches for measuring phenol and formaldehyde (see Appendix D of the proposal BID); however, unquantified phenol interference occurred with the chromotropic acid method. If these emissions do require control in the future, the test methods proposed by the commenter for these compounds will be

considered further as possible approaches.

Paperwork Reduction Act

Three types of reporting would be associated with the standard. First, there would be notification requirements, which would inform enforcement personnel of facilities subject to the standard. Second, there would be reporting of the results of performance tests that would be conducted to determine compliance with the standard. These reports are required by the General Provisions of 40 CFR Part 60, which apply to all standards of performance. Third, a report would be required documenting calibration of monitoring devices and control device operating parameters that are less than 70 percent of the lowest value or greater than 130 percent of the highest value of each operating parameter recorded during the most recent performance test. This report would be required on a semiannual basis. In addition, any owner or operator subject to the standard would have to maintain the operating log of key operating parameters in a form suitable for inspection.

Based on the information collection requirements analysis, the resources needed by the industry to maintain records and to collect, prepare, and use the reports for the first 3 years would be about 2.4 person-years per year. This estimate is based on 2 new plants and 10 new lines becoming subject to the NSPS in the first 3 years the standard is in effect. The resources required by government agencies to process and maintain records for the first 3 years would be about 0.16 person-years per year.

The Paperwork Reduction Act of 1980 (Pub. L. 96-511) requires that the Office of Management and Budget (OMB) approve reporting and recordkeeping requirements that qualify as an "information collection request" (ICR). Information collection requirements associated with this regulation (40 CFR 60.7 and 60.8) have been approved by the OMB under the provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 3101 *et seq.*, and have been assigned OMB Control Number 2060-0062.

Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered in the development of this rulemaking. The principal purposes of the docket are: (1) To allow interested parties to identify readily and locate documents so that

they can effectively participate in the rulemaking process; and (2) to serve as the record in case of judicial review, except for interagency review materials [Section 307(d)(7)(A)].

Miscellaneous

The effective date of this regulation is February 25, 1985. Section 111 of the Clean Air Act provides that standards of performance or revision thereof become effective upon promulgation and apply to affected facilities, construction or modification of which was commenced after the date of proposal (February 7, 1984).

As prescribed by Section 111 of the Clean Air Act, as amended, establishment of a standard of performance for this source category is based on the Administrator's determination (40 CFR 60.16, 44 FR 49222, dated August 21, 1979) that fiberglass manufacturing contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. In accordance with Section 117 of the Act, publication of this promulgated standard was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies.

This regulation will be reviewed 4 years from the date of promulgation as required by the Clean Air Act. This review will include an assessment of such factors as the need for integration with other programs, the existence of alternative methods, enforceability, improvements in emission control technology, and reporting requirements.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any new source standard of performance promulgated under section 111(b) of the Act. An economic impact assessment was prepared for this regulation and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the standard to ensure that cost was carefully considered in determining BDT. The economic impact assessment is included in the proposal BID. There have been no changes in the economic impact assessment since proposal.

In addition to economics, the cost effectiveness of each regulatory alternative was evaluated to determine the least costly way to reduce emissions and to assure the controls required by this rule are reasonable. For the purposes of the economic impact assessment, four regulatory alternatives were identified. Regulatory Alternative III, selected as the basis for the

standard, achieved the greatest emission reduction at the least cost. In 1989, the standard is expected to result in a reduction of emissions from the projected 3 new manufacturing plants and 17 new manufacturing lines by 9,250 Mg (10,200 tons) per year. The annualized costs for emissions control equipment would increase by about \$3,100,000 over baseline requirements to achieve this emission reduction. Thus, the cost effectiveness of the standard would be \$335 per Mg (\$304 per ton) of particulate matter removed.

Under Executive Order 12291, the EPA must judge whether a regulation is "major" and therefore subject to the requirement of a regulatory impact analysis. This regulation is not major because: (1) The national annualized compliance costs, including capital charges resulting from the standard, total less than \$100 million; (2) the standard does not cause a major increase in prices or production costs; and (3) the standard does not cause significant adverse effects on domestic competition, employment, investment, productivity, innovation, or competition in foreign markets. This regulation was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMB to the EPA and any EPA response to those comments are included in Docket A-80-27. This docket is available for public inspection at the EPA's Central Docket Section that is listed under the ADDRESSES section of this notice.

Regulatory Flexibility Act Compliance

The Regulatory Flexibility Act of 1980 (RFA) requires consideration of the impacts of regulations on small businesses. The guidelines for conducting a regulatory flexibility analysis define a small business as "any business concern which is independently owned and operated and not dominant in its field as defined by the Small Business Administration Regulations under section 3 of the Small Business Act." The Small Business Administration has determined that any firm classified in SIC 3296 (which includes wool fiberglass insulation manufacturing facilities) that employs less than 750 workers will be considered small in regard to the Small Business Act. None of the five firms in this industry qualify as a small business because each employs more than 750 workers. Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this rule will not have a significant economic

impact on any small entities because no small entity is affected.

List of Subjects in 40 CFR Part 60

Air pollution control, Aluminum, Ammonium sulfate plants, Asphalt, Cement industry, Coal, Copper, Electric power plants, Glass and glass products, Grains, Intergovernmental relations, Iron, Lead, Metals, Metallic minerals, Motor vehicles, Nitric acid plants, Paper and paper products industry, Petroleum, Phosphate, Sewage disposal, Steel sulfuric acid plants, Waste treatment and disposal, Zinc, Tires, Incorporation by reference, Can surface coating, Sulfuric acid plants, Industrial organic chemicals, Organic solvent cleaners, Fossil fuel-fired steam generators, Fiberglass insulation, Synthetic fibers, Lime.

Dated: February 12, 1985.

Lee M. Thomas,
Administrator.

PART 60—[AMENDED]

40 CFR Part 60 is amended as follows:

1. Section 60.17 of Subpart A is amended by adding paragraphs (a)(45) and (e) as follows:

§ 60.17 Incorporation by reference.

* * * * *

(a) * * *

(45) ASTM D2584-68, Standard Test Method for Ignition Loss of Cured Reinforced Resins, IBR approved February 25, 1985 for § 60.685(e).

* * * * *

(e) The following material is available for purchase from the Water Pollution Control Federation (WPCF), 2626 Pennsylvania Avenue NW., Washington, D.C. 20037.

(1) Method 209A, Total Residue Dried at 103-105 °C, in *Standard Methods for the Examination of Water and Wastewater*, 15th Edition, 1980, IBR approved February 25, 1985 for § 60.683(b).

(2) [Reserved]

2. Subparts III through OOO are reserved, and a new Subpart PPP is added as follows:

Subparts III through OOO—[Reserved]

Subpart PPP—Standard of Performance for Wool Fiberglass Insulation Manufacturing Plants

Sec.

60.680 Applicability and designation of affected facility.

Sec.

- 60.681 Definitions.
- 60.682 Standard for particulate matter.
- 60.683 Monitoring of operations.
- 60.684 Recordkeeping and reporting requirements.
- 60.685 Test methods and procedures.

Authority: Sections 111 and 301(a) of the Clean Air Act, as amended (42 U.S.C. 7411, 7601(a)), and additional authority as noted below.

Subparté III through OOO—[Reserved]**Subpart PPP—Standard of Performance for Wool Fiberglass Insulation Manufacturing Plants****§ 60.680 Applicability and designation of affected facility.**

(a) The affected facility to which the provisions of this subpart apply is each rotary spin wool fiberglass insulation manufacturing line.

(b) The owner or operator of any facility under paragraph (a) of this section that commences construction, modification, or reconstruction after February 7, 1984, is subject to the requirements of this subpart.

§ 60.681 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in Subpart A of this part.

"Glass pull rate" means the mass of molten glass utilized in the manufacture of wool fiberglass insulation at a single manufacturing line in a specified time period.

"Manufacturing line" means the manufacturing equipment comprising the forming section, where molten glass is fiberized and a fiberglass mat is formed; the curing section, where the binder resin in the mat is thermally "set;" and the cooling section, where the mat is cooled.

"Rotary spin" means a process used to produce wool fiberglass insulation by forcing molten glass through numerous small orifices in the side wall of a spinner to form continuous glass fibers that are then broken into discrete lengths by high velocity air flow.

"Wool fiberglass insulation" means a thermal insulation material composed of glass fibers and made from glass produced or melted at the same facility where the manufacturing line is located.

§ 60.682 Standard for particulate matter.

On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any affected facility any gases which

contain particulate matter in excess of 5.5 kg/Mg (11.0 lb/ton) of glass pulled.

§ 60.683 Monitoring of operations.

(a) An owner or operator subject to the provisions of this subpart who uses a wet scrubbing control device to comply with the mass emission standard shall install, calibrate, maintain, and operate monitoring devices that measure the gas pressure drop across each scrubber and the scrubbing liquid flow rate to each scrubber. The pressure drop monitor is to be certified by its manufacturer to be accurate within ± 250 pascals (± 1 inch water gauge) over its operating range, and the flow rate monitor is to be certified by its manufacturer to be accurate within ± 5 percent over its operating range.

(b) An owner or operator subject to the provisions of this subpart who uses a wet electrostatic precipitator control device to comply with the mass emission standard shall install, calibrate, maintain, and operate monitoring devices that measure the primary and secondary current (amperes) and voltage in each electrical field and the inlet water flow rate. In addition, the owner or operator shall determine the total residue (total solids) content of the water entering the control device once per day using Method 209A, "Total Residue Dried at 103–105 °C," in *Standard Methods for the Examination of Water and Wastewater*, 15th Edition, 1980 (incorporated by reference—see § 60.17). Total residue shall be reported as percent by weight. All monitoring devices required under this paragraph are to be certified by their manufacturers to be accurate within ± 5 percent over their operating range.

(c) All monitoring devices required under this section are to be recalibrated quarterly in accordance with procedures under § 60.13(b).

(Sec. 114 of the Clean Air Act, as amended (42 U.S.C. 7414))

§ 60.684 Recordkeeping and reporting requirements.

(a) At 30-minute intervals during each 2-hour test run of each performance test of a wet scrubber control device and at least once every 4 hours thereafter, the owner or operator shall record the measurements required by § 60.683(a).

(b) At 30-minute intervals during each 2-hour test run of each performance test of a wet electrostatic precipitator control device and at least once every 4 hours thereafter, the owner or operator shall record the measurements required by § 60.683(b), except that the concentration of total residue in the water shall be recorded once during

each performance test and once per day thereafter.

(c) Records of the measurements required in paragraphs (a) and (b) of this section must be retained for at least 2 years.

(d) Each owner or operator shall submit written semiannual reports of exceedances of control device operating parameters required to be monitored by paragraphs (a) and (b) of this section and written documentation of, and a report of corrective maintenance required as a result of, quarterly calibrations of the monitoring devices required in § 60.683(c). For the purpose of these reports, exceedances are defined as any monitoring data that are less than 70 percent of the lowest value or greater than 130 percent of the highest value of each operating parameter recorded during the most recent performance test.

(e) The requirements of this section remain in force until and unless the Agency, in delegating enforcement authority to a State under section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such State. In that event, affected facilities within the State will be relieved of the obligation to comply with this section, provided that they comply with the requirements established by the State.

(Sec. 114 of the Clean Air Act, as amended (42 U.S.C. 7414))

(Approved by the Office of Management and Budget under Control No. 2060–0062)

§ 60.685 Test methods and procedures.

(a) Reference methods in Appendix A of this part, except as provided under § 60.8(b), shall be used to determine compliance with § 60.682 as follows:

- (1) Method 1 for sample and velocity traverses;
- (2) Method 2 for stack gas velocity and volumetric flow rate;
- (3) Method 3 for stack gas dry molecular weight;
- (4) Method 4 for stack gas moisture content; and
- (5) Method 5E for the measurement of particulate emissions.

(b) The sampling time for each test run shall be at least 2 hours and the minimum volume of gas sampled shall be 2.55 dscm.

(c) The performance test shall be conducted while the product with the highest loss on ignition (LOI) expected to be produced by the affected facility is being manufactured.

(d) For each test run, the particulate mass emission rate, R, shall be computed as follows:

$$R = C_i \times Q_{std} \times \frac{6 \times 10^{-5} \text{ min} \cdot \text{kg}}{\text{h} \cdot \text{mg}}$$

Q_{std} = stack gas volumetric flow rate as determined by Reference Method 2 (dscm/min).

(e) The glass pull rate, P, for the manufacturing line shall be computed as follows:

$$P = L_g \times W_m \times M \times \left(\frac{100 - \text{LOI}}{100} \right) \times \frac{6 \times 10^{-5} \text{ min} \cdot \text{Mg}}{\text{h} \cdot \text{g}}$$

where:

R = mass emission rate (kg/h),
 C_i = particulate concentration as determined by Reference Method 5E (mg/dscm),

where:

P = glass pull rate (Mg/h),
 L_g = line speed (m/min),
 W_m = trimmed mat width (m),
 M = mat gram weight (g/m²),
 LOI = loss on ignition (weight percent), as determined by ASTM Standard Test Method D2584-68 (Reapproved 1979), "Ignition Loss of Cured Reinforced Resins" (incorporated by reference—see § 60.17).

For each 2-hour test run, the average glass pull rate shall be computed from at least three glass pull rates determined at intervals of at least 30 minutes during the test run.

(f) For each test run, the particulate mass emission level, E, shall be computed as follows:

$$E = \frac{R}{P_{avg}}$$

where:

E = mass emission level (kg/Mg),
 R = mass emission rate (kg/h),
 P_{avg} = average glass pull rate (Mg/h).
 (Sec. 114 of the Clean Air Act, as amended (42 U.S.C. 7414))

3. Appendix A to Part 60 is amended by adding Reference Method 5E as follows:

Appendix A—Reference Methods

* * * * *

Method 5E—Determination of Particulate Emissions From the Wool Fiberglass Insulation Manufacturing Industry

1. Applicability and Principle.

1.1 *Applicability.* This method is applicable for the determination of particulate emissions from wool fiberglass insulation manufacturing sources.

1.2 *Principle.* Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature in the range of 120 ° ± 14 °C (248 ° ± 25 °F) and in solutions of 0.1 N NaOH. The filtered particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water. The condensed particulate material collected in the impinger solutions is

determined as total organic carbon (TOC) using a nondispersive infrared type of analyzer. The sum of the filtered particulate mass and the condensed particulate matter is reported as the total particulate mass.

2. Apparatus.

2.1 *Sampling Train.* The equipment list for the sampling train is the same as described in Section 2.1 of Reference Method 5 except as follows:

2.1.1 *Probe Liner.* Same as described in Section 2.1.2 of Reference Method 5 except use only borosilicate or quartz glass liners.

2.1.2 *Filter Holder.* Same as described in Section 2.1.5 of Reference Method 5 with the addition of a leak-tight connection in the rear half of the filter holder designed for insertion of a thermocouple or other temperature gauge for measuring the sample gas exist temperature.

2.2 *Sample Recovery.* The equipment list for sample recovery is the same as described in Section 2.2 of Reference Method 5 except three wash bottles are needed instead of two and only glass storage bottles and funnels may be used.

2.3 *Analysis.* The equipment list for analysis is the same as Section 2.3 of Reference Method 5 with the additional equipment for TOC analysis as described below:

2.3.1 *Sample Blender or Homogenizer.*

Waring type of ultrasonic.

2.3.2 *Magnetic Stirrer.*

2.3.3 *Hypodermic Syringe.* 0= to 100=μl capacity.

2.3.4 *Total Organic Carbon Analyzer.* Beckman Model 915 with 215 B infrared analyzer or equivalent and a recorder.

2.3.5 *Beaker.* 30 ml.

2.3.6 *Water Bath.* Temperature-controlled.

2.3.7 *Volumetric Flasks.* 1,000 ml and 500 ml.

3. Reagents.

3.1 *Sampling.* The reagents used in sampling are the same as used in Reference Method 5 with the addition of 0.1 N NaOH (dissolve 40 g of ACS reagent grade NaOH in distilled water and dilute to 1 liter).

3.2 *Sample Recovery.* The reagents used in sample recovery and the same as used in Reference Method 5 with the addition of distilled water and 0.1 N NaOH as described in Section 3.1.

3.3 *Analysis.* The reagents used in analysis are the same as in Reference Method 5 except as follows:

3.3.1 *Carbon Dioxide-Free Water.* Distilled or deionized water that has been freshly boiled for 15 minutes and cooled to room temperature while preventing exposure to ambient air with a cover vented with an ascarite tube.

3.3.2 *Hydrochloric Acid.* HCl, concentrated, with a dropper.

3.3.3 *Organic Carbon Stock Solution.* Dissolve 2.1254 g of dried potassium biphthalate in CO₂= free water and dilute to 1 liter in a volumetric flask. This solution contains 1,000 mg/l organic carbon.

3.3.4 *Inorganic Carbon Stock Solution.* Dissolve 4.404 g anhydrous sodium carbonate in about 500 ml of CO₂=free water in a 1 liter volumetric flask. Add 3.497 g anhydrous sodium bicarbonate to the flask and dilute to 1 liter with CO₂=free water. This solution contains 1,000 mg/l inorganic carbon.

3.3.5 *Oxygen Gas.* CO₂=free.

4. Procedure.

4.1 *Sampling.* The sampling procedures are the same as in Section 4.1 of Reference Method 5 except as follows:

4.1.1 *Filtration Temperature.* The temperature of the filtered gas stream, rather than the filter compartment air temperature, is maintained at 120 ° ± 14 °C (248 ° ± 25 °F).

4.1.2 *Impinger Solutions.* 0.1 N NaOH is used in place of water in the impingers. The volumes of the solutions are the same as in Reference Method 5.

4.2 *Sample Recovery.* The sample recovery procedure is as follows:

Water is used to rinse and clean the probe parts prior to the acetone rinse. Save portions of the water, acetone, and 0.1 N NaOH used for cleanup as blanks following the procedure as in Section 4.2 of Reference Method 5.

Note.—All parts of the sample collection portion of the train (e.g., probe and nozzle, filter holder, impinger glassware) must be free of organic solvent residue before sample collection. It is necessary that all sampling apparatus that have been rinsed with acetone be flushed twice with water or dilute NaOH before the sample run. The rinse solutions from this cleaning process should be discarded. If other solvents that are not readily soluble in water (e.g., TCE) are used, place the exposed sampling apparatus in a drying oven at 105 °C for at least 30 minutes.

Container No. 1. The filter is removed and stored in the same manner as in Section 4.2 of Reference Method 5.

Container No. 2. Use water to rinse the sample nozzle, probe, and front half of the filter holder three times in the manner described in Section 4.2 of Reference Method 5 except that no brushing is done. Put all the wash water in one container, seal, and label.

Container No. 3. Rinse and brush the sample nozzle, probe, and front half of the filter holder with acetone as described for Container No. 2 in Section 4.2 of Reference Method 5.

Container No. 4. Place the contents of the silica gel impinger in its original container as described for Container No. 3 in Section 4.2 of Reference Method 5.

Container No. 5. Measure the liquid in the first three impingers and record the volume or weight as described for the Impinger Water in Section 4.2 of Reference Method 5. Do not

discard this liquid, but place it in a sample container using a glass funnel to aid in the transfer from the impingers or graduated cylinder (if used) to the sample container. Rinse each impinger thoroughly with 0.1 N NaOH three times, as well as the graduated cylinder (if used) and the funnel, and put these rinsings in the same sample container. Seal the container and label to identify its contents clearly.

4.3 Analysis. The procedures for analysis are the same as in Section 4.3 of Reference Method 5 with exceptions noted as follows:

Container No. 1. Determination of weight gain on the filter is the same as described for Container No. 1 in Section 4.3 of Reference Method 5 except that the filters must be dried at $20 \pm 6^\circ\text{C}$ ($68 \pm 10^\circ\text{F}$) and at ambient pressure.

Containers Nos. 2 and 3. Analyze the contents of Containers Nos. 2 and 3 as described for Container No. 2 in Section 4.3 of Reference Method 5 except that evaporation of the samples must be at $20 \pm 6^\circ\text{C}$ ($68 \pm 10^\circ\text{F}$) and at ambient pressure.

Container No. 4. Weigh the spent silica gel as described for Container No. 3 in Section 4.3 of Reference Method 5.

"Water and Acetone Blank" Containers. Determine the water and acetone blank values following the procedures for Acetone Blank Container in Section 4.3 of Reference Method 5. Evaporate the samples at ambient temperature [$20 \pm 6^\circ\text{C}$ ($68 \pm 10^\circ\text{F}$)] and pressure.

Container No. 5. For the determination of total organic carbon, perform two analyses on successive identical samples, i.e., total carbon and inorganic carbon. The desired quantity is the difference between the two values obtained. Both analyses are based on conversion of sample carbon into carbon dioxide for measurement by a nondispersive infrared analyzer. Results of analyses register as peaks on a strip chart recorder.

The principal differences between operating parameters for the two channels involve the combustion tube packing material and temperature. In the total carbon channel, a high temperature [950°C (1740°F)] furnace heats a Hastelloy combustion tube packed with cobalt oxide-impregnated asbestos fiber. The oxygen in the carrier gas, the elevated temperature, and catalytic effect of the packing result in oxidation of both organic and inorganic carbonaceous material to CO_2 and steam. In the inorganic carbon channel, a

low temperature [150°C (300°F)] furnace heats a glass tube containing quartz chips wetted with 85 percent phosphoric acid. The acid liberates CO_2 and steam from inorganic carbonates. The operating temperature is below that required to oxidize organic matter. Follow the manufacturer's instructions for assembly, testing, calibration, and operation of the analyzer.

As samples collected in 0.1 N NaOH often contain a high measure of inorganic carbon that inhibits repeatable determinations of TOC, sample pretreatment is necessary. Measure and record the liquid volume of each sample. If the sample contains solids or an immiscible liquid, homogenize the sample with a blender or ultrasonics until satisfactory repeatability is obtained.

Transfer a representative portion of 10 to 15 ml to a 30-ml beaker, acidify with about 2 drops of concentrated HCl to a pH of 2 or less. Warm the acidified sample at 50°C (120°F) in a water bath for 15 minutes. While stirring the sample with a magnetic stirrer, withdraw a 20- to 50- μl sample from the beaker and inject it into the total carbon port of the analyzer. Measure the peak height. Repeat the injections until three consecutive peaks are obtained within ± 10 percent of the average.

Repeat the analyses for all the samples and the 0.1 N NaOH blank. Prepare standard curves for total carbon and for inorganic carbon of 10, 20, 30, 40, 50, 60, 80, and 100 mg/l by diluting with CO_2 -free water 10, 20, 30, 40, and 50 ml of the two stock solutions to 1,000 ml and 30, 40, and 50 ml of the two stock solutions to 500 ml. Inject samples of these solutions into the analyzer and record the peak heights as described above. The acidification and warming steps are not necessary for preparation of the standard curve.

Ascertain the sample concentrations for the samples from the corrected peak heights for the samples by reference to the appropriate standard curve. Calculate the corrected peak height for the standards and the samples by deducting the blank correction as follows:

$$\text{Corrected peak height} = A - B \quad \text{Eq. 5E-1}$$

Where:

A = Peak height of standard or sample, mm or other appropriate unit.

B = Peak height of blank, mm or other appropriate unit.

If samples must be diluted for analysis, apply an appropriate dilution factor.

5. Calibration. Calibration of sampling and analysis equipment is the same as in Section 5 of Reference Method 5 with the addition of the calibration of the TOC analyzer described in Section 4.3 of this method.

6. Calculations. The calculations and nomenclature for the calculations are the same as described in Section 6 of Reference Method 5 with the addition of the following:

6.1 Mass of Condensed Particulate Material Collected.

$$m_c = (0.001)(C_c)(V_s) \quad \text{Eq. 5F-2}$$

Where:

0.001 = Liters per milliliter.

m_c = Mass of condensed particulate material collected in the impingers measured as TOC, mg.

C_c = Concentration of TOC in the liquid sample from TOC analysis in Section 4.3, mg/l.

V_s = Total volume of liquid sample, ml.

6.2 Concentration of Condensed Particulate Material.

$$C_c = (0.001 [m_c/V_{m(\text{std})}]) \quad \text{Eq. 5E-3}$$

Where:

0.001 = Grams per milligram.

C_c = Concentration of condensed particulate matter in stack gas, dry basis, corrected to standard condition, g/dscm.

$V_{m(\text{std})}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm, from Section 6.3 of Reference Method 5.

6.3 Total Particulate Concentration.

$$C_t = C_s + C_c \quad \text{Eq. 5E-4}$$

Where:

C_t = Total particulate concentration, dry basis, corrected to standard conditions, g/dscm.

C_s = Concentration of filtered particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscm, from Equation 5-6 of reference Method 5.

7. Bibliography. The bibliography is the same as in Section 8 of Reference Method 5 with the addition of the following:

7.1 American Public Health Association, American Water Works Association, Water Pollution Control Federation. Standard Methods for the Examination of Water and Wastewater. Fifteenth Edition. Washington, D.C. 1980.

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