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Research Triangle Park NC 27711

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Sewage Treatment Plant NSPS: Responses to Comments on April 1986 Proposed Revisions

NSPS

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Emission Standards Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

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1.0 SUMMARY

On April 18, 1986, the U. S. Environmental Protection Agency (EPA) proposed revisions to the monitoring, recordkeeping, reporting and testing requirements associated with the new source performance standards (NSPS) for sewage treatment plants (51 FR 13424) under authority of Section 114 of the Clean Air Act. The standard limits atmospheric emissions of particulate matter (PM) from new, modified, or reconstructed sewage sludge incinerators. The April 18, 1986, Federal Register notice proposed additional monitoring, recordkeeping, and reporting requirements and additional performance test requirements for owners and operators of existing and future sewage sludge incinerators subject to the NSPS.

Public comments were requested on the proposal in the Federal Register notice. The public comment period was extended 1 month to July 17, 1986, to allow additional commenters to participate. A total of nine comment letters was received. Commenters included industry representatives, an environmental group, and a State agency. The public comments are summarized in this document along with responses to the comments. The comments and responses serve as the basis for changes and clarifications to the revised standards made between proposal and promulgation.

1.1 SUMMARY OF CHANGES SINCE PROPOSAL

In response to the public comments, several changes and clarifications have been made to the proposed monitoring, reporting, and performance test requirements for sewage sludge incinerators. No comments were received on the proposed recordkeeping requirements. The comments and the basis for these changes are included in Section 2.0. These changes are:

- The proposed alternative requirement for plants to monitor incinerator exhaust flow rate in lieu of oxygen content of incinerator exhaust, temperature profile of incinerator, fuel use, and sludge moisture and volatiles content has been withdrawn.

- The proposed monitoring, recordkeeping, and reporting requirements for incinerator temperature, fuel use, and sludge moisture and volatiles content have been modified to exempt facilities from which particulate emissions are measured to be less than or equal to 0.75 lb/ton of dry sludge input.
- A requirement for plants to continuously monitor and record the sludge feed rate to the incinerator has been added; hourly averages of sludge feed rate are to be reported for days when a decrease in scrubber pressure drop or increase in exhaust gas oxygen content is reported. This requirement applies only to facilities from which particulate emissions are measured to be greater than 0.75 lb/ton of dry sludge input.
- The specific requirements for locating oxygen (O_2) monitors has been replaced with a general requirement that monitors be placed upstream of sources of dilution air.
- The incinerator exhaust oxygen content level triggering reporting requirements has been made uniform for all facilities: 3 percent greater than level measured during the most recent performance test.
- The number of thermocouples required in multiple hearth incinerators to measure the temperature profile of the incinerator has been reduced from three thermocouples per hearth to one thermocouple per hearth in the cooling and drying zones and at least two thermocouples per hearth in the combustion zone. Similarly, electric incinerators will be required to have one thermocouple in each of the drying and cooling zones and at least two thermocouples in the combustion zone and fluidized bed incinerators will be required to have one thermocouple in the bed and the outlet of the incinerator.
- The performance test requirements for metals analysis have been modified to allow plants to analyze for arsenic, cadmium, chromium, copper, nickel, selenium, and zinc either by atomic absorption or neutron activation.

1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

The environmental, energy, and economic impacts of the proposed standards are described in the Federal Register proposal notice (51 FR 13431). The changes in the standard since proposal will have no effect on the impacts of the proposed standard with one exception. The added requirement for monitoring and recordkeeping of sludge feed rate may represent a small cost to some plants. Equipment to monitor sludge feed rate is expected to be available at most facilities due to the existing requirements of 40 CFR 60.153(a)(2) for measuring sludge feed rate during performance tests. However, recording instrumentation may need to be added. The estimated annual cost of this instrumentation is less than $1,000 per incinerator.

Similarly, the exemption from monitoring, recordkeeping, and reporting of incinerator temperature, fuel use, and sludge moisture and volatiles content for facilities that comply with the particulate emission limit at a level of 0.75 lb/ton of dry sludge input or less may reduce compliance cost for some facilities. The estimated annual cost would be reduced by about $12,000 per incinerator.

2.0 SUMMARY OF PUBLIC COMMENTS AND RESPONSES

This section includes responses to public comments on the proposed revisions to the monitoring, recordkeeping, reporting and testing requirements associated with the sewage treatment plant NSPS. A list of the commenters, their affiliations, and the EPA docket numbers assigned to their correspondence is given in Table 2-1. The comments are organized according to topic in the following sections.

2.1 MONITORING REQUIREMENTS

Comment — Location of O_2 Monitors

Three commenters (IV-D-1, IV-D-4, and IV-D-6) discussed the topic of the required O_2 monitor location.

The first commenter (IV-D-1) cited plugging of suction piping and "numerous operational and maintenance problems" in his facility's experiences with O_2 analyzers located upstream of the scrubber. Their electrochemical O_2 analyzer located downstream of the scrubber, however, has worked well for four years. The commenter disagrees with EPA's statement that the injection of center shaft cooling air into the exhaust stack results in erroneous O_2 measurements if the O_2 analyzer is located downstream of the scrubber. According to the commenter, the center shaft cooling air enters the stack downstream from the O_2 analyzers in most facilities. The commenter further pointed out that erroneous O_2 measurements can result even when the monitor is located on the top hearth of the incinerator due to influx of air through the sludge inlet.

TABLE 2-1. LIST OF COMMENTERS ON PROPOSED REVISIONS TO THE SEWAGE TREATMENT PLANT NSPS

Docket Item Number[a]	Date	Commenter and Affiliation
IV-D-1	June 12, 1986	Robert P. Dominak, P.E. Northeast Ohio Regional Sewer District 3826 Euclid Avenue Cleveland, Ohio 44115-2504 (216) 881-6600
IV-D-2	June 13, 1986	Eric R. Jankel Narragansett Bay Commission 44 Washington Street Providence, Rhode Island 02903 (401) 277-6680
IV-D-3	June 4, 1986	William E. Brennan Central Contra Costa Sanitary District 5019 Imhoff Place Martinez, California 94553-4392 (415) 689-3890
IV-D-4	June 12, 1986	Al Baturay, P.E. Carlson Associates Technical Services, Inc. 7594 Oakwood Avenue Cleveland, Ohio 44131 (216) 642-0199
IV-D-5	June 17, 1986	Frances Dubrowski, Jessica Landman, Joan Becker Natural Resources Defense Council 1350 New York Avenue, N.W. Washington, D.C. 20005 (202) 783-7800
IV-D-6	June 13, 1986	Charlie J. Williams Detroit Water and Sewerage Department Water Board Building Detroit, Michigan 48226 (313) 224-4800

TABLE 2-1. LIST OF COMMENTERS ON PROPOSED REVISIONS TO THE SEWAGE TREATMENT PLANT NSPS (Continued)

Docket Item Number[a]	Date	Commenter and Affiliation
IV-D-7	June 27, 1986	Jorge H. Berkowitz, Ph.D. State of New Jersey Department of Environmental Protection John Fitch Plaza, CN 027 Trenton, New Jersey 08625 (609) 292-5383
IV-D-8	July 17, 1986	David D. Doniger and Ellen S. Kern Natural Resources Defense Council 1350 New York Avenue, N.W. Washington, D.C. 20005 (202) 783-7800
IV-D-9	August 21, 1986	Helen Boyer Metropolitan Waste Control Commission: Twin Cities Area 350 Metro Square Building Saint Paul, Minnesota 55101 (612) 222-8423

[a]The docket number for this project is A-84-03. Dockets are on file at EPA's Central Docket Section in Washington, D.C.

A second commenter (IV-D-4) stated that measuring O_2 accurately at the uppermost hearth is difficult because of air leaking from the openings at the furnace shell and uneven gas flow within the furnace. A representative sample of gas flow at this location would require a long probe or sampling tube and would "present mechanical problems." The commenter suggested that the "gas outlet breaching" would be a more appropriate location for measuring O_2 content of incinerator exhaust gas.

The third commenter (IV-D-6) agreed with Commenter IV-D-4 on this last point, stating that his facility has located its oxygen analyzers in the breach of the incinerators, upstream of any source of ambient air entering the scrubber, rather than in the first hearth, and believes this location should be acceptable.

Response

The proposed revisions (51 FR 13432) require incinerator owners and operators of sewage sludge incinerators to monitor incinerator excess air levels. As with the scrubber pressure drop monitoring requirement, the main purpose of monitoring excess air is to identify significant deviations from conditions during compliance tests that may be indicative of increased particulate emissions. The monitoring of incinerator excess air levels can be accomplished by measuring the oxygen content, which is directly related to excess air levels, in the exhaust gases from the incinerator.

The proposed revisions required the following specific locations for monitoring oxygen levels. In multiple-hearth incinerators, oxygen levels would be monitored at the uppermost hearth. For fluidized-bed and other incinerator types, oxygen levels would be measured at any point upstream of the inlet to the emissions control device. These locations were specified to avoid erroneous measurements due to in-leakage of air. As pointed out by one commenter (IV-D-1), many multiple-hearth incinerators are designed with the center shaft cooling air by-pass injected downstream of the scrubber (not in the incinerator exhaust), so that effects of this in-leakage can be avoided even if the monitor is placed after the scrubber. Another commenter pointed out that existing O_2 monitors at other locations besides the top

hearth of multiple hearth incinerations yield acceptable O_2 measurements since they are upstream of any significant source of air in-leakage. The commenters' facilities already have oxygen monitors which would have to be relocated under the proposed revision.

To avoid unnecessary relocation of existing O_2 monitors, EPA is revising the requirement for oxygen monitors by removing the specific location requirements for multiple-hearth and fluidized bed incinerators. In its place, a requirement has been added that O_2 monitors be located upstream of significant sources of air dilution including center shaft cooling air bypass inlets, fans, and ambient air recirculation dampers.

Comment — Location of Pressure Drop Monitors

Two commenters (IV-D-6 and IV-D-4) questioned the location requirement for pressure drop monitors. The first commenter (IV-D-6) explained that his facility uses ambient air recirculation dampers located upstream of the scrubbers which allows them to reduce the airflow from the incinerator without reducing the pressure drop across the scrubber. The commenter questioned whether his current practice of measuring pressure drop across the scrubber would meet the location requirements for measuring pressure drop or if additional differential pressure cells would need to be installed at other locations.

The second commenter (IV-D-4) stated his opinion that for incineration systems equipped with venturi scrubbers and impingement plate subcoolers, monitoring the pressure drop at the venturi would be more meaningful since the scrubber collection efficiency is a direct function of the pressure drop at the venturi but not necessarily the pressure drop at the subcooler. He further pointed out that venturi scrubbers on recently installed sludge incineration systems typically have adjustable throats and are equipped with pressure drop monitors that are used to control pressure drop at a constant level.

Response

The proposed revisions (51 FR 13432) require owners and operators of sewage sludge incinerators to continuously monitor and record the pressure drop of the gas flow "through the wet scrubbing device." The primary purpose of this requirement is to detect significant decreases in scrubber pressure drop relative to the pressure drop measured during performance testing that may be indicative of increased particulate emissions. Secondarily, the requirement will provide data that EPA may use in the next 4-year review of the standard to establish a correlation between scrubber pressure drop and particulate emissions that would apply to all incinerators. Both intents will be served by the existing scrubber pressure drop monitoring schemes described by the commenters. Further, for incinerators equipped with variable throat venturis with built-in pressure monitors, the location of the existing monitor will meet the requirements of the standard. Some facilities may have to relocate or add new pressure drop monitoring equipment to comply with the revised standard. However, EPA believes that the location of existing pressure drop sensors used to monitor the operation of wet scrubbers is probably adequate in most cases.

Comment — Number and Location of Thermocouples

Four commenters (IV-D-6, IV-D-1, IV-D-3, and IV-D-9) addressed the proposed requirement for monitoring the incinerator operating temperature. Specifically, the commenters questioned the need for three thermocouples per hearth in multiple hearth incinerators and requested clarification on the requirements for locating and recording the thermocouples.

The multiple hearth incinerators operated by Commenter IV-D-6 currently are installed with one thermocouple per hearth. According to the commenter, the proposed requirement of three thermocouples per hearth would be "excessive and redundant." The commenter further stated that his facility would have to install an additional 324 thermocouples to comply with this proposed change to the regulation and that "major modifications" would have to be made to their burner management system in order to comply with this requirement.

The second commenter (IV-D-1) recommended that no more than two thermocouples be required in the incinerator hearths in the drying and burning zone and that only one thermocouple be recorded, with the second being monitored by a remote indicator. The incinerators operated by this commenter currently are installed with one thermocouple in the drying and cooling zones and three thermocouples in the burning zone. One thermocouple in each hearth is recorded and the additional thermocouples are monitored by auxiliary indicators.

The third commenter (IV-D-3) questioned whether the temperature to be recorded was to be an average of the three thermocouples' temperatures, or if each of the three readings was to be recorded separately. The commenter added that the location of the thermocouple on the hearth affected its accuracy, and that proposed Section 60.153, paragraph (a)(6) was not clear about whether the thermocouples were to have a common location or if each was to be placed at a different spot on the hearth. The commenter also stated that since the closeness of the operating burner to the thermocouple will affect the thermocouple's accuracy, adding more thermocouples could improve accuracy but would not seem to be necessary since one thermocouple per hearth does an adequate job of showing the trends in hearth temperature.

The fourth commenter (IV-D-9) remarked that "cooling hearth temperatures have no useful purpose for process control and should be omitted from the requirement." He added that a requirement for three thermocouples was "unsupported," asserting that "one properly located and maintained thermocouple per hearth is satisfactory for process control relative to air pollution emissions and slagging control." He further stated that the possibility of exceeding "critical operating temperature" increases with more than one controlling thermocouple per hearth, and that "automatic shutdown of the entire system" would then occur. The commenter concluded that installation and maintenance costs for his firm, were they required to install the additional thermocouples, would exceed the cost estimated in the proposed changes to the rule.

Response

The proposed revisions (51 FR 13432) require owners and operators of sewage sludge incinerators to monitor the temperature profile of the incinerator and report temperature data for any period that the monitored scrubber pressure drop or incinerator exhaust gas oxygen content deviates by a specified amount the levels measured during the most recent compliance test. Information on incinerator operating temperatures will be used to identify whether temperature control problems may be responsible for excessive cooling air requirements resulting in potential increases in particulate matter emissions. EPA agrees with the commenters that only one operating thermocouple is adequate for providing information on incinerator temperature trends in the drying and cooling hearths of multiple hearth incinerators. However, the practice reported by one commenter of operating redundant thermocouples is considered by EPA to be good operating practice in the event that one or more thermocouples become inoperable. In the combustion zone, multiple thermocouples may be necessary to determine representative hearth temperatures due to the larger fluctuation in hearth temperatures (i.e., from startups and shutdowns) and due to fluctuations in temperature within the hearth (i.e., depending on proximity to the burner(s), access hatches, drop holes, etc.). Further, EPA believes it is common industry practice to operate several thermocouples for control purposes in the combustion hearths of multiple-hearth incinerators. For these reasons, EPA is modifying the requirement for monitoring incinerator operating temperatures to require one thermocouple per hearth in the drying and cooling hearths and two or more thermocouples per hearth in the combustion hearths of multiple hearth incinerators. Similarly, EPA is modifying the requirements for electric and fluidized bed incinerators to require one thermocouple in each of the drying and cooling zones and at least two thermocouples in the combustion zone of electric incinerators and one thermocouple in the bed and outlet of fluidized bed incinerators. However, it should be noted that EPA encourages the use of redundant instrumentation (i.e., two or more thermocouples) in all incineration types.

The location of the thermocouples within the incinerator is not specified by EPA. It is intended that facilities utilize currently installed thermocouples to the extent practicable. It is important that thermocouples remain in the same location during normal incineration operation and during the compliance test. This will help ensure against false readings of incinerator temperature trends from changing the location where temperatures is monitored compared to changes in actual operation temperatures. The EPA believes it is good practice to locate the thermocouples away from incinerator features such as burners, access hatches, and drop holes to minimize fluctuations in temperature resulting from these features.

When temperature is monitored by more than one thermocouple in a hearth (or zone), facilities should report the average hearth temperature as part of the incinerator temperature profile. It is important that temperatures be reported on the same basis as they were recorded during the compliance test.

Finally, as described in response to the following comment, some incinerators will be exempt from continuous monitoring, recording, and reporting requirements for incinerator temperature.

Comment — Need and Basis for Monitoring Requirements

Four commenters (IV-D-2, IV-D-6, IV-D-8, and IV-D-9) commented on the need and basis for the proposed monitoring requirements.

One commenter (IV-D-9) stated that because of the hourly and daily variability in the sludge fuel feed, the operating conditions for a given sludge incinerator are neither constant nor predictable. Further, the commenter stated that a direct and predictable correlation between particulate emissions and incinerator operating conditions has not been verified by actual incinerator operating experience. Since direct measurement of particulates cannot be accomplished continuously with current technology, the commenter suggested that EPA consider requiring more frequent performance test in lieu of the additional monitoring requirements. According to the commenter, such an approach would be preferable because it

would provide information on direct measurement of pollutants instead of indirect information based on monitoring operating parameters. Further, the commenter stated that annual or more frequent performance tests are both feasible and affordable. A second commenter (IV-D-6) made a similar recommendation, stating that his facility performs annual emission tests using Methods 1-5 and performs hourly opacity readings during daylight hours. He recommended that EPA reevaluate the need for increased monitoring of the incinerator process for facilities such as his.

With regard to scrubber pressure drop, Commenter IV-D-9 questioned the existence of a "direct linear correlation between scrubber pressure drop and particulate emissions" and said that performance tests at his own facility have shown no such correlation. He suggested, as an alternative to the proposed scrubber pressure drop reporting requirement, requiring facilities to conduct studies to determine whether there is a correlation between particulate emissions and scrubber pressure drop. If facilities found such a correlation, the Agency could then "establish the appropriate minimum scrubber pressure drop to be included in the air operating permit for the [particular] facility."

The third commenter (IV-D-2) suggested that if EPA is trying to collect operating data on sludge incinerators in order to correlate efficiency of particulate emission control systems versus specific incinerator operating conditions, then only those facilities that must conduct performance tests should be required to install the proposed new equipment and comply with "routine data collection and reporting requirements."

The final commenter (IV-D-8) disagreed with the previous commenters, stating that a correlation between specific operating variables (including pressure drop) and performance levels exists, but that EPA was unable to quantitatively establish such a correlation due to its inability, given the available data base, to account for other relevant variables. The commenter stated that higher pressure drops and specific operating practices reduce particulate emissions within a particular incinerator. He cited the ICFAR-type optimization programs which show a very large potential to reduce

PM and fuel consumption and stated that incinerators that have not undergone such optimization programs should not be described by EPA as "well operated."

Response

As discussed in the preamble to the proposed revisions (51 FR 13427), EPA has been unable to establish a direct quantitative correlation between particulate emissions and scrubber pressure drop that would apply to all incinerators. The EPA is familiar with the ICFAR optimization program, the primary purpose of which was to investigate incinerator operating parameters to optimize incinerator fuel consumption. At one of the facilities included in the ICFAR study, particulate emission measurements were taken in conjunction with the incinerator operating modifications. Based on the findings at this one plant, it appears that incinerator operating practices that optimize fuel consumption also reduce particulate emissions. Accordingly, EPA encourages plants to undergo optimization programs such as those implemented by ICFAR. However, emissions data from one facility are an insufficient basis to require all plants to undergo optimization programs.

EPA disagrees with the commenters' (IV-D-6, IV-D-9) recommendations that periodic performance tests and/or opacity monitoring be required instead of incinerator and control device monitoring. Annual emission tests indicate if a facility is in compliance only 4 to 5 days out of the year. Such a test may or may not be representative of the variations in incinerator operating conditions that occur throughout the year. Further, opacity measurements may not be a direct indicator of particulate emissions. Water vapor would tend to condense after leaving the wet scrubber and could be measured by opacity readings as particulate emissions. Opacity monitoring alone also would not provide information on how the incinerator has been operated or how well the control equipment functions that would be useful in evaluating causes of potential high particulate emissions.

In response to the commenter (IV-D-9) who recommended that facilities be required to conduct "studies" based on performance tests to establish an

appropriate scrubber pressure drop requirement for each incinerator, EPA believes such a requirement would be more burdensome than the proposed monitoring requirements. However, based on the data recorded by facilities as a result of the monitoring requirements, it may be possible to adopt the approach recommended by the commenter during the next four-year review of the standard.

The intent of the monitoring requirements is not, as the third commenter (IV-D-2) stated, to collect operating data that can be used to correlate efficiency of particulate emission control systems versus specific incinerator operating conditions. Although the data recorded by facilities as a result of these requirements will be useful to EPA when performing subsequent reviews of the standard, the primary purpose of the requirements is to provide EPA compliance personnel with information on incinerator and control device operating practices that might result in increased particulate emissions from these sources after the initial performance test.

After consideration of these comments, EPA reaffirms its position in the preamble to the proposed regulation (51 FR 13429) that monitoring of scrubber pressure drop, incinerator exhaust gas oxygen content, incinerator temperature, fuel use, and sludge moisture and volatiles content are reasonable and will be useful in detecting an analyzing periods of potential excess particulate emissions. However, EPA recognizes that compliance with some of these monitoring requirements may not be necessary for all facilities, particularly those which are currently operated in such a way that particulate emissions are well below the standard of 0.65 g of particulate per kg of dry sludge input (1.3 lb/ton). Accordingly, EPA has decided to exempt those incinerators with particulate emission measurements of less than or equal to 0.38 g/kg of dry sludge input (0.75 lb/ton) from all continuous monitoring recording, and reporting requirements except scrubber pressure drop and incinerator exhaust gas oxygen content. All sludge incinerators subject to the NSPS will be required to conduct a performance test following promulgation of these revisions during which all control device and incinerator parameters (including incinerator temperature, fuel use, sludge feed rate, and sludge moisture and volatiles content) are monitored. Following the performance test, all facilities will

be required to monitor, record and report scrubber pressure drop and incinerator exhaust gas oxygen as proposed. However, following the performance test, only those facilities from which particulate emissions measurements exceed 0.38 g/kg of dry sludge input (0.75 lb/ton) will be required to continuously monitor, record, and report incinerator temperature, fuel use, and sludge feed rate, and to perform daily sampling and analysis of sludge moisture and volatiles content. EPA believes this exemption is reasonable because it will focus information collection on those facilities for which particulate emission measurements indicate a facility is operating close to the standard. Variations in incinerator operation at these facilities are more likely to result in excess emissions than at facilities where compliance was demonstrated by a wider margin. This exemption is also expected to provide incentive to incinerator owners and operators to evaluate and identify those control device and incinerator operating conditions which ensure low particulate emissions prior to the performance test.

Comment — Incinerator Exhaust Oxygen Measurement

Three commenters took issue with the proposed monitoring requirements for oxygen content in the incinerator exhaust.

The first commenter (IV-D-3) disagreed with EPA's contention that limiting the amount of air in excess of that required for combustion and temperature control would not impose any unreasonable restrictions on operating practices. If the incinerator is equipped with afterburners, he stated, the increased afterburner temperature and air flow will increase the volume of incinerator exhaust but should at the same decrease particulate discharge. The commenter contended that limiting the volume of exhaust gas flow would both limit the afterburner's effectiveness in reducing particulate emissions, and limit the waste-heat boiler's steam production.

The second commenter (IV-D-4) disagreed with EPA's findings regarding excess air requirements for multiple-hearth furnaces, stating that some of these furnaces are designed and operated at higher than 100 percent excess air rates to control individual hearth temperatures, particularly when high

solid concentration and high calorific sludges are being incinerated. The high excess air rates for combustion of these sludges are necessary to protect equipment from high temperatures and prevent fusion of ash in furnaces.

Commenter IV-D-9 stated that the proposed changes to the regulation "fail to consider actual operating experience of new sewage sludge processing facilities" in requiring continuous monitoring and recording of the oxygen content of flue gas in the top hearth of each multiple-hearth sludge incinerator (51 FR 13432). The commenter cited lime addition to sludge in the dewatering phase ("a process still commonly used by many communities") as a factor in preventing slagging at 75-100 percent excess air and 1800^{o}F combustion hearth temperature. However, the commenter's facility has abandoned the practice of adding lime. The facility has solved the slagging problem that results by reducing the combustion hearth temperature to 1600^{o}F, using more excess air for cooling. He added that although "the amount of excess air required depends on sludge moisture content and heat content, ... it typically will be 200 $\pm$ 50 percent." Therefore, the commenter reasoned, continuous monitoring and recording of O_2 content in flue gas "provides inconsequential data regarding oxygen requirements for actual combustion," since the amount of excess air facilities such as his use is much more than required for complete combustion. The commenter recommended, as an alternative, "discretionary application" of the O_2 monitoring requirement.

Response

As stated previously, the primary purpose of the requirement for measuring oxygen content of the incinerator exhaust is to provide information on incineration excess air levels. Significant increases in excess air levels over that measured during the performance test may be indicative of increased particulate emissions. This trend applies to all sludge incinerators regardless of the typical excess air operating levels. The preamble to the proposed revisions (51 FR 13429) stated that "limiting the amount of air in excess of that required for combustion and temperature

control would not impose any unreasonable restrictions on operating practices." Based on the comments received, EPA acknowledges that this conclusion is not applicable to all incinerators. For example, EPA recognizes that incinerators equipped with afterburners, that burn high solids and high calorific sludges, or that operate at reduced temperatures to prevent slagging, may be operated at characteristically higher excess air levels than other incinerators. The requirement to measure and report significant deviations in incinerator exhaust oxygen content does not restrict these facilities from operating at higher excess air levels. Because this level will be recorded during the performance test, these facilities will be required to report only those periods when measured oxygen content exceeds the performance test level by 3 percent. This requirement is as valid for these facilities as for facilities with incinerators operated at lower excess air levels because significant increases in excess air levels for these incinerators may also be indicative of increased particulate emissions over that measured during the performance test.

Comment — Exhaust Gas Volume Measurement

Three commenters (IV-D-4, IV-D-1, and IV-D-9) commented on the proposed provision that owners and operators be allowed to measure exhaust gas volumetric flowrate as an alternative to monitoring and recording oxygen content of incinerator exhaust gas (51 FR 13430).

The first commenter (IV-D-4) stated that the measurement of gas flow from the incinerator does not indicate how the incinerator has been operated or how well control equipment functions. He gave three examples of undesirable incineration operating practices which might still yield acceptable exhaust gas volumetric flowrates. First, the furnace could be overloaded with a high sludge feed rate which may cause incomplete combustion and high uncontrolled particulate emissions, yet the exhaust gas flow might be within the normal range of operation. Second, the furnace operation may be out of control with higher than normal gas outlet temperature, while the gas flow may be within the design range. And third,

incineration with a very high excess air rate and lower sludge feed rate than normal and lower than acceptable gas outlet temperature may product gas flow within the design rate.

The second commenter (IV-D-1) stated that he did not know of an accurate and reliable way to measure and record continuously the exhaust gas volumetric flowrate. He, therefore, recommended that EPA not enact this change.

The third commenter (IV-D-9) said that, from his facility's experience, this requirement "is not supported by any data from air pollutant emissions control." The commenter included with his statement a graph which showed, he said, "no correlation between particulate emissions and flue gas flow rate." The reason for that is that flue gas flow rate is a function of sludge feed and heat content, both of which are "variable" in an incinerator.

Response

The option for plants to monitor and report periods of excessive incinerator exhaust gas flowrate was included in the proposed revisions to the standard to provide plant owners and operators that do not already monitor and record the oxygen content of incinerator exhaust, temperature profile of incinerator, fuel usage, and sludge moisture and volatiles content a less burdensome monitoring and reporting alternative. As noted above, one commenter (IV-D-9) provided test data from his facility which showed no correlation between particulate emissions and incinerator exhaust gas flow rate. Another commenter (IV-D-4) described incinerator operating conditions which could result in elevated particulate emissions within normal incinerator exhaust rates. Based on review of these comments, EPA now believes that measurement of incinerator exhaust gas alone would be insufficient for detecting all periods of potential increased particulate emissions. To be effective, other incinerator operating parameters would have to be measured such as incinerator temperature, sludge feed rate, and sludge moisture and volatiles content. Requiring these additional monitoring requirements along with the requirement for monitoring exhaust

gas flow would negate the intent of providing plants with a less burdensome monitoring alternative. Further, EPA believes that information on incinerator exhaust gas flow alone would provide insufficient data for correlating emission rates with specific incinerator operating parameters for those facilities with particulate emissions measurements near the standard. For these reasons, EPA has decided to drop the alternative of measuring incinerator exhaust flow and require all plants to monitor oxygen content of incinerator exhaust, temperature profile, fuel use, sludge feed rate, and sludge volatiles and moisture content in addition to scrubber pressure drop. As discussed previously, facilities with particulate emission measurements less than or equal to 0.38 g/kg of dry sludge input (0.75 lb/ton) will be required to continuously monitor, record, and report only the scrubber pressure drop and incinerator exhaust oxygen content.

Comment — Frequency of Pressure Drop Measurements

The commenter (IV-D-6) stated that his facility currently monitors and records hourly the pressure drop across the scrubber. He pointed out that strip chart recorders and associated instrumentation would have to be installed to comply with the proposed continuous monitoring requirement.

Response

Hourly measurements of scrubber pressure drop provide only an instantaneous indication of scrubber operation and would not provide a record of the scrubber drop variation over the 60 minute period. This variation is important in detecting periods when the operation of the incinerator (and control device) may result in increased emissions. For this reason, EPA is requiring plants to report hourly averages of continuous pressure drop measurements when they are less than, by a specified amount, the average pressure drop measured during the most recent performance test.

Comment — O_2 Monitor Calibration Requirements

Two commenters (IV-D-6 and IV-D-1) objected to the proposed requirement that O_2 analyzers be calibrated every 24 hours (51 FR 13432). The first commenter said that "daily calibration would be excessive based on our considerable experience in keeping this equipment in calibration, adding that daily calibration would not be "cost effective" and that their own unspecified practices with respect to calibration should be acceptable. The second commenter agreed, saying that the proposed requirement to calibrate the analyzers once every 24 hours would not be practical.

A third commenter (IV-D-3) said that the proposed revision to the standard did not state clearly how the calibration was to be performed.

Response

The EPA believes that calibrating oxygen analyzers every 24 hours is necessary to ensure accurate measurements. Properly maintained and calibrated instruments would help eliminate the possibility of violations based on false readings by out-of-calibration instruments, thus reducing unnecessary reporting requirements. The time and expense to daily calibrate the oxygen analyzer is expected to be less burdensome than preparing a report for increased oxygen content resulting from an out-of-calibration instrument. Due to the wide variety of oxygen analyzers available, EPA recommends calibration according to methods prescribed by the manufacturer.

Comment — Alternative/Additional Monitoring Recommendations: Opacity

One commenter (IV-D-3) disagreed with EPA's finding that opacity measurements of sewage sludge incineration exhaust gas are infeasible (51 FR 13428), citing that incinerators at his facility are equipped with visible emission monitoring systems that have operated reliably for the past two years.

Response

EPA has investigated the feasibility of in-stack opacity monitors for sludge incinerator exhaust gas and concluded that, for most exhaust streams, they are not feasible. As explained in the preamble to the proposed revisions to the standard (51 FR 13428), water vapor would tend to condense after leaving the wet scrubber and would be measured by opacity monitors resulting in an inaccurate measure of particulate.

Although exhaust gas conditions at some facilities, such as Commenter IV-D-3's facility, may be amenable to opacity monitors, opacity monitoring would not be a substitute for the other proposed monitoring requirements. In addition, opacity monitoring alone would not provide information on how the incinerator has been operated or how well the control equipment functions that would be useful in identifying causes of high particulate emissions.

Comment Alternative/Additional Monitoring Recommendations: CO

One commenter (IV-D-7) supported EPA's proposed O_2 monitoring requirement (51 FR 13430), suggesting that CO be included in the monitoring since it is an indicator of combustion efficiency.

Response

Although CO monitoring would provide an indication of combustion efficiency, it would not necessarily indicate particulate emissions. The EPA is unaware of any additional benefit of requiring CO monitoring in addition to O_2 monitoring for detecting potential periods of increased particulate emissions.

Comment — Alternative/Additional Monitoring Recommendations: Sludge Feed Rate

In addition to measurement and recording of sludge moisture and volatile solids content (51 FR 13430), the commenter (IV-D-4) suggested that the amount of hourly sludge feed rate to the incinerator be added, under previously amended sections of the regulations, to the measurement requirement for evaluating incinerator performance.

Response

The current new source performance standard for sewage sludge incinerators requires owners and operators of sewage sludge incinerators to install, calibrate, maintain, and operate a flow measuring device which can be used to determine either the mass or volume of sludge charged to the incinerator during performance testing.

EPA agrees that information on continuous sludge feed rates would be beneficial to the Agency in evaluating causes for potential periods of increased particulate emissions (as indicated by changes in either scrubber pressure drop or oxygen content). The cost of monitoring and recording sludge feed rates would be minimal since the measuring devices have already been installed in compliance with performance testing requirements of the existing standard. Therefore, EPA is including this requirement in the promulgated standards. The amount of hourly sludge feed, either by mass or volume, will be monitored and recorded on a continuous basis. The amount of hourly sludge feed will be reported for periods that must be reported because of either variations in scrubber pressure drop or changes in exhaust gas oxygen content. This requirement will apply to all facilities from which particulate emission measurement exceed 0.38 g/kg of dry sludge input (0.75 lb/ton).

Comment — Costs of Monitoring Requirements

Three commenters (IV-D-1, IV-D-2, and IV-D-6) took issue with the Agency's estimate of cost (51 FR 13431). The first commenter (IV-D-1)

estimated that the cost to his facility to buy and install the equipment necessary to comply with the proposed revisions would be $235,000.00.

The second commenter (IV-D-2) stated that EPA has underestimated the cost of complying with the proposed changes and requested more detailed information on how these costs were developed.

The third commenter (IV-D-6) quoted an installation price of $330,000 to install the equipment required to comply with the proposed changes in the regulation and cited a $200,000 annual cost thereafter of operating and maintaining the new equipment. The commenter gave a ten-point breakdown for the installation cost, including prices for 3 thermocouples per hearth, 324 thermocouple transmitters plus 20 percent spares, conduit, cable, differential pressure cells, chart recorders, installation of thermocouples, installation of "other items," salaries for four instrument technicians to service equipment, and salary for a waste water technician to monitor incinerator process and generate deviation reports.

Response

The EPA estimates a maximum annual cost of $24,200 per incinerator to achieve compliance with the monitoring, recordkeeping, and reporting requirements in the revised standard (Docket Item IV-B-1). Table 2-2 provides a breakdown of the maximum annual cost. Facilities which qualify for the exemption from requirements to monitor, record, and report incinerator temperature, fuel use, sludge feed rate, and sludge moisture and volatiles content would incur a maximum annual cost of about $12,000 per incinerator. The maximum annual cost includes both annualized capital and operating costs. Annualized capital costs are based on a 5-year equipment life and 10 percent interest. Annual compliance costs for new and many existing sewage sludge incinerators are expected to be about $5,600 per year, taking into account that new and many existing sewage sludge incinerators already routinely monitor at least some of the incinerator operating parameters required by the revised standard.

TABLE 2-2. MAXIMUM ANNUAL COST PER INCINERATOR

Item	Capital Cost	Annual Cost
Monitoring Instruments	$15,540	$ 4,100
Recording Instruments	$ 8,515	$ 2,260
Maintenance	---	$ 4,600
Recordkeeping and Reporting	---	$ 1,480
Laboratory Analysis	$ 2,725	$11,785
TOTAL	$26,800	$24,220

Commenter IV-D-1 estimated that cost to his facility to buy and install equipment necessary to comply with the proposed revision would be $235,000. This facility currently owns and operates six sewage sludge incinerators. Based on EPA's cost estimates, maximum capital cost for six incinerators would be $161,000. Commenter IV-D-1 did not provide any information on the basis of their cost estimate. For a sewage sludge incinerator already monitoring incinerator and control device operating parameters, the capital cost estimated by EPA is about $8,700.

Commenter IV-D-6 owns and operates 14 sewage sludge incinerators. This commenter estimated a total capital cost to comply with the revised standard of $330,000 compared to EPA's estimate of $375,000 (for 14 incinerators). Commenter IV-D-6 also estimated $200,000 in annual operating and maintenance. Based on EPA estimates, the proposed revision would result in a cost ranging from $78,400 to $339,000 per year in annual operating and maintenance for 14 incinerators. EPA notes that the commenter's cost estimates fall well within EPA's.

Comment Miscellaneous: Deadline for Installing Monitoring Equipment

One commenter (IV-D-2) requested clarification of the proposed measure's applicability to existing incinerators. In particular, he questioned how much time would be allotted to install control and monitoring equipment after the final regulations are adopted (51 FR 13433).

Response

Section 60.153(e) of the proposed revisions to the standard requires owners or operators of sludge incinerators on which the required monitoring systems were not installed at the time of the most recent performance test to conduct a performance test within 360 days of the effective date of the revised regulations (the date of promulgation of the final rule). For all other facilities, the requirements will apply during the initial performance test, required under Section 60.8 of the General Provisions of Part 60.

2.2 REPORTING REQUIREMENTS

Comment — Levels Triggering Reporting of O_2 Level

Two commenters (IV-D-4 and IV-D-9) discussed the reporting of oxygen levels. The first commenter (IV-D-4) recommended that periods of low oxygen content should be included in the report for those multiple hearth incinerators that have oxygen levels less than 7 percent (50 percent excess air) and for fluid bed incinerators with oxygen levels under 4 percent (20 percent excess air). The second commenter (IV-D-9) stated that although a cut-off level of 10 percent oxygen is valid when auxiliary fuel is used, the cut-off is "meaningless" under conditions of autogeneous combustion, when excess air is used for cooling.

Response

Although EPA agrees with the commenter (IV-D-4) that substantial decreases in oxygen content of the incinerator exhaust may be indicative of incomplete combustion and elevated particulate emissions, EPA believes that plant operators will tend to correct these incinerator conditions for safety reasons in a relatively short time, thus limiting the duration of increased particulate emissions. For this reason, EPA is not adopting the commenter's suggestion to require reporting of periods of low oxygen levels in the incinerator exhaust.

Commenter IV-D-9 indicated that the cut-off level of 10 percent oxygen is "meaningless" under conditions of autogeneous combustion and excess air used for cooling. EPA does not consider the cut-off meaningless. The percent oxygen cut-off is determined during performance testing and is not always 10 percent. Periods of autogeneous combustion would be rare and when reported would be supplemented with fuel rates.

According to the proposed standard, if a facility, during performance testing, recorded less than 10 percent average oxygen, the facility would be required to report only periods of oxygen levels in excess of 10 percent. If a facility, during performance testing, recorded an average oxygen

content greater than 10 percent, he would be allowed an increase in oxygen content of 3 percent before being required to report. To reduce the potentially excessive reporting burden on facilities that record oxygen levels only slightly under 10 percent during the performance testing, EPA has decided to make the reporting requirements uniform for all facilities. Accordingly, all facilities will be required to report only periods of oxygen levels which exceed by 3 percent or more the level measured during the most recent performance test.

Comment Requirements for Periods When Incinerator is on Stand-by

One commenter (IV-D-6) was not sure about the periods of time for which the facility would be "accountable for deviations from these regulations," (51 FR 13430) and wondered if deviation reports would have to be prepared if the incinerator was on stand-by.

Response

EPA recognizes that sewage sludge incinerators experience periodic down time. During the period that the incinerator is on stand-by (excluding the start-up and shut-down sequence), no emissions are expected to occur. Requirements for reporting scrubber pressure drop and oxygen levels in the incinerator exhaust do not apply to incinerators on stand-by. However, they apply to all other periods when the incinerator is in operation including during the start-up and shut-down sequence.

2.3 PERFORMANCE TEST REQUIREMENTS

Comment Metals Emissions Testing

Four commenters (IV-D-1, IV-D-2, IV-D-7, and IV-D-9) addressed the proposed requirements for measuring metals emissions during the performance test.

One commenter (IV-D-2) questioned EPA's proposal to test sludge and emissions for metals in the absence of standards for metals.

The second commenter (IV-D-1) said that his facility currently analyzes weekly grab samples of sludge for cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCB's and could analyze for arsenic, beryllium, and selenium as well. However, the commenter suggested that EPA's proposed rule for measuring these metals during emissions testing be dropped "once a correlation between sludge concentration and particulate emission concentration for these metals is established, preferably by EPA," since this testing would be difficult and expensive.

The third commenter (IV-D-7) questioned why more attention was not paid in the proposed revisions to sludge metal content. He cited the Port Washington study that showed that "significant amounts of metal vaporized in the incinerator and were not collected by the scrubber." These metal concentrations are "enriched" in the incinerator emissions and, in some cases, may not be detected by the standard test methods.

The fourth commenter (IV-D-9) suggested that EPA consider atomic absorption as an alternative method to neutron activation analysis because of "lack of availability" and cost per analysis. He said that his firm had "routinely" used atomic absorption to analyze particulate samples with "no problems in quantifying the samples." Finally, he stated that a detection limit should be specified for the metals assay "regardless of the approved method(s)."

Response

As stated in the preamble, EPA's intention is to consolidate existing waste management authorities with the broad authorities provided under Section 405 of the Clean Water Act. Section 405(d) of the Clean Water Act requires EPA to develop regulation for the use and disposal of sewage sludge. The measurement of metals will assist the Agency in establishing guidelines for State and local sludge management programs. Also, this will allow the Agency to determine if future regulatory action is warranted.

Additionally, EPA evaluated the expense and difficulty of performing the metals emissions analyses. Since no special emissions testing equipment and procedures would be needed, the added expense is limited to the analytical laboratory cost. Based on contacts with laboratories that perform metal analyses, both atomic absorption and neutron activation methods are comparable in cost. However, very few laboratories are equipped for neutron activation analysis. For this reason, EPA is modifying the requirement for using neutron activation analysis. Since there is no significant difference in the accuracy of the two methods, atomic absorption may be used in the place of neutron activation for arsenic, cadmium, chromium, copper, nickel, selenium, and zinc. The estimated cost to facilities to perform metals analysis on sludge and particulate emission samples during performance tests is estimated at $1,200 per test. This cost would only be incurred once per facility.

It is unclear whether the commenter who requested that the requirement for metals analysis be deleted, once a correlation between sludge metals concentrations and metals emissions has been established, was referring to the establishment of a universal correlation that could be applied to all incinerators or whether the commenter was referring to establishment of facility or plant-specific correlations. The emissions of metals are affected by a combination of factors beyond the metals content of the sludge, including the incinerator design, its operating condition, and the particular emission control system applied. Consequently, it is doubtful whether a universal correlation could be established. However, for a particular system design and method of operation, it would seem reasonable that a facility or site-specific correlation could be established. Regardless, it is not EPA's intention to require each source to perform a metals analysis for every particular performance test that may be conducted. As stated previously, the proposed regulation has been modified to indicate more clearly that this is a one-time analysis.

EPA is aware of the study cited by Commenter IV-D-7 that indicates that some metals may be vaporized and therefore not collected by the scrubber. Additional data, however, shows a wide variability in the proportion of

metals in the sludge that are emitted out of the stack. An example of such data is presented in the draft report "Air Pollution Discharges from Ten Sewage Sludge Incinerators" (EPA, February 1981).

Test methods for metals measurement are still in the developmental stages for some metal species, in particular. Until new and improved methods are available, the existing test methods must be utilized. EPA has no basis at this time for specifying detection limits other than what are given in the specified test methods.

Comment — Date of Applicability

One commenter (IV-D-2) was not sure how the proposed changes to the regulation will affect the performance test his facility has scheduled to take place before June 1987. The commenter wondered if that test would have to conform to the proposed requirements with respect to both monitoring equipment and items to be recorded.

Response

Sewage sludge incinerators subject to the new source performance standard will be required to conduct a performance test within 360 days of the effective date of the revisions (i.e., the date of promulgation of the final rule) with the prescribed monitors in place, unless a previous performance test has been conducted consistent with the new monitoring requirements. The commenter's plant may elect to comply with the proposed monitoring requirements for its June 1987 performance test to avoid having to repeat the test at a later date. However, the new performance test requirements would not be required until the final revisions are promulgated sometime in late 1987.

Comment — Maximum Versus Normal Sludge Feed Rates

One commenter (IV-D-1) said that emission tests at his facility are conducted at maximum sludge feed rates since the maximum certified capacity of the incinerator is determined also at that time. He indicated that

"actual pressure drops are usually lower under normal or average sludge feed rates." The commenter supported his point with figures from his facility's most recent emission test. He recommended that performance testing be required at maximum and normal sludge feed rates.

Response

EPA recognizes that facilities often conduct one performance test for both EPA compliance purposes and for State and local permit requirements. For State and local permits, tests may be required at maximum conditions to determine maximum certifiable emissions. For facilities such as the commenter's facility, scrubber pressure drop may be lower for normal operation sludge feed rates. To avoid burdensome reporting of scrubber pressure drop, some plants may wish to conduct a separate performance test at normal sludge feed conditions. For some plants, this may require two performance tests. EPA recommends that each plant decide on a case-by-case basis whether a performance test at normal sludge feed rate is appropriate to determine compliance at lower pressure drops, in addition to the test at maximum feed rate.

2.4 OTHER COMMENTS

Comment — Level of Standard

Two commenters (IV-D-7 and IV-D-8) discussed the standard's effectiveness, or stringency. The first commenter (IV-D-7) stated that the proposed revisions to the standard concentrate on particulate matter emissions. Some incinerators can comply with the standard by reducing scrubber power consumption so the current particulate standard is only "marginally attained," resulting in increased particulate matter emissions rates.

According to the second commenter (IV-D-8), if EPA were to persist in specifying the venturi-impingement tray scrubber as the reference technology, it should make the standard "substantially stricter," since the

average incinerator performs much better than the existing standard requires. The commenter suggested two options to use in formulating a more stringent standard. The first option would base the standard on the average of the best performers (90th or 75th percentile performance level) and would rely on ICFAR-type optimization processes to bring new units into compliance. The second option would adopt a ceiling at the present level of the standard with a percentage reduction requirement from inlet concentrations as the standard's basis. The commenter noted that this second option had been applied to sulfur emissions from coal-fired power plants. In sum, the percentage reduction requirement should not be less than 98 percent or 99 percent.

Response

The second review of the new source performance standard for sewage treatment plants, completed in 1984, concluded the current level of the standard is achievable by all the incinerators when correctly operated and equipped with an appropriate control device. Although many individual facilities were found to be achieving the standard with emission rates well under the required level of 1.3 lb/ton of dry sludge, some incinerators have achieved emission rates only slightly below the emission limit. No information was found during the review to indicate that these incinerators and associated control devices were not well operated and maintained. The EPA concluded that no change in the level of the standard was justified for those existing sources subject to this standard.

This does not rule out the potential for a more stringent emissions limit for new (not yet constructed) sources subject to this standard. However, as noted elsewhere, this review of the standard did not include any technologies other than venturi/tray scrubbers. Two incinerators with fabric filter control devices are reportedly under construction in California, and several are used in Europe. Under another program, EPA is currently investigating the applicability and effectiveness of fabric filters and other types of control devices. This information will be

considered during the next 4-year review of the standard. At the conclusion of that review, the agency will again determine if this standard should be revised.

EPA disagrees that the effect of not changing the level of the standard is that plants will reduce their scrubber efficiency so that the standard is only marginally maintained. The emission rate from sludge incinerators depends on a variety of factors in addition to scrubber pressure drop including the characteristics of the sludge being burned and the method of operating the incinerator, both of which may vary continuously for a given incinerator. It is unlikely that facilities could effectively predict the "minimum" scrubber pressure drop that would allow them to marginally achieve the emission standard for the various sludge and incinerator operation conditions.

Comment — Technology Basis of Standard

Four commenters (IV-D-3, IV-D-7, IV-D-8, and IV-D-9) discussed the Agency's selection of the control technology basis of the standard.

The first commenter remarked that his facility is able to meet the particulate emission limit of 1.3 lb/ton dry sludge input with a pressure drop of only 10 inches of water instead of 30 inch pressure drop at which "most incinerators" that are equipped with scrubbers and achieved compliance with the standard operate (51 FR 13425). The commenter remarked that their scrubber manufactured by Krebs may be responsible for this performance difference.

The second commenter questioned EPA's interpretation of Section 111 of the Clean Air Act with respect to selecting control technology to achieve the best emissions control achievable. According to the commenter, the Act "intends that new source performance standards represent a reasoned prediction of what can be achieved in the future," rather than maintaining performance levels achieved in the past. Incinerators already in operation, according to the commenter, have greatly improved control performance levels, and the NSPS should take those levels into account.

With respect to selection of a specific control as the reference technology, the second commenter characterized EPA's proposed choice of venturi-impingement tray scrubbers as "based entirely on what the bulk of the industry has unilaterally chosen to use in the past." Instead, he stated, EPA should consider a standard based on baghouses. Arguing that baghouse performance has already been demonstrated on "at least one" sewage sludge facility, and in "similar other industrial processes," the commenter quoted a 99 percent + particulate removal rate as "typical." Baghouses also offer "the best control of fine particles and metals," he said.

The commenter stated that the emission control performance rates for electric incinerators could be improved if they were fitted with controls "equal to those on the better multiple-hearth units." If that occurred, he said, electric incinerators would be the cleanest technology available. The commenter said that EPA should explain both "the failure of electric incinerators to operate at pressure drops considered BACT" and "why the newer electric incinerator technology has not become the appropriate basis for the NSPS."

Response

As discussed in the preamble to the proposed revisions (51 FR 13427), EPA has been unable to establish a quantitative correlation between particulate emission rates and scrubber pressure drops. Performance test data indicate that new incinerators since 1978 achieved compliance with the emission standard at pressure drops ranging from 10 to 45 in. W.G. New incinerators tested between 1973 and 1978 achieved compliance at pressure drops ranging from 7 to 32 in. W.G. Because no industry-wide correlation between scrubber pressure drop and particulate emission rates has been found, EPA is unable to specify a pressure drop requirement that would be applicable to scrubbers on all incinerators subject to the standard.

During the review of the standard, no newly demonstrated technologies were found that control particulate emissions more efficiently than those currently in use. Currently, all sewage sludge incinerators subject to the new source performance standard control emissions with scrubbers. Two

incinerators with fabric filter control devices are reportedly under construction in California, and several are in use in Europe. Under another program, EPA is currently investigating the applicability and effectiveness of fabric filters and other types of control devices. This information will be considered during the next 4-year review of the standard. In the meantime, facilities using fabric filters as control devices will be required to monitor, record, and report pressure drop across the fabric filter in the same way as incinerators with wet scrubbers.

The majority of new sewage sludge incinerators installed are multiple-hearth type followed by fluidized-bed type. Electric incinerators are the newest technology, but only a small number have been used commercially thus far. As indicated in the preamble to the proposed revisions (51 FR 13426), new electric incinerators installed since 1978 have experienced difficulty in demonstrating compliance with the standard. The EPA believes that failure of these incinerators to achieve compliance occurred because low uncontrolled emission rates of electric incinerators have led design engineers to specify unreasonably low pressure drop scrubbers for these incinerators. None of the electric incinerators are in operation at this time.

The sludge feed capacity of commercially used electric incinerators (less than 1.0 ton of wet sludge per hour) is much less than that of new multiple-hearth and fluidized-bed incinerators (up to 15 to 18 tons of wet sludge per hour, respectively). Given the current size limitation of electric incinerators and other factors, EPA believes it would be inappropriate to restrict the technology for new incinerators to electric incinerators.

Comment — Factors Affecting Emissions of Toxic Organics

The commenter (IV-D-8) pointed out that the proposed revisions to the NSPS do not mention temperature and residence time requirements for destruction of dioxin and organics such as difurans and PCBs. He added that the residence times and operating temperatures that were discussed--in the context of rabble arm speeds and burner firing rates--were inadequate to

destroy these emissions. The commenter said that EPA should look into ways to raise incinerator temperatures sufficiently to prevent formation of dioxins and PCBs.

Also, the commenter suggested that EPA impose a gas cooling requirement to enhance metal emission controls. He also suggested specifying a maximum temperature at the control device inlet.

Response

In regard to the commenter's concern that the standard does not contain provisions sufficient to ensure metals emission reduction, it should be pointed out that the new source performance standard for sewage treatment plants currently applies only to particulate emissions. The EPA is currently investigating other regulatory actions under Section 405(d) of the Clean Water Act for sewage treatment plants. These actions will include regulations specifically aimed at metals emissions and will take into account the recommendations of the commenter.

Comment Regulatory Action Under Section 405 of the CWA

Two commenters (IV-D-7 and IV-D-5) urged EPA to proceed with further regulatory action affecting sewage sludge incinerators under Section 405 of the Clean Water Act.

One commenter (IV-D-7) stated his concern that cancer risk assessment, dispersion modeling and stack height were not addressed in the proposed revisions. He added that sludge incinerators "traditionally" have short stacks which cause plume downwash and speculated that cancer risk in the range of 1 to 1,000 for a 70 year lifetime may be associated with emissions from these operations. He recommended that regulatory actions under Section 405 of the Clean Water Act address health effects from dispersion of metal emissions.

The second commenter (IV-D-5) stated that EPA's revision of the sewage treatment plant NSPS under Section 111 of the Clean Air Act, does not "relieve the agency of its obligation, under Section 405 of the Clean Water

Act," to issue comprehensive regulations for the use and disposal of sewage sludge." The commenter further stated that regulations adopted under Section 405 affecting sewage sludge incinerators must be broader in scope than the proposed NSPS revisions. In particular, he indicated that Section 405 regulations should address all sewage sludge incinerators and not just those facilities subject to the NSPS. Also, the Section 405 regulations should address all sludge pollutants that may interfere with incineration as a disposal technique. The list of sludge pollutants that EPA will measure during performance tests under the added NSPS requirement is insufficient. Finally, the commenter noted that the Clean Water Act set 1978 as the deadline for EPA's issuance of Section 405 sludge regulations but that EPA has not acted yet.

Response

As explained in the preamble to the proposed revisions (51 FR 13425), EPA recognizes the need for an integrated approach for regulating the use and disposal of municipal sewage sludge. Accordingly, EPA is consolidating, where practicable, its exiting sludge management authorities with the broad authorities provided under Section 405 of the Clean Water Act. Under this authority, EPA has initiated an action to review, revise, or develop regulations which will establish guidelines for State and local sludge management programs and technical guidelines for the following disposal and use methods: distribution and marketing, land application, landfill, ocean dumping, and incineration. Unlike the proposed revisions to the NSPS under Section 111 of the Clean Air Act, the review of sewage sludge incineration under Section 405 of the Clean Water Act will consider all existing incinerators, and not just incinerators built after the NSPS was in effect. Further, the review of sewage sludge incineration will consider concentrations of pollutants which may interfere with incineration as a disposal technique.

[Note to Office of Water reviewers: Please add a brief discussion of the status of these review activities and the current schedule.]

Comment — Sewage Sludge Incineration Growth Potential

A single commenter (IV-D-8) disagreed with the EPA's projection of the rate of construction for new incinerators. According to the commenter, EPA's projection does not consider increasing demand for sludge incinerators due to "the phase-out of ocean dumping and the decline of available landfill sites." The commenter suggested a revised estimate which reflects this increased demand.

Response

EPA's projection of the rate of construction for new incinerators presented in the preamble to the proposed revisions (51 FR 13425) is based on a survey of ongoing and future construction projects at wastewater treatment plants conducted in 1982. Current investigations by EPA under Section 405 of the Clean Water Act will update these projections based on more current information reflecting the phase-out of ocean dumping and the decline of available landfill sites.