Citation: 45 Fed. Reg. 74846 1980

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[AD-FRL 1623-4]

Standards of Performance for New Stationary Sources; Ammonium Sulfate Manufacture

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Standards of performance for ammonium sulfate manufacturing plants were proposed in the Federal Register on February 4, 1980 (45 FR 7758). This action finalizes standards of performance for ammonium sulfate manufacturing plants. These standards implement Section 111 of the Clean Air Act and are based on the Administrator's determination that ammonium sulfate manufacturing plants cause, or contribute significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare. The intended effect of these standards is to require all new, modified, and reconstructed ammonium sulfate manufacturing plants to use the best demonstrated system of continuous emission reduction, considering costs, nonair quality health, and environmental and energy impacts.

EFFECTIVE DATE: November 12, 1980.

Under Section 307(b)(1) of the Clean Air Act, judicial review of this new source performance standard is available *only* by the filing of a petition for review in the United States 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 brought by EPA to enforce these requirements.

ADDRESSES: *Background Information Document.* The background information document (BID) for the promulgated standards may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, North Carolina 27711, telephone number (919) 541-2777. Please refer to "Ammonium Sulfate Manufacture—Background Information for Promulgated Emission Standards," EPA-450/3-79-0346b.

Docket. A docket, number A-79-31, containing information used by EPA in development of the promulgated standards, is available for public inspection between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section (A-130), West Tower Lobby, Gallery 1, 401 M Street, S.W., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT: Mr. Gene W. Smith, Standards Development Branch, Emission Standards and Engineering Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone (919) 541-5421.

SUPPLEMENTARY INFORMATION:

The Standards

The promulgated standards will limit atmospheric particulate matter emissions from new, modified, and reconstructed ammonium sulfate dryers at caprolactam by-product ammonium sulfate plants, synthetic ammonium sulfate plants, and coke oven by-product ammonium sulfate plants.

Specifically, the promulgated standards limit exhaust emissions from ammonium sulfate dryers to 0.15 kilogram of particulate matter per megagram of ammonium sulfate production (0.30 lb/ton). An opacity emission standard is also promulgated and limits emissions from the affected facility to no more than 15 percent.

The promulgated standards require continuous monitoring of the pressure drop across the control system for any affected facility to help ensure proper operation and maintenance of the system. Flow monitoring devices necessary to determine the mass flow of ammonium sulfate feed material to the process are also required at those plants not equipped with product weigh scales.

Summary of Environmental, Energy, and Economic Impacts

The promulgated standards will reduce projected 1985 particulate emissions from new ammonium sulfate dryers from about 670 megagrams (737 tons) per year, the level of emissions that would occur under a typical State Implementation Plan, to about 131 megagrams (144 tons) per year. This will be an 80 percent reduction of particulate emissions under a typical State Implementation Plan and will bring the overall collection efficiency to nearly 99 percent of the uncontrolled emissions. This reduction in emissions will result in reduction of ambient air concentrations of particulate matter in the vicinity of new, modified, and reconstructed ammonium sulfate plants. The promulgated standards are based on the use of medium energy wet scrubbing to control particulate matter. All captured particulate matter will be reclaimed; therefore, the promulgated standards will have no adverse impact on water quality or solid waste.

The promulgated standards will not significantly increase energy consumption at ammonium sulfate plants and will have a minimal impact on national energy consumption. The incremental energy needed to operate control equipment to meet the standards will range from 0.10 percent of the total energy required to run a synthetic or coke oven by-product ammonium sulfate plant to 0.65 percent of the total energy required to operate a caprolactam by-product ammonium sulfate plant.

Economic analysis indicates that the impact of the promulgated standards will be reasonable. Cumulative capital costs of complying with the promulgated standards for the ammonium sulfate industry as a whole will be about $1.0 million by 1985. Annualized cost to the industry in the fifth year of the promulgated standards will be about $0.5 million. The industry-wide price increase necessary to offset the cost of compliance will amount to less than 0.01 percent of the wholesale price of ammonium sulfate. Costs of emission control required by the promulgated standards are not expected to prevent or hinder expansion or continued production in the ammonium sulfate industry.

Public Participation

Prior to proposal of the standards, interested parties were advised by public notice in the Federal Register (44 FR 45242, August 1, 1979) of a meeting of the National Air Pollution Control Techniques Advisory Committee to discuss the ammonium sulfate manufacturing plant standards recommended for proposal. This meeting occurred on August 28, 1979. The meeting was open to the public and each attendee was given an opportunity to comment on the standards recommended for proposal.

The standards were proposed in the Federal Register on February 4, 1980 (45 FR 7758). Public comments were solicited at that time and, when requested, copies of the Background Information Document (BID) were distributed to interested parties.

To provide interested persons the opportunity for oral presentation of data, views, or arguments concerning the proposed standards, a public hearing was held on March 6, 1980, at Research Triangle Park, North Carolina. The hearing was open to the public and each attendee was given an opportunity to comment on the proposed standards. The public comment period was from February 4 to April 5, 1980.

Six comment letters were received concerning issues relative to the proposed standards of performance for ammonium sulfate manufacturing plants. The comments have been carefully considered and, where determined to be appropriate by the Administrator, changes have been made in the standards that were proposed.

Significant Comments and Changes to the Proposed Standards

Comments on the proposed standards were received from ammonium sulfate manufacturers and State air pollution control agencies. Most of the comment letters contained multiple comments. The comments have been divided into the following areas: General; Emission Control Technology; Test Methods and Monitoring; and Other Considerations.

General

One commenter thought that new source performance standards (NSPS) should be applied to any new ammonium sulfate dryer regardless of the manufacturing process used. The commenter referred to one plant which recovers ammonium sulfate from a scrubber controlling the emissions from a sulfuric acid unit at a phosphate fertilizer plant.

The standards regulate new, modified, and reconstructed dryers at three types of ammonium sulfate manufacturing plants: synthetic, caprolactam by-product, and coke oven by-product. Over 90 percent of ammonium sulfate is generated from these types of plants. During the development of the standards, EPA determined that the impact of regulation and potential for emission reduction with new source performance standards is significant only within these industry sectors. These types of plants are the major sources of ammonium sulfate emissions. Only two plants in the U.S. are known to produce ammonium sulfate as a by-product of sulfuric acid manufacture using the Cominco-Swenson process; the trend in the industry is toward using the dual absorption process of manufacturing sulfuric acid which eliminates the output of ammonium sulfate. Since there does not appear to be any growth or replacement potential for plants using the Cominco-Swenson process (this segment is in fact contracting), there is no justification to include this process in the standards.

Ammonium sulfate is also a by-product of the manufacture of nickel from ore concentrates and the manufacture of methyl methacrylate at one existing facility. However, no new plants of either type are expected to be built. Furthermore, new technology for the manufacture of methyl methacrylate now being put in use at existing plants eliminates the production of ammonium sulfate altogether.

It was recommended by one commenter that an emission limit be established for sulfur dioxide and ammonia through specification of a modified Method 5 test procedure.

Study of the ammonium sulfate industry has shown that ammonium sulfate particulate matter is the principal pollutant emitted to the atmosphere from ammonium sulfate plants. Sulfur dioxide and ammonia are not emitted from ammonium sulfate plants in amounts significant enough to warrant regulation. EPA Method 5 provides detailed procedures, equipment criteria, and other considerations necessary to obtain accurate and representative particulate emission data and is the appropriate test procedure to measure ammonium sulfate particulate emissions. EPA Method 5 was used to gather the data which is the basis for the promulgated standards and is therefore specified as the method to be used for compliance testing.

Emission Control Technology

Specification of Control Equipment

One commenter suggested that the proposed standard be "equipment specific" requiring the use of venturi scrubbers. However, Section 111(h) of the Clean Air Act establishes a presumption against design, equipment, work practice, and operational standards. Such standards cannot be promulgated if a standard of performance is feasible. Performance standards for control of ammonium sulfate particulate emissions have been determined as practical and feasible; therefore, design, equipment, work practice, or operational standards are not considered as regulatory options.

Use of Fabric Filters to Meet Proposed Standards

Two comments were received which questioned the feasibility of utilizing fabric filters for the collection of particulate emissions at ammonium sulfate plants. Both commenters noted the fact that frequent and serious operational problems can occur with the use of fabric filter systems at ammonium sulfate plants. One commenter, a synthetic ammonium sulfate producer, pointed out that his company's efforts to utilize a baghouse were totally unsuccessful. The plant discontinued use of the fabric filter system because excessive blinding of the fabric and caking of the collected dust in the baghouse, bins, and discharge chutes occurred which required frequent plant shutdown (an operating pattern considered entirely unacceptable at large scale, continuous process ammonium sulfate plants).

The condensation which causes the blinding and caking results from failure to maintain the temperature of the dryer exhaust and/or baghouse surfaces sufficiently above the dew point at all times. The commenter noted that the presence of even low level sulfuric acid (or hydrocarbon) vapor effectively results in a gaseous mixture that has a dew point considerably higher than would be predicted solely on the basis of the moisture content.

This is considered a reasonable comment. EPA contended in the preamble to the proposed regulation that fabric filters had the potential to meet the proposed emission limits. However, it was felt that none of the facilities coming on-line would elect to install fabric filter systems due to the relative advantages of wet scrubbers. The new information provided regarding the character of the ammonium sulfate dryer exhaust gas, coupled with the operational experience of those plants which have tried fabric filtration as a control technique, leads to the conclusion that fabric filtration is not a viable control alternative applicable to particulate collection at ammonium sulfate plants. This conclusion, however, does not affect the numerical emission limits proposed for ammonium sulfate dryer new source performance standards. The emission limits as well as the estimated environmental, economic, and energy impacts are based on the use of a medium energy wet scrubber. These limits represent the most stringent control level that can be met by all segments of the industry. Therefore, no change has been made in the numerical emission limits from proposal to promulgation.

Volatile Organic Compound Emissions At Caprolactam By-Product Plants

Two commenters were concerned with the effect of using fabric filters on volatile organic compound (VOC) emissions at caprolactam by-product ammonium sulfate plants. Both contended that although the use of fabric filters would reduce particulate emissions, VOC emissions would increase because a fabric filter would capture very little, if any, of the VOC which would be captured by a wet collection method.

Caprolactam is introduced into the ammonium sulfate process from those streams which, in the caprolactum formation reactions, produce ammonium sulfate as a by-product. Caprolactam has a melting point of 60°C and a boiling point of 140°C. This means that the majority of caprolactam present in the ammonium sulfate dryer at the operating temperature involved (about 85°C) is in the liquid phase. The liquid caprolactam in the dryer adheres to the ammonium sulfate crystals and passes through the drying and classifying process. This residual caprolactam is a solid at ambient storage conditions. Any volatile caprolactam present in the ammonium sulfate dryer (and exit gas) results from the vapor pressure of caprolactam at the operating temperature of the dryer. EPA test data indicate that uncontrolled volatilized caprolactam emissions are relatively low level (about 60 ppm). In addition, wet collection currently in use as particulate control has demonstrated nearly 90 percent removal efficiency of the uncontrolled caprolactam emissions. This results in a controlled emission rate of about 7 ppm which is not considered to contribute significantly to air pollution.

As pointed out in the previous comment concerning fabric filters, there is now adequate evidence to conclude that wet scrubbing will be selected to control particulate emissions from ammonium sulfate plants. Since fabric filters will not be used there is no potential for increase in VOC emission.

Control Equipment Efficiency and Process Variations

One commenter stated it is doubtful that either the venturi scrubber or fabric filter will be able to sustain 99.9 percent efficiency during all variations associated with normal operating conditions at ammonium sulfate plants. The commenter went on to say that EPA has repeatedly failed to consider variations associated with processes, control devices, testing equipment, and laboratory procedures and that EPA has failed to recognize the wide variations obtained from the same plant and pollution control system, as measured by EPA methods, during representative operating conditions.

The new source performance standards for this industry are not based on percent removal efficiency but on the performance level of the best system of continuous emission reduction considering cost and other factors. The percent efficiencies were provided for information purposes only. EPA determined the performance level through direct emission testing at ammonium sulfate plants representative of the full range of operating conditions in the industry. Several plants were selected by EPA for emission testing in order to adequately consider all commonly occurring process and emission control variations found in the industry. The plants tested used the various drying techniques and gas-to-product ratios found in the industry and likely to be used in the future. For instance, both fluidized bed and rotary drum dryers were tested utilizing both direct-fired and steam heated air as the drying medium. Each emission test consisted of three separate test runs conducted during normal or representative operating conditions utilizing EPA Method 5. Results of the test runs were averaged (as would be the case in determining source compliance) to provide for any minor variations in process and test conditions during the plant test. In the future, performance tests for determination of source compliance will be conducted using procedures identical to those used in development of the promulgated standards. Emission test results from these different drying techniques indicate that the performance levels selected for the standards can be met by all segments of the ammonium sulfate industry.

Test Methods and Monitoring

One commenter suggested that § 60.423(a) of the proposed standards, Monitoring of Operations, be changed to provide consistency with § 60.424(d) which states that production rate may be determined by use of product weigh scales, or by material balance calculations. As proposed, § 60.423(a) of the regulation would have required installation of process feed stream flow meters, even if weigh scales were used to measure production rate.

This is a reasonable comment. The emission limit of the regulation is expressed in allowable emissions per unit mass of product. Therefore, production rate must be determinable. Flow meters were required in an effort to provide a means to accurately determine the production rate at those facilities electing not to install weigh scales. It is not EPA's intention that owners or operators of affected facilities who elect to install weigh scales should also be required to install process stream flow monitors. The regulation has therefore been changed to note that if a plant uses weigh scales of the same accuracy as the flow monitoring devices, then flow monitors are not required.

One commenter requested that instead of continuous monitoring of pressure drop, periodic monitoring of pressure drop across the control system for any affected facility be allowed. It was suggested that the pressure drop across the control system should be taken by operating personnel at a frequency no greater than once every 2 hours and entered in an operator log. It was contended that the reliability of venturi scrubbers is such that more frequent measurements or continuous pressure drop monitors could not be justified and would be a waste of both capital and energy. It was stated that imposing more costly or time-consuming monitoring requirements than is necessary to adequately demonstrate emission compliance will, in the long run, be counterproductive.

In EPA's experience, continuous pressure drop monitoring provides a more accurate indication of emission control equipment operation and maintenance than periodic or intermittent readings and thereby facilities enforcement activities. It has also been determined that the costs of continuous pressure drop monitoring at ammonium sulfate plants are reasonable, and that there are no technical or process reasons to monitor periodically. Therefore, no change in the pressure drop monitoring requirements of the proposed regulation was made.

One commenter noted that for caprolactam by-product plants the ammonium sulfate feed streams which require flow monitoring devices for determination of mass product flow are, in some cases, inappropriate. It was pointed out that not all ammonium sulfate solution produced is taken to the solid form; some is sold as solution. Therefore, the total combined feed streams to the ammonium sulfate crystallizer, prior to any recycle streams, would be the most accurate place to measure process input feed.

This is considered a reasonable comment. For those caprolactam by-product ammonium sulfate plants not equipped with product weigh scales, the proposed standards would have required that the oximation ammonium sulfate stream to the ammonium sulfate plant and the oleum stream to the caprolactam rearrangement reactor must be monitored separately as a means of determining the ammonium sulfate production rate. It did not specify that the total combined feed stream leading directly to the crystallizer stage can also be monitored.

Therefore, in response to this comment, § 60.424(d) has been changed to specify monitoring of the total or combined feed streams leading directly to the crystallizer stage for caprolactam by-product plants. A new equation has been developed for § 60.424(d) to allow calculation of ammonium sulfate production rate from the flow rate of the total feed stream.

Another commenter contended that visual opacity measurement is unscientific, inaccurate, and, at best, arbitrary. It was suggested that the proposed opacity standard is unnecessary to adequately monitor ammonium sulfate manufacturing emissions; and since there is no reliable method for its measurement, the opacity standard should be deleted.

An opacity standard of 15 percent was proposed for all affected facilities to ensure proper operation and maintenance of control systems on a day-to-day basis. The proposed method for opacity monitoring is EPA Method 9. The reliability of opacity standards and the reference test method has been rigorously tested in the field and in the courts. In the case of *Portland Cement Association v. Train, 513 F.2d 506 (D.C. Cir. 1975)*, the court ruled that plume opacity was not too unreliable to be used either as a measure of pollution or as an aid in controlling emissions. As a basis for the standard, ammonium sulfate dryers were observed to have no opacity readings greater than 15 percent opacity during observation periods totaling more than 19 hours. For these reasons no change was made in the opacity standard.

Other Considerations

One commenter could not find justification for proposing a standard for modified and new sources that is more stringent than the baseline emission level of existing SIP. It was contended that since there was no medical evidence presented showing any harm being created by the ammonium sulfate dryer emissions allowed under existing State regulations, there is no justification for standards requiring additional investment and energy.

On August 21, 1979, ammonium sulfate manufacturing was listed under Section 111(f) of the Clean Air Act as a stationary source category for which standards should be promulgated (44 FR 49222). This listing represents the Administrator's determination that ammonium sulfate manufacturing causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare. The commenter did not submit any arguments that suggested the Administrator should reconsider this determination.

Under Section 111(a), standards which are promulgated for a category must reflect the degree of emission control achievable through application of the best demonstrated technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and non-air quality health, and environmental and energy impacts) has been adequately demonstrated. Based on a thorough study on control alternatives, including no additional regulatory action, EPA has determined that the promulgated emission limits best satisfy these criteria for ammonium sulfate manufacture.

Furthermore, particulate matter, the principal pollutant emitted to the atmosphere from ammonium sulfate plants, is a criteria pollutant (listed as such under Section 108 of the Clean Air Act) for which national ambient air quality standards have been established. Specific information regarding the health and welfare effects of particulate matter in the atmosphere was provided in association with the listing of particulate matter as a criteria pollutant.

Docket

The docket is an organized and complete file of all the information considered by EPA in the development of the rulemaking. The docket is a dynamic file, since 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 intelligently and effectively participate in the rulemaking process. Along with the statement of basis and purpose of the promulgated standards and EPA responses to significant comments, the contents of the docket will serve as the record in case of judicial review [Section 307(d)(7)(A)].

Miscellaneous

The effective date of this regulation is November 12, 1980. Section 111 of the Clean Air Act provides that standards of performance become effective upon promulgation and apply to affected facilities, construction or modification of which was commenced after the date of proposal (February 4, 1980).

It should be noted that standards of performance for new stationary 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, and non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated. [Section 111(a)(1)]

Although there may be emission control technology available that can reduce emissions below those levels required to comply with standards of performance, this technology might not be selected as the basis of standards of performance due to costs associated with its use. Accordingly, standards of performance should not be viewed as the ultimate in achievable emission control. In fact, the Act requires (or has the potential for requiring) the imposition of a more stringent emission standard in several situations.

For example, applicable costs do not necessarily play as prominent a role in determining the "lowest achievable emission rate" for new or modified sources locating in nonattainment areas; i.e., those areas where statutorily-mandated health and welfare standards are being violated. In this respect, Section 173 of the Act requires that new or modified sources constructed in an area which exceeds the National Ambient Air Quality Standard (NAAQS) must reduce emissions to the level which reflects the "lowest achievable emission rate" (LAER), as defined in Section 171(3) for such category of source. The statute defines LAER as that rate of emissions based on the following, whichever is more stringent:

> (A) The most stringent emission limitation which is contained in the implementation plan of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable; or
>
> (B) The most stringent emission limitation which is achieved in practice by such class or category of source.

In no event can the emission rate exceed any applicable new source performance standard [Section 171(3)].

A similar situation may arise under the prevention of significant deterioration of air quality provisions of the Act (Part C). These provisions require that certain sources [referred to in Section 169(1)] employ "best available control tehnnology" (BACT) as defined in Section 169(3) for all pollutants regulated under the Act. Best available control technology (BACT) must be determined on a case-by-case basis, taking energy, environmental, and economic impacts and other costs into account. In no event may the application of BACT result in emissions of any pollutants which will exceed the emissions allowed by an applicable standard established pursuant to Section 111 (or 112) of the Act.

In any event, State Implementation Plans (SIPs) approved or promulgated under Section 110 of the Act must provide for the attainment and maintenance of National Ambient Air Quality Standards designed to protect public health and welfare. For this purpose, SIPs must in some cases require greater emission reductions than those required by standards of performance for new sources.

Finally, States are free under Section 116 of the Act to establish even more stringent limits than those established under Section 111 or those necessary to attain or maintain the NAAQS under Section 110. Accordingly, new sources may in some cases be subject to limitations more stringent than EPA's standards of performance under Section 111, and prospective owners and operators of new sources should be aware of this possibility in planning for such facilities.

EPA will review this regulation four 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. The reporting requirements in this regulation will be reviewed as required under EPA's sunset policy for reporting requirements in regulations.

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 the promulgated regulations and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the promulgated standards to insure that the standards would represent the best system of emission reduction considering costs. The economic impact assessment is included in the Background Information Document.

Dated: November 4, 1980.

Douglas M. Costle,
Administrator.

PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

40 CFR Part 60 is amended by adding a new subpart as follows:

Subpart PP—Standards of Performance for Ammonium Sulfate Manufacture

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

Subpart PP—Standards of Performance for Ammonium Sulfate Manufacture

§ 60.420 Applicability and designation of affected facility.

(a) The affected facility to which the provisions of this subpart apply is each ammonium sulfate dryer within an ammonium sulfate manufacturing plant in the caprolactam by-product, synthetic, and coke oven by-product sectors of the ammonium sulfate industry.

(b) Any facility under paragraph (a) of this section that commences construction or modification after February 4, 1980, is subject to the requirements of this subpart.

§ 60.421 Definitions.

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

"Ammonium sulfate dryer" means a unit or vessel into which ammonium sulfate is charged for the purpose of reducing the moisture content of the product using a heated gas stream. The unit includes foundations, superstructure, material charger systems, exhaust systems, and integral control systems and instrumentation.

"Ammonium sulfate feed material streams" means the sulfuric acid feed stream to the reactor/crystallizer for synthetic and coke oven by-product ammonium sulfate manufacturing plants; and means the total or combined feed streams (the oximation ammonium sulfate stream and the rearrangement reaction ammonium sulfate stream) to the crystallizer stage, prior to any recycle streams.

"Ammonium sulfate manufacturing plant" means any plant which produces ammonium sulfate.

"Caprolactam by-product ammonium sulfate manufacturing plant" means any plant which produces ammonium sulfate as a by-product from process streams generated during caprolactam manufacture.

"Coke oven by-product ammonium sulfate manufacturing plant" means any plant which produces ammonium sulfate by reacting sulfuric acid with ammonia recovered as a by-product from the manufacture of coke.

"Synthetic ammonium sulfate manufacturing plant" means any plant which produces ammonium sulfate by direct combination of ammonia and sulfuric acid.

§ 60.422 Standards for particulate matter.

On or after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator of an ammonium sulfate dryer subject to the provisions of this subpart shall cause to be discharged into the atmosphere, from any ammonium sulfate dryer, particulate matter at an emission rate exceeding 0.15 kilogram of particulate per megagram of ammonium sulfate produced (0.30 pound of particulate per ton of ammonium sulfate produced) and exhaust gases with greater than 15 percent opacity.

§ 60.423 Monitoring of operations.

(a) The owner or operator of any ammonium sulfate manufacturing plant subject to the provisions of this subpart shall install, calibrate, maintain, and operate flow monitoring devices which can be used to determine the mass flow of ammonium sulfate feed material streams to the process. The flow monitoring device shall have an accuracy of ± 5 percent over its range. However, if the plant uses weigh scales of the same accuracy to directly measure production rate of ammonium sulfate, the use of flow monitoring devices is not required.

(b) The owner or operator of any ammonium sulfate manufacturing plant subject to the provisions of this subpart shall install, calibrate, maintain, and operate a monitoring device which continuously measures and permanently records the total pressure drop across the emission control system. The monitoring device shall have an accuracy of ± 5 percent over its operating range.

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

§ 60.424 Test methods and procedures.

(a) Reference methods in Appendix A of this part, except as provided in § 60.8(b), shall be used to determine compliance with § 60.422 as follows:

(1) Method 5 for the concentration of particulate matter.

(2) Method 1 for sample and velocity traverses.

(3) Method 2 for velocity and volumetric flow rate.

(4) Method 3 for gas analysis.

(b) For Method 5, the sampling time for each run shall be at least 60 minutes and the volume shall be at least 1.50 dry standard cubic meters (53 dry standard cubic feet).

(c) For each run, the particulate emission rate, E, shall be computed as follows:

$$E=Q_{sd}\times C_s\div 1000$$

(1) E is the particulate emission rate (kg/h),

(2) Q_{sd} is the average volumetric flow rate (dscm/h) as determined by Method 2; and

(3) C_s is the average concentration (g/dscm) of particulate matter as determined by Method 5.

(d) For each run, the rate of ammonium sulfate production, P (Mg/h), shall be determined by direct measurement using product weigh scales or computed from a material balance. If production rate is determined by material balance, the following equations shall be used.

(1) For synthetic and coke oven by-product ammonium sulfate plants, the ammonium sulfate production rate shall be determined using the following equation:

$$P=A\times B\times C\times 0.0808$$

where:

P=Ammonium sulfate production rate in megagrams per hour.
A=Sulfuric acid flow rate to the reactor/crystallizer in liters per minute averaged over the time period taken to conduct the run.
B=Acid density (a function of acid strength and temperature) in grams per cubic centimeter.
C=Percent acid strength in decimal form.
0.0808=Physical constant for conversion of time, volume, and mass units.

(2) For caprolactam by-product ammonium sulfate plants the ammonium sulfate production rate shall be determined using the following equation:

$$P=D\times E\times F\times (6.0\times 10^{-5})$$

where:

P=Production rate of caprolactam by-product ammonium sulfate in megagrams per hour.
D=Total combined feed stream flow rate to the ammonium sulfate crystallizer before the point where any recycle streams enter the stream, in liters per minute averaged over the time period taken to conduct the test run.
E=Density of the process stream solution in grams per liter.
F=Percent mass of ammonium sulfate in the process solution in decimal form.
6.0×10^{-5}=Physical constant for conversion of time and mass units.

(e) For each run, the dryer emission rate shall be computed as follows:

$$R=E/P$$

where:

(1) R is the dryer emission rate (kg/Mg);

(2) E is the particulate emission rate (ky/h) from (c) above; and

(3) P is the rate of ammonium sulfate production (Mg/h) from (d) above.

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

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