

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60 and 63

[EPA-HQ-OAR-2007-0877; FRL-]

RIN 2060-AO42

Standards of Performance for Portland Cement Plants

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The EPA is proposing amendments to the current Standards of Performance for Portland Cement Plants. The proposed amendments include revisions to the emission limits for affected facilities which commence construction, modification, or reconstruction after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. The proposed amendments also include additional testing and monitoring requirements for affected sources.

DATES: Comments must be received on or before [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. If any one contacts EPA by [INSERT DATE 10 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER] requesting to speak at a public hearing, EPA will hold a public hearing on [INSERT DATE 15 DAYS AFTER PUBLICATION OF THIS PROPOSED RULE IN THE FEDERAL REGISTER]. Under the Paperwork Reduction Act, comments on the information collection provisions must be received by the Office

of Management and Budget (OMB) on or before [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Submit your comments, identified by Docket ID No. EPA-HQ-OAR-2007-0877, by one of the following methods:

- <http://www.regulations.gov>: Follow the on-line instructions for submitting comments.
- E-mail: a-and-r-docket@epa.gov.
- Fax: (202) 566-1741.
- Mail: U.S. Postal Service, send comments to: EPA Docket Center (6102T), Standards of Performance (NSPS) for Portland Cement Plants Docket, Docket ID No. EPA-HQ-OAR-2007-0877, 1200 Pennsylvania Ave., NW, Washington, DC 20460. Please include a total of two copies. In addition, please mail a copy of your comments on the information collection provisions to the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), Attn: Desk Officer for EPA, 725 17th St., NW, Washington, DC 20503.
- Hand Delivery: In person or by courier, deliver comments to: EPA Docket Center (6102T), Standards of Performance (NSPS) for Portland Cement Plants Docket, Docket ID No. EPA-HQ-OAR-2007-0877, EPA West, Room 3334, 1301 Constitution Avenue, NW, Washington, DC

20004. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information. Please include a total of two copies.

Instructions: Direct your comments to Docket ID No. EPA-HQ-OAR-2007-0877. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at www.regulations.gov, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through www.regulations.gov or e-mail. The www.regulations.gov website is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through www.regulations.gov, your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and

cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

Docket: All documents in the docket are listed in the www.regulations.gov index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in www.regulations.gov or in hard copy at the EPA Docket Center, Standards of Performance (NSPS) for Portland Cement Plants Docket, EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Docket Center is (202) 566-1742.

FOR FURTHER INFORMATION CONTACT: Mr. Keith Barnett, Office of Air Quality Planning and Standards, Sector Policies and Programs Division, Metals and Minerals Group (D243-02), Environmental Protection Agency, Research Triangle Park, NC 27711, telephone

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SUPPLEMENTARY INFORMATION:

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I. General Information

A. Does this action apply to me?

Categories and entities potentially regulated by this proposed rule include:

Category	NAICS code ¹	Examples of regulated entities
Industry....	327310	Cement manufacturing
Federal government...		Not affected.
State/local/tribal government...		Not affected.

¹ North American Industry Classification System.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. To determine whether your facility would be regulated by this action, you should examine the applicability criteria in 40 CFR 60.60 (subpart F). If you have any questions regarding the applicability of this proposed action to a particular entity, contact the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. What should I consider as I prepare my comments to EPA?

Do not submit information containing CBI to EPA through www.regulations.gov or e-mail. Send or deliver information identified as CBI only to the following address: Roberto Morales, OAQPS Document Control Officer (C404-02), Office of Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, NC 27711, Attention Docket ID No. EPA-HQ-OAR-2007-0877. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD-ROM that you mail to EPA, mark the outside of the disk or CD-ROM as CBI and then identify electronically within the disk or CD-ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

C. Where can I get a copy of this document?

In addition to being available in the docket, an electronic copy of this proposed action is available on the Worldwide Web (WWW) through the Technology Transfer Network (TTN). Following signature, a copy of this proposed action will be posted on the TTN's policy and guidance page for newly proposed or promulgated

rules at <http://www.epa.gov/ttn/oarpg>. The TTN provides information and technology exchange in various areas of air pollution control.

D. When would a public hearing occur?

If anyone contacts EPA requesting to speak at a public hearing by [INSERT DATE 10 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], a public hearing will be held on [INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

Persons interested in presenting oral testimony or inquiring as to whether a public hearing is to be held should contact Mr. Keith Barnett, listed in the **FOR FURTHER INFORMATION CONTACT** section, at least 2 days in advance of the hearing.

II. Background Information on Subpart F

A. What is the statutory authority for the proposed amendments to subpart F?

New source performance standards (NSPS) implement Clean Air Act (CAA) section 111(b) and are issued for categories of sources which EPA has listed because they cause, or contribute significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare. The primary purpose of the NSPS is to attain and maintain ambient air quality by ensuring that the best demonstrated emission control technologies are installed as industrial infrastructure is modernized. Since 1970, the NSPS have been successful in

achieving long-term emissions reductions in numerous industries by assuring cost-effective controls are installed on new, reconstructed, or modified sources.

Section 111 of the CAA requires that NSPS reflect the application of the best system of emission reductions achievable which, taking into consideration the cost of achieving such emission reductions, and any non-air quality health and environmental impact and energy requirements, the Administrator determines has been adequately demonstrated. See CAA section 111(a)(1). This level of control is commonly referred to as best demonstrated technology (BDT). In assessing whether a standard is achievable, EPA must account for routine operating variability associated with performance of the system on whose performance the standard is based. See National Lime Ass'n v. EPA, 627 F. 2d 416, 431-33 (D.C. Cir. 1980). Today's proposal considers all of these factors, including both short- and long-term operating variability associated with potential control technologies.

Common sources of information as to what constitutes a best demonstrated technology, and for assessing that technology's level of performance, include best available control technology (BACT) determinations made as part of new source review, emissions limits that exist in State and Federal permits for recently permitted sources, and emissions test data for

demonstrated control technologies collected for compliance demonstration or other purposes. EPA compares permit limitations and BACT determination data with actual performance test data to insure that permitting and BACT limitations are representative of actual performance and also to identify any site specific factors that could influence general applicability of the information to the entire source category. EPA also carefully examines test data to insure that control devices were properly designed and operated during the test.

Section 111(b)(1)(B) of the CAA requires EPA to periodically review and revise these standards of performance, as necessary, to reflect improvements in methods for reducing emissions. We promulgated Standards of Performance For Portland Cement Plants (40 CFR part 60, subpart F) on December 23, 1971 (36 FR 24876). Since then, we have conducted three reviews of the standards (39 FR 20793, June 14, 1974; 39 FR 39874, November 12, 1974; and 53 FR 50354, December 14, 1988).

B. What are the current Portland Cement Plant (PCP) NSPS?

The PCP NSPS applies to new, modified, and reconstructed affected facilities in the portland cement manufacturing industry that commenced construction, reconstruction, or modification after August 17, 1971. Affected facilities at PCP include the kiln, clinker cooler, raw mill system, finish mill system, raw mill dryer, raw material storage, clinker storage,

finished product storage, conveyor transport points, bagging and bulk loading and unloading systems. Unless otherwise noted, the term "new" as used in this preamble includes newly constructed, modified or reconstructed units.

III. Summary of the Proposed Amendments to Subpart F

The proposed amendments to subpart F of 40 CFR part 60 are summarized in Table 1 of this preamble.

Table 1. Summary of the Proposed Amendments

Citation	Proposed change
60.62	Change the title of §60.62 to standards. Revise paragraph (a)(1) to include paragraph (a)(1)(i) which specifies that the current emission limit for particulate matter (PM) applies to kilns constructed, reconstructed, or modified after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Add a paragraph (a)(1)(ii) which limits PM emissions for kilns that commence construction, reconstruction, or modification after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER], emissions to 0.086 pounds of PM per ton (lb/ton) of clinker.
	Revise paragraph (a)(2) to clarify that the opacity limit does not apply to kilns constructed, reconstructed, or modified after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER] that use a bag leak detection system or PM continuous emission monitoring system.
	Add paragraph (a)(3) which requires kilns constructed, reconstructed, or modified after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER] to meet a nitrogen oxides (NO _x) emission limit of 1.50 lb/ton of clinker on a 30-day, 24-hour rolling average basis.
	Add paragraph (a)(4) which requires kilns constructed, reconstructed, or modified after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER] to meet either a sulfur dioxide (SO ₂) emission limit of 1.33 lb/ton of

	<p>clinker on a 30-day, 24-hour rolling average basis or demonstrate a 90-percent reduction in SO₂ emissions from the kiln.</p>
	<p>Revise paragraph (b)(1) to include a paragraph (b)(1)(i) which specifies that the current PM limit applies to clinker coolers constructed, reconstructed, or modified after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Add a paragraph (b)(1)(ii) which limits PM emissions from clinker coolers constructed, reconstructed, or modified after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER] to 0.086 pounds of PM per ton (lb/ton) of clinker.</p>
	<p>Revise paragraph (b)(2) to clarify that the opacity limit does not apply to clinker coolers constructed, reconstructed, or modified after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER] that use a bag leak detection system or PM continuous emission monitoring system.</p>
60.63	<p>Revise paragraph (a) to correct applicability term ("subpart" instead of "part") and add the word "clinker" before the phrase "production rate" to clarify that daily recordkeeping requirement is for clinker production rate.</p> <p>Revise paragraph (b) to include paragraph (b)(1) which specifies monitoring requirements for kilns and clinker coolers constructed, modified, or reconstructed after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION IN FEDERAL REGISTER]. Paragraph (b)(1)(i) contains the current requirements for continuous opacity monitoring systems (COMS). Paragraphs (b)(1)(ii) and (iii) allow the source to install a bag leak detection system or a PM CEMS in lieu of a COMS. Also revise paragraph (b) to include paragraph (b)(2) which specifies monitoring requirements for kilns and clinker coolers constructed, modified, or reconstructed or after [INSERT DATE OF PUBLICATION IN FEDERAL REGISTER]. Paragraphs (b)(2)(i) and (ii) require the source to install a bag leak detection system or a PM continuous emission monitoring system.</p> <p>Revise paragraph (c) to clarify that the alternative for visible emission monitoring applies to the requirement in paragraph (b)(1)(i) for a continuous opacity monitoring system.</p>

	Add paragraph (f) to which specifies installation and operation requirements for bag leak detection systems.
	Add paragraph (g) which specifies the required installation, operation, and maintenance procedures for a PM continuous emission monitoring system.
	Add paragraph (h) which specifies requirements for weight measurement system for clinker production from kilns constructed, modified or reconstructed on or after [INSERT DATE OF PUBLICATION IN FEDERAL REGISTER].
	Add paragraph (i) to require a NO _x continuous emission monitoring system for each kiln subject to the NO _x emission limit.
	Add paragraph (j) to require a SO ₂ continuous emission monitoring system for each kiln subject to the SO ₂ emission limit.
	Add paragraph (k) to require that NO _x and SO ₂ continuous emission monitoring systems be installed, operated, and maintained according to Performance Specification 2 of Appendix B to part 60 and that monitors comply with quality assurance requirements in Procedure 1 of Appendix F to part 60.
	Add paragraph (l) to require that NO _x and SO ₂ monitors record data during all periods of operation.
	Add paragraph (m) to require a continuous exhaust flow rate monitoring system for each kiln subject to the NO _x or SO ₂ emissions limit.
	Add paragraph (n) to require the use of an electrostatic precipitator (ESP) predictive model to monitor the performance of ESPs controlling PM emissions from kilns or clinker coolers.
60.64	Revise paragraph (b)(1) to add definition of the term "P" in Equation 1 for new kilns subject to PM emission limit in lb/ton of clinker production.
	Add paragraph (b)(5) to require repeat PM performance tests (every 5 years) for kilns and clinker coolers.
	Add paragraph b(6) to require visible emissions monitoring for sources other than kilns and clinker coolers.
	Add paragraph (c) which specifies procedures for converting concentration of NO _x and SO ₂ to pounds per ton of clinker produced (30 day rolling average).
60.66	Update to specify authorities to be retained by the Administrator.

IV. Rationale for the Proposed Amendments to Subpart F

A. How is EPA proposing to change the emission limits for future affected facilities?

For "new" affected facilities constructed, modified, or reconstructed after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER], we are proposing:

- To change the format of the PM emission limits from lb/ton of dry feed to lb/ton of clinker product;
- To reduce the PM emission limit for kilns from 0.3 lb/ton of dry feed to 0.086 lb/ton of clinker;
- To set a limit on NO_x emissions from kilns of 1.50 lb/ton of clinker; and
- To set a limit on SO₂ emissions from kilns of 1.33 lb/ton of clinker, or, in the alternative, demonstrate a reduction in SO₂ emissions from the kiln of at least 90 percent;
- To reduce the PM emissions limit for clinker coolers from 0.1 lb/ton dry feed to 0.086 lb/ton of clinker; and
- To add new monitoring options of a bag leak detector or PM continuous emission monitoring systems (CEMS) for kilns and clinker coolers to demonstrate compliance with the PM limits in lieu of the requirement for continuous opacity monitoring systems (COMS).

The emission limits for affected facilities constructed, modified, or reconstructed before [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER] remain unchanged.

In determining BDT we generally look at the controls and control performance of new sources. In the case of cement kilns we reviewed recently issued permits and BACT determinations issued by States to identify emissions limits more stringent than the current subpart F (and to understand if limits more stringent than those in subpart F are commonplace or rare, or cover additional air pollutants). We believe that the use of State permit data and BACT determination developed as part of new source review is appropriate because a BACT determination evaluates available controls, their performance, cost, and non-air environmental impacts. The main difference between those determinations and a BDT determination for purposes of a new source performance standard is that a BACT determination is made on a site-specific basis. Therefore, in evaluating BACT determinations, we have to account for any site-specific factors that may not be applicable to the source category as a whole. We have also reviewed data gathered in support of related rules involving the portland cement industry, notably the National Emission Standards for Hazardous Air Pollutants (NESHAP) for portland cement kilns issued pursuant to section 112 of the CAA,

and the NESHAP for hazardous waste-burning Portland cement kilns, also implementing section 112 of the CAA.

We also collected emissions test data from a number of sources. The emission test data is used to verify the achievable performance of the controls, and to evaluate whether or not the permit levels reviewed accurately reflect control device performance.

Our review of permits and actual test data from portland cement sources, and discussions with industry representatives and State environmental agencies indicates that certain changes have occurred since the 1988 review of the NSPS, and that these changes are still continuing. We found that older, less energy efficient wet and long dry kilns are being replaced with preheater/precalciner kilns because preheater/precalciner kilns have superior energy efficiency and increased clinker capacity.¹ According to the industry, all new kilns will be preheater/precalciner kilns.¹ We confirmed this by reviewing a detailed listing of portland cement kilns which indicates that since 2000 all kilns constructed or modernized are of the preheater/precalciner design.¹

The information also revealed that recently built kilns are subject to more stringent limits on their emissions through

¹ Technical Support Document for Portland Cement NSPS Review. May 2008.

State permitting processes than those currently in the PCP NSPS. In addition, many State permits contain emission limits for NO_x and SO₂, pollutants that are not regulated under the current NSPS.¹ Modern preheater/precalciner kilns and improved combustion process designs and add-on controls that greatly lower NO_x emissions are increasingly being used to meet State permit limits. Our review of permits, BACT determinations, and emissions test data show that SO₂ emissions are typically low as a result of the inherent scrubbing action of alkaline raw materials in the kiln and raw mill as well as the typically low sulfur content of raw materials and fuel. However, there are a few locations where the raw materials used in production of clinker contain high levels of sulfur. In these few situations, wet scrubbers or dry lime sprayers have been used to reduce SO₂ emissions in order to meet State SO₂ limits.

Preheater/precalciner kilns have in-line raw mills, which means that the kiln exhaust gas is routed to the raw mill and then to the final PM control device. Therefore, the kiln and raw mill exhaust through the same stack. In order to maximize energy efficiency, facilities route as much clinker cooler exhaust as possible to the kiln (typically as tertiary air), and sometimes to the raw mill to recover heat from the clinker cooling operation. However, typically some portion of the clinker cooler gas flow exhausts directly to atmosphere through

its own stack so that clinker coolers are one of the enumerated units covered by the NSPS, and one of the emission points addressed by these proposed amendments.

As previously mentioned, older kilns are typically replaced with new preheater/precalciner kilns rather than being modified or reconstructed. However, because modified and reconstructed kilns are also subject to NSPS, we evaluated the situation where an existing kiln becomes subject to NSPS through modification or reconstruction. We identified only two instances since 1990 where an existing kiln was significantly modified rather than replaced with a new kiln, so we do not expect this to be a common occurrence. Moreover, in one such case a wet kiln was converted to a semi-dry process that included a preheater/precalciner. Performance data from this kiln indicate that the emissions of SO₂ and NO_x are actually lower than would have been expected if the kiln had been replaced with a new preheater/precalciner kiln.² Therefore, we expect that the emission limits proposed for new preheater/precalciner kilns would be applicable to this type of conversion. In the second case, a long dry kiln was shortened and a preheater/precalciner added. A modification of this type would be expected to use the

² Lone Star's Unique Approach to Environmental Challenges. O.P. Jepsen and B.P. Keefe, Fuller Company, Cement Industry Technical Conference, IEEE-IAS/PCA, 2001.

same technology in the precalciner/preheater section as a new preheater/precalciner kiln and the resulting modified kiln would basically be the same as a new kiln from the standpoint of criteria pollutant emissions control. Accordingly, EPA believes that the limits proposed today are appropriate for new, modified, and reconstructed kilns since the preheater/precalciner design will be utilized in each of these instances.

1. Format of the Standard

The current NSPS limits for PM are expressed on a pound of PM per ton (lb/ton) of dry feed input format. Emission limits are typically normalized to some type of production or raw material input value because this allows comparison (and ultimately the ability to set a single standard) for different sized facilities. (A common example of normalization is expressing vehicle fuel economy in terms of miles of gasoline per vehicle mile traveled, e.g. miles per gallon.) The 1971 NSPS uses a pound of pollutant per ton dry feed basis as the normalizing parameter. In these proposed amendments we are adopting a new normalizing parameter of lb/ton of clinker - i.e. normalizing based on kiln output rather than input for sources constructed, reconstructed or modified after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

Adopting an output-based standard avoids rewarding a source for becoming less efficient, i.e., requiring more feed to produce a unit of product, therefore promoting the most efficient production processes. As an example, assume a cement kiln rated at 1.2 million tons per year (tpy) has a NO_x emission limit of 1.5 lb/ton of clinker (output). The equivalent input-based limit would be 0.909 lb/ton of feed (on average 1.65 tons of feed produces one ton of clinker, so a kiln rated at 1.2 million tpy clinker uses 1.98 million tpy of feed). Under either an input- or output-based standard, the maximum allowed NO_x emissions would be 900 tpy (1.5 lb/ton clinker x 1.2 million tons clinker ÷ 2000 = 900 tons = 0.909 lb/ton feed x 1.98 million tons feed ÷ 2000). However, if a facility has a less efficient kiln, for example it requires 1.7 tons of feed to produce one ton of clinker (so the feed input is now 2.04 million tons), this kiln would be allowed to emit 927 tpy of NO_x (0.909 lb/ton feed x 2.04 million tons feed ÷ 2000) under the input-based standard of 0.909 lb/ton of feed, but still only 900 lb per year of NO_x under the 1.5 lb/ton of clinker output-based standard.

Over the short term, the measurement of kiln output is not as exact as the measure of kiln input. For this reason, we are basing compliance with the proposed NO_x and SO₂ emission limits on a 30 day rolling average. We believe this will alleviate the

issues related to the inaccuracy of short-term output measurements. However, industry has requested the option to convert to an input-based standard to accommodate site-specific configurations and operational limitations.³

In the following discussions, emissions were typically reported as a concentration or per ton of feed. The BACT permit limits discussed were typically based on output. We have converted all the data to an output based standard using a conversion factor of 1.65 tons of input equals one ton of clinker. More information on conversion may be found in the technical support document (see footnote 1).

We are specifically requesting comment on the benefits of an output-based standard, output measurement methods and their associated errors, provisions that would allow a site to convert to an input-based standard, any limitations we should impose on conversion, and the appropriate averaging times. Information on how conversions from input-based emission limits and test data and/or concentration-based data to output-based limits and test data may be found in the Technical Support Document for the Portland Cement NSPS review (See Footnote 1).

2. PM

³ Email, H. Ybanez, Holcim, Inc to K. Barnett, EPA, February 27, 2008.

The most effective control devices to reduce PM emission from cement kilns and clinker coolers identified in the original NSPS were fabric filters and electrostatic precipitators (ESPs). These continue to be the most effective PM controls in use, capable of removing over 99.9 percent of the PM from the exhaust gas. At the time of the 1988 review, 17 new kilns that had become subject to the NSPS since the 1979 review were controlled by fabric filters and 13 by ESPs. Of the 21 clinker coolers with a separate exhaust stack that had become subject to the NSPS, 17 were controlled by fabric filters, and four were controlled by gravel bed filters. Gravel bed filters perform similarly to fabric filters except they use a moving bed of gravel to capture the particulate rather than cloth or membrane fabric. We do not expect new facilities to install gravel bed filters.

Though ESPs and fabric filters have comparable removal efficiencies based on short-term tests, recently built new kilns have fabric filters as PM controls, and we expect this trend to continue. ESPs applied to cement kilns must be deenergized if the carbon monoxide (CO) or excess air levels rise above a preset critical level where an explosion could occur, which results in short periods of high emissions. The high resistivities of PM from a cement kiln require gas conditioning if an ESP is used. In addition, resistivity can change if the

chemistry of the clinker changes. ESP performance can also be affected by the particle size distribution. Fabric filters are not affected by these factors, and fabric filters control generally to the same concentration irrespective of the PM loading at the filter inlet, though some variability in PM emissions from fabric filters does occur due to seepage and leakage.⁴ Therefore, we expect the long-term performance of a fabric filter to be superior to an ESP. For this reason, we believe that well-operated and maintained fabric filters are the best technology for control of PM emissions at portland cement kilns, and so are basing this part of the proposal on use of fabric filters for PM control.

In assessing the level of performance constituting BDT (i.e. the level of performance achievable by well-operated and maintained fabric filters in this industry considering normal operating variability) we reviewed data on PM limits in eight recently issued permits for new cement kilns, all of which are equipped with fabric filters. The permit limits for PM for these kilns were in various units, but were converted to a lb/ton output basis.¹ The PM limits ranged from 0.093 to 0.28 lb/ton of clinker, and the average was 0.16 lb/ton. In order to determine if the permitted PM emissions limits were

⁴ Technical Support Document for HWC MACT Standards - Volume I: Description of Source Categories, U.S. Environmental Protection Agency. September 2005, Section 3.2.

representative of actual performance we reviewed two data sets measured by EPA Reference Method 5 (40 CFR part 60, Appendix A-3). The first set was comprised of 21 emission tests of portland cement kilns equipped with fabric filters at various domestic locations which fabric filters were (reportedly) equipped with membrane bags. These PM emissions ranged from 0.0023 up to 0.4724 lb/ton of clinker with a median of 0.1360 lb/ton. Fifteen of the 21 tests were below 0.16 lb/ton of clinker. All of the tests where the emissions were above 0.16 lb/ton of clinker, except one, were on kilns that were not preheater/precalciner kilns. The one test on a preheater/precalciner that was above 0.16 lb/ton of clinker was on a kiln built in 1981. Therefore, we have reason to doubt that the data above 0.16 lb/ton of clinker are representative of the most current designs. We also reviewed 37 emissions tests for PM from Florida kilns equipped with fabric filters where the bag type was unknown. The range was 0.015 to 0.153 lb/ton of clinker, so all 31 tests were below 0.16 lb/ton. Although these are single test results, and so are unlikely to reflect all the operating variability associated with air pollution control device performance, these data still suggest that a limit of 0.16 lb/ton of clinker is achievable by new cement kilns equipped with a fabric filter.

We also evaluated the performance of fabric filters using membrane bag technology, generally considered the most efficient type of fabric filter. Membrane bags have superior performance to the cloth bags that are part of the standard fabric filter design. Cloth bags capture PM in the interstices of the woven fabric and form a primary dust cake. Until the primary dust cake forms cloth bags are inefficient as filters. Therefore, each time the bag is cleaned emissions increase until the primary dust cake reforms. Emissions also occur when the pressure drop becomes so high that the PM migrates completely through the fabric. Membrane bags, in contrast, operate under the principle of surface filtration, i.e., the PM is captured on the surface of the bag. This results in more consistent performance (no need to build up a primary dust cake). In addition, at a constant airflow membrane bags reduce the average pressure drop across the fabric filter. However, membrane bags are more expensive than cloth bags.⁵

We reviewed 19 emission tests conducted on four portland cement kilns where we were able to establish that the facilities used fabric filters with membrane bags, and where the kilns had been built in the last 10 years, so we could be reasonably certain the control device was representative of the latest

⁵ Cement Americas "Optimizing Kiln Operations by Improving Baghouse Performance" November 2001, pp. 1-5.

fabric filter design. Thirteen of those tests were on a cement kiln that burns hazardous waste. We believe there is no difference in the performance of a fabric filter for PM applied to a kilns that burn hazardous waste and those that do not because PM emissions are largely contributed by non-hazardous waste feed streams, and because fabric filters control PM emissions generally to the same concentration irrespective of the PM loading at the inlet (see 69 FR 21225 and 21233). The individual test results converted to an output basis ranged from 0.0023 to 0.10176 lb/ton of clinker with an average of 0.0357 lb/ton. In order to account for variability, we analyzed the statistical variation by calculating a standard deviation of the test averages, multiplying the standard deviation by the t value for the 95th or 99th percentile, and adding this value to the average of all the tests. The result was we determined that a level of 0.0830 lb/ton of clinker represented an emissions limit that will not be exceeded 95 percent of the time and a level of 0.1025 lb/ton of clinker represented an emissions limit that will not be exceeded 99 percent of the time. EPA has also performed a different statistical analysis of the data from the hazardous waste-burning cement kiln equipped with a membrane fabric filter, applying to the data a so-called universal variability factor derived from the performance of the best performing (lowest emitting) PM performers equipped with fabric

filters across the hazardous waste combustor source category. This variability factor quantifies both short-term and long-term operating variability, i.e., variability associated with the conditions of the individual compliance test and variability associated with the performance of the control equipment over time. See generally 72 FR 54878-79, September 27, 2007. (This approach is more sophisticated, since it accounts for both short-term and long-term variability, whereas variability in the individual runs comprising the compliance tests (i.e., the 95th or 99th percentile of those data), is more a measure of short-term variability alone, see 72 FR 54878). The standard under this analysis is 0.0069 gr/dscf corrected to 7 percent oxygen. See 71 FR 14669, March 23, 2006. Using a typical value of 54,000 dry standard cubic feet (dscf) of exhaust produced per ton of kiln feed and one ton of clinker producer per 1.65 tons of feed, 0.0069 gr/dscf converts to 0.086 lb/ton of clinker.¹

We are proposing this level as BDT for PM emitted by new portland cement kilns, as measured by EPA Reference Method 5 in 40 CFR part 60, Appendix A-3. Our analysis of individual stack results from the newer kilns equipped with membrane bag-equipped fabric filters confirms that the level is achievable, the level is between the 95th or 99th percentile of those data, and as just explained, this level accounts for all of the potential

operating variability associated with operation of a membrane-bag fabric filter.

We evaluated the costs of the different control levels discussed above. This evaluation, and all subsequent cost, environment, and energy impacts on a per kiln basis are based on a model preheater/precalciner kiln with a rated capacity of 1.2 million tpy of clinker. The average capacity of kilns which were constructed beginning in 2000 and were operating in 2006 was approximately 1.3 million tpy. We choose a model kiln with a capacity slightly lower than average to provide a more conservative cost estimate (smaller kilns tend to have a greater control cost per ton of capacity). The other kiln design specifications (flue gas flow rates, temperatures, etc.) may be found in the Technical Support Document (See Footnote 1).

Based on our assessment that all new fabric filters with standard cloth bag will achieve a level of 0.16 lb/ton of clinker, and that new kilns would at least be equipped with this type of fabric filter, there are no costs or other impacts associated with meeting a PM emissions limit to 0.16 lb/ton of clinker. There are a variety of regulatory reasons that new kilns, on average, currently meet a 0.16 lb/ton of clinker PM limit, and we believe it is appropriate to use this level as the baseline in our cost analysis. We considered using a baseline of 0.5 lb/ton of clinker (equivalent to the current NSPS).

However, not only is this level inappropriate because it does not reflect current operating performance, but choosing 0.5 lb/ton of clinker as the baseline would not have changed our decision in any case.

To achieve a level of 0.086 lb/ton of clinker, a new kiln with a capacity of 1.2 million tpy of clinker production may have to equip the fabric filter with more expensive membrane bags at an estimated capital cost of \$1.3 million and at a total annualized cost of \$176,000 per year. This includes additional operating and maintenance costs, and amortized capital costs. The estimated emission reduction over the baseline would be 44 tpy for the model kiln and the cost per ton of additional PM control is \$3,969. This cost appears to be reasonable to EPA, given that it is well within the range of cost-effectiveness for total PM control accepted as reasonable for other stationary sources. See, e.g. 70 FR 9715, February 28, 2005 (cost effectiveness of \$8,400 per ton of total PM considered reasonable for proposed rule for electric utility steam generating units) and 71 FR 9876, February 27, 2006, promulgating the proposed rule.

We also analyzed the cost per ton of fine PM (PM of 2.5 micrometers or less) emissions reduction. Data from development of the PM National Ambient Air Quality Standards (NAAQS) indicate that the majority of the adverse health effects from PM

exposure are from exposure to fine PM (although exposure to coarse PM is likewise associated with health effects, see 71 FR 61184-85, October 17, 2006). As a result, EPA established a NAAQS for fine PM separate from the NAAQS for coarse PM. Based on data from EPA's Compilation of Emission Factors (AP-42), 45 percent of the PM from a cement kiln fabric filter is fine PM. Therefore, the estimated emissions reduction of fine PM resulting from a total PM standard of 0.086 lb/ton of clinker is 19.8 tpy for the model kiln and the cost per ton of fine PM reduction is \$8,819.

In most cases there would be no non-air impacts associated with the proposed standard because PM captured in the control device for a preheater/precalciner kiln is mainly raw materials which are recycled back to the kiln, rather than disposed of as solid waste. In the case of a kiln equipped with an alkali bypass, however, additional PM captured in the alkali bypass fabric filter would typically be disposed as a solid waste. This PM is high in alkali materials and cannot be recycled back to the kiln or mixed with the product. Based on data collected on amounts of solids generated by the PM controls, the solids from the alkali bypass are about 1 percent of total collected solids (i.e., 99 percent is collected in the main fabric filter and recycles to the kiln). Therefore, the amount of additional solid waste resulting from this proposed PM emissions limit

would be expected to be minimal. We do not anticipate any adverse energy impacts because membrane bags reduce control device pressure drop and thus reduce energy use. Given the reasonable costs, and minimal solid waste impacts we are proposing a PM emissions level of 0.086 lb/ton of clinker as BDT.

As previously noted, fabric filters are also the predominant control for another emission point, clinker coolers. Included in the 1988 review of the NSPS were 12 PM emissions tests for clinker coolers where the coolers had separate stacks. One test was performed under abnormal operating conditions and so was not used in our analysis. The remaining 11 tests showed a PM emissions range of 0.008 to 0.05 lb/ton of feed, which converts to 0.013 up to 0.083 lb/ton of clinker.⁶ Tests on three clinker coolers associated with preheater/precalciner kilns built in the last 10 years using fabric filters for PM control showed a range of 0.0038 to 0.0094 lb/ton of feed which converts to 0.0063 to 0.01551 lb/ton of clinker. Based on these test data, we believe that the current clinker cooler controls used on new sources can meet the same level of PM control as a kiln with membrane bags, i.e. 0.086 lb/ton of clinker. Since new

⁶ Portland Cement Plants - Background Information for Proposed Revisions to Standards. EPA-450/3-85-003a, May 1985. pp. 4-9 to 4-13 and C-2 to C-5.

facilities are already installing controls (usually fabric filters) capable of meeting the proposed clinker cooler limit of 0.086 lb/ton of clinker, the incremental costs of the proposed emissions limit would be very low or zero, as would any non-air environmental and energy impacts.

We considered proposing a limit below 0.086 lb/ton of clinker for clinker coolers, based on the emissions shown for the three newer facilities. Based on these data a limit of 0.0245 lb/ton of clinker (representing the 99th confidence interval) would be achievable for new sources. However, we believe that these limited data are not sufficient to support a lower PM limit for clinker coolers, since these data are unlikely to fully reflect control device operating variability. We are requesting comment, however, on the achievability of a lower PM emission limit for clinker coolers.

3. NO_x⁷

The current NSPS does not regulate the emissions of NO_x. Concurrent with this 8-year review we are proposing an NSPS for NO_x that would apply to kilns constructed, modified, or

⁷ Information on NO_x emissions from preheater/precalciner kilns, factors affecting NO_x emissions, process controls that reduce NO_x emissions, staged combustion, selective noncatalytic reduction, selective catalytic reduction and more can be found in the EPA publication "Alternative Control Techniques Document Update - NO_x Emissions from New Cement Kilns, EPA-453/R-07-006, November 2007, and is available on EPA's Technology Transfer Network at <http://www.epa.gov/ttn/oarpg>.

reconstructed after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. The high temperatures and oxidizing atmospheres required for cement manufacturing are favorable for NO_x formation. In cement kilns, NO_x emissions are formed during fuel combustion primarily by the oxidation of molecular nitrogen present in combustion air (referred to as thermal NO_x) and the oxidation of nitrogen compounds in fuel (referred to as fuel NO_x). Many States issuing construction and operating permits for new kilns have specified emission limits for NO_x. EPA's BACT/RACT/LAER Clearinghouse database shows that for the period 2001 through 2007, 30 determinations for new, modified or reconstructed kilns included NO_x limits. Emissions of NO_x are typically reduced through process controls such as burner design (low-NO_x burners) and staged combustion in the calciner (SCC). NO_x emissions from kilns using process designs such as low NO_x burners and SCC emit on average about 2.5 lb/ton of clinker. The exclusive add-on control used to reduce NO_x emissions from kilns operating in the U.S. is selective noncatalytic reduction (SNCR). In recent Prevention of Significant Deterioration permits for portland cement kilns, States have determined BACT emission limits for NO_x based on the use of SNCR in combination with well-designed SCC and other process designs such as low NO_x burners. In SNCR systems, a reagent such as ammonia or urea is injected into the flue gas at a suitable temperature zone,

typically in the range of 1,600 to 2,000°F and at an appropriate ratio of reagent to NO_x. SNCR system performance depends on temperature, residence time, turbulence, oxygen content, and other factors specific to the given gas stream. On average, SNCR achieves approximately a 35 percent reduction in NO_x at a ratio of ammonia-to-NO_x of about 0.5 and a reduction of 63 percent at an ammonia-to-NO_x ratio of 1.0. At the high ratios, including ratios above 1, some ammonia may not react with NO_x and will be emitted. The unreacted ammonia is referred to as ammonia slip. It can also produce a visible stack plume when the ammonia forms ammonia chlorides. Under certain atmospheric conditions ammonia can also react with nitrates and sulfates, both of which can be available in cement kiln exhaust, to form fine PM emissions, see 69 FR 4583, January 30, 2004, and ammonia itself is a pollutant under the CAA. Limits on ammonia slip are often imposed by permits or design requirements, which in some instances constrain the NO_x reduction achievable by an SNCR system.

Another NO_x control technology, SCR, is used in the electric utility industry to reduce NO_x emissions from boilers and has been used worldwide on three cement kilns in Europe. SCR is capable of reducing NO_x emissions by about 80 percent. Though SCR is demonstrated in Europe, SCR has never been used on any cement kilns in the U.S. Uncertainties exist as to its specific

performance level and catalyst plugging and fouling, which affects operating costs (see discussion below).

One control option considered was to make to make no changes in the current NSPS and thus not regulate NO_x emissions. However, we rejected that option because NO_x is emitted by cement kilns, is currently controlled at most new cement kilns, and, based on our review of recently issued permits, demonstrated technologies are available to reduce NO_x emissions considering costs and other impacts.

In proposing a NO_x emission limit, we reviewed recently issued permits, recent BACT determinations and recent emissions data for preheater/precalciner kilns to establish potential NO_x control levels for evaluation. Most of the emission limits and test data are 30 day averages based on data from continuous emissions monitors. A first step in doing so is to establish a baseline from which control options can be evaluated. NO_x emissions from three recently permitted preheater/precalciner kilns utilizing well-designed and operated process designs including SCC, averaged NO_x emissions of 1.62, 1.88 and 1.97 lb/ton of clinker. These levels are achieved at kilns that are not equipped with additional add-on controls. While demonstrating the capabilities of kilns utilizing well- designed process controls including SCC but not add-on controls, these emission levels are not necessarily representative of what all

new kilns would achieve even with similar process designs. Several factors can influence NO_x emissions. Changes in the kiln feed rate, chemical composition, or moisture content of raw materials can cause kiln temperatures to vary, resulting in variation in NO_x emissions. Raw materials from the same quarry can vary in chemical composition from day to day. Certain raw materials require higher temperatures and longer heating times to properly calcine the materials (referred to as burnability). For example, raw materials that contain high alkali content must be heated longer and at higher temperatures to volatilize and remove the alkali compounds. With higher temperatures and longer residence times, NO_x emissions may increase. Based on data from equipment vendors and representatives from facilities with more difficult-to-burn raw materials, we believe that future well-designed and operated cement kilns, which will incorporate SCC and low-NO_x burners, will meet a level of 2.5 lb/ton of clinker on average, without consideration of end-of-stack air pollution control. Therefore, we are using this level as the baseline level of control that would occur with no additional regulatory action. However, we know that in some applications the level achieved even when using low-NO_x burners, indirect firing and well-designed SCC may be as high as 3 lb/ton of clinker due to the reasons, such as burnability, discussed above.

We considered choosing as baseline of a new preheater/precalciner kiln designed without SCC or low NO_x burners, i.e. a completely uncontrolled kiln. For a variety of regulatory reasons, the newest kilns based on the most current designs of which we are aware all incorporate low NO_x combustion technologies. Therefore we have no data to determine the appropriate NO_x emission level for a new preheater/precalciner kiln that does not incorporate low-NO_x burners and SCC. In addition, choosing 2.5 lb/ton of clinker as our baseline versus a higher number would not have changed our decision on the proposed NO_x level.

The second emissions level we evaluated was 1.95 lb/ton of clinker, which is the most common level established as BACT in recent permits for new cement kilns.⁸ As previously noted, some new kilns meet this level of control using low-NO_x burners and SCC. However, we expect that, on average, new facilities would require only a modest SNCR removal efficiency of 22 percent SNCR to meet this level from the uncontrolled industry average 2.5 lb NO_x/ton of clinker, which is well within the range demonstrated for SNCR control efficiency in this industry.

The third control level we evaluated was 1.5 lb/ton of clinker, and was established based on our assessment of the best

⁸ Memorandum from M. Bahner, RTI, to M. Laney, RTI, and K. Barnett, EPA, Review of Three BACT Analyses, October 10, 2007.

demonstrated performance utilizing optimal process design, including SCC, and SNCR taking into account variability of such factors as the burnability of raw material inputs, which can affect NO_x emissions. Data on SNCR show a performance that ranges from approximately 20 to 80 percent NO_x reduction. Since NO_x levels of 1.62 to 1.97 lb/ton of clinker are demonstrated for kilns using well-designed SCC, a level of 1.5 lb/ton of clinker would be easily achievable even with SNCR removal efficiencies in the lower range of demonstrated SNCR performance. Generally, SNCR performance (i.e. percentage removed) increases as uncontrolled NO_x levels increase. For example, SNCR performance in which a reagent was injected into a flue gas at a temperature of 1,800°F, a 41 percent NO_x removal efficiency was obtained at 70 parts per million (ppm); at 200 ppm the NO_x removal efficiency increased to 54 percent. We estimate that for an SNCR with optimal injection configuration and reagent injection rate, a 50 percent NO_x emission reduction represents a reasonable level of performance of SNCR over the long term. Although, as noted above, we are projecting that new kilns on average will have emissions of 2.5 lb/ton of clinker prior to the application of add-on controls, there may be some situations where specific raw materials properties, such as those affecting burnability, will result in higher uncontrolled NO_x emissions. For this reason we assumed a maximum baseline of 3.0 lb/ton of clinker and 50

percent emission reduction by SNCR to establish a 1.5 lb/ton of clinker control level. And where uncontrolled NO_x emission levels achieved by process design are lower than the assumed maximum baseline of 0.3 lb/ton of clinker, the removal efficiency of SNCR can be lower and still achieve the 1.5 lb/ton of clinker limit. The levels of performance for SNCR are from single test results. By allowing compliance on a 30 day average, we are allowing more operating margin to assure we have accounted for normal operating variability.

The results of this analysis showed that for both the 1.95 and 1.5 lb/ton of clinker levels, the capital costs for the installation are the same, about \$2.3 million. Annualized costs for the 1.95 level are \$0.7 million and for the 1.5 level, \$1.3 million. The annualized cost, including operating and maintenance costs, of control for the 1.5 level is higher than the annualized cost for the 1.95 level because a higher reagent injection rate would be required to reach the lower limit. Overall cost effectiveness at the 1.95 lb/ton of clinker level was approximately \$2,000 per ton of NO_x reduction and at the 1.5 lb/ton of clinker level was approximately \$2,100 per ton of NO_x reduction. This level of cost effectiveness for both options compares favorably with the reference range of NO_x control cost effectiveness (\$200 to \$2,800) considered highly cost effective in the Clean Air Interstate Rule. See 70 FR 25208, May 12,

2005. Neither control option results in non-air environmental impacts. The energy impacts due to electrical demand of the SNCR system are not significant. Given the similarity of the cost effectiveness of both options, we are proposing the 1.5 lb/ton of clinker level as BDT.

We also evaluated a control level of 0.5 lb/ton of clinker based on the performance of SCR. SCR is the process of adding ammonia or urea in the presence of a catalyst to selectively reduce NO_x emissions from exhaust gases and has been used extensively on gas turbines, internal combustion engines, and fossil fired-fired utility boilers. The desired chemical reactions are identical with SNCR and SCR. However, SCR uses a catalyst, which allows the reactions to occur at a lower temperature. In SCR systems, ammonia is typically injected to produce an ammonia-to-NO_x ratio of about 1.05 or 1.1 to 1 to achieve a NO_x reduction of 80 to 90 percent with an ammonia slip of 10 ppm. At a cement kiln, SCR can be installed either after the PM control device (a low-dust system) or before the PM control device (a high-dust system).

As noted earlier, three cement kilns have used SCR, all in Europe. Despite the use of SCR on three kilns in Europe, there are several uncertainties as to whether they represent BDT. Of the three kilns in Europe using SCR, two are preheater kilns, and one kiln is a Polysius Lepol technology kiln, which is a

traveling grate preheater kiln. None of the kilns using SCR are preheater/precalciner kilns which are the only type of kiln that will be built in the U.S. Also, one of the European cement plants has switched back to using its SNCR system to compare the operational costs of the two systems to evaluate which technology is better and more economical. Because the experience with SCR on cement kilns is so limited, issues have been raised on SCR applicability to cement kilns. Because the optimum operating temperature for most SCR systems is between 600 and 750°F, the ideal location of the SCR system would be downstream of the preheater cyclones and prior to the roller mill, which is also prior to the PM control device. This location results in the SCR system operating in a high-dust environment. One of the concerns with this location is catalyst plugging and fouling where the accumulation of dust blocks access to the catalyst pores resulting in reduced effectiveness and shortened life span. Because of the problem of catalyst plugging with high-dust SCR systems, a catalyst cleaning mechanism such as pressurized air nozzles or sonic horns is necessary. For more thorough cleaning, it is necessary to periodically remove each individual catalyst bed for cleaning using water or other solvent solutions. The resulting wastewater and solids generated during this cleaning process must be properly managed and disposed (an adverse non-air impact

associated with this technology's use). To move exhaust gases past or through the catalyst, there will be an additional pressure drop that may require that existing air-handling equipment, such as fans and blowers, be scaled up. Other concerns include the oxidation of SO_2 to SO_3 by the SCR catalyst, catalyst masking by CaSO_4 formation and the generation of sulfuric acid mist, formation of ammonium sulfate which can foul downstream equipment, and alkali poisoning of catalysts and deactivation of catalyst. Eventually, a catalyst will reach the end of its useful life and need to be replaced with new catalyst elements. If not physically damaged, a catalyst can often be regenerated. If not, it must be properly managed and disposed. To avoid the issue of plugging and fouling created by a high dust environment, an SCR can be located downstream of the PM control device as a low-dust system. The disadvantage of a low-dust system is that the SCR system is no longer located in a suitable temperature range and the flue gas must be reheated at a significant cost in order for the injected ammonia to properly react with NO_x in the gas stream. Reheating is typically accomplished using a natural gas burner. While the emissions impact of a gas burner would likely be minimal, the amount of energy use would be in the range of 500 to 600 billion Btu for a 1.2 million tpy kiln. If other less expensive fuels are used

(such as coal), then emissions of other pollutants such as PM and SO₂ may increase.

EPA estimates the costs of installing an SCR system to be \$5.7 million in capital cost and \$3.1 million annualized cost. The resulting average NO_x emissions reduction would be 1,200 tpy over baseline, and the incremental NO_x reduction over the 1.5 lb/ton of clinker control level would be 600 tpy. The average cost effectiveness is approximately \$2,500 per ton and the incremental cost effectiveness is approximately \$3,000 per ton of NO_x reduction. To determine the reasonableness of this cost effectiveness, we turned to the CAIR rule. Reference cost effectiveness for NO_x controls ranged from \$200 to \$2,800 and, for marginal cost effectiveness, \$1,400 to \$3,000. Highly cost effective controls are considered to be those whose cost effectiveness tends toward the lower ends of the reference range. A cost effectiveness of \$3,000 for SCR systems on a cement kiln is at or just above the range of average cost effectiveness. It should also be noted that there is considerable uncertainty in the SCR cost estimates due to the technical issues discussed above. If site specific factors relating to the raw materials do cause significant plugging and fouling, the costs calculated above may be biased low. In addition, SCR increases energy use due to the pressure drop

across the catalyst, and as noted above, produces liquid and solid wastes that must be managed.

Considering these potential technical operating difficulties with SCR in this industry, somewhat high cost effectiveness, the uncertainty of the costs estimates, and adverse non-air and energy implications, EPA is not proposing SCR as BDT for portland cement kilns. EPA solicits comment on this issue.

We expect that all new kilns will be required to install SNCR systems to meet the 1.5 lb/ton of clinker NO_x limit. One concern with the use of SNCR is the potential for condensable PM emissions. As explained above, under certain conditions the injected ammonia reacts to form condensable fine PM that is not captured by the fabric filter because it is emitted as a gas. We are requesting comments on the effect that ammonia slip from use of SNCR might have in the generation of condensable PM emissions, and what actions, if any, are available to mitigate those impacts.

4. SO₂

In the previous NSPS review, we declined to set SO₂ standards because there were no demonstrated add-on SO₂ control technologies applied to cement kilns (53 FR 50354, December 14, 1988). Since that time at least two SO₂ control technologies have been applied to cement kilns, wet scrubbers and lime

injection. The proposed emission limit is based on a review of recent BACT determinations and emissions test data and takes into account the inherent scrubbing ability of the naturally alkaline raw materials used in the cement-manufacturing process (70 FR 72337, December 2, 2005).

In a cement kiln, SO₂ comes from two sources. The first is sulfur in the coal fuel (fuel SO₂). Most fuel SO₂ mixes with lime in the kiln and preheater and is not emitted into the atmosphere. The other and potentially more important source of SO₂ is the raw materials (raw materials SO₂). Sulfides or elemental sulfur in the raw materials may be oxidized to SO₂ in the kiln system where sufficient oxygen is present. Through the inherent scrubbing ability of the alkaline raw materials, this SO₂ is partially removed in the raw mill (50 to 70 percent removal). Raw mills typically operate about 90 percent of the time when the kiln is operating.

For most portland cement plants, the levels of sulfur in raw materials are low enough that most of the SO₂ generated is removed by the natural scrubbing action of the kiln raw feed. However, in those instances where the sulfur content of raw materials is great due to the presence of pyritic sulfur, uncontrolled SO₂ emissions can be significant. Add-on controls may be necessary in those situations.

Cement kilns faced with high SO₂ emissions due to high sulfur levels in raw materials have used either wet scrubbers or lime injection for SO₂ emission control. Wet scrubbers applied to cement kilns typically achieve at least a 90 percent or more reduction in SO₂ emissions.⁹ A recently installed scrubber on a cement plant with high uncontrolled SO₂ emissions due to high-sulfur raw materials was designed to achieve a 95 reduction in SO₂ emissions.¹⁰ A 95 percent SO₂ reduction is consistent with other information on the performance of scrubbers for SO₂ removal.¹¹ Assuming the wet scrubber is correctly sized (typically a liquid-to-gas ratio of 30 gallons per 1,000 actual cubic feet per minute), the percent removal can vary based on inlet concentration (higher inlet concentrations result in a higher percent reduction) and scrubber pH.

Lime injection consists of injecting lime into a duct downstream of the preheater, or in some cases injecting lime into the first two preheater stages to remove SO₂. At some facilities lime injection is only used when increases in SO₂ emission above a specified level are detected, such as when the raw mill is down. The percent reduction in SO₂ emissions is a function of the inlet SO₂ concentrations and lime injection

⁹ Summary of Cement Kiln Wet Scrubber and Lime Injection Design and Performance Data, May 2, 2008.

¹⁰ PSD Application for Lehigh Mason City, 9/02.

¹¹ Assessment of Control Technology Options for BART-Eligible Sources, March 2005.

rates. Increasing either increases the percent reduction in SO₂ emissions. Dry lime systems can reportedly achieve a SO₂ emissions reduction of up to approximately 70 to 75 percent, though one vendor claims potential reductions of up to 90 percent.¹² We evaluated three control options using three levels of uncontrolled SO₂ emissions: low, moderate and high uncontrolled SO₂ emissions. For examples of kilns with low uncontrolled sulfur emissions, we considered kilns operating in the State of Florida. Low uncontrolled sulfur emissions are typical of preheater/precalciner kilns operating in Florida due to the very low amounts of sulfur in most of the available limestone.¹³ While making a determination that SO₂ emissions of 0.20 lb/ton of clinker is BACT, Florida State officials expect actual emission levels of 0.01 to 0.05 lb/ton of clinker as a result of the use of these low sulfur raw materials and self scrubbing of fuel SO₂ by finely divided lime in the kiln and calciner.¹⁴

As noted above, high uncontrolled SO₂ emissions can occur when pyritic sulfur is present in the raw materials and SO₂

¹² Summary of Cement Kiln Wet Scrubber and Lime Injection Design and Performance Data, May 2, 2008.

¹³ Technical Evaluation, Preliminary Determination, Draft BACT Determination, Sumter Cement Company. Florida Department of Environmental Protection, December 21, 2005.

¹⁴ Technical Evaluation, Preliminary Determination, Draft BACT Determination, Sumter Cement Company. Florida Department of Environmental Protection, December 21, 2005.

emissions are left uncontrolled. Where such cases have occurred, add-on controls have been used to reduce SO₂ emissions. Uncontrolled SO₂ emissions of about 5,000 tpy were reported from a preheater/precalciner kiln where a wet scrubber was recently being added.¹⁵ At a reported production capacity of 800,000 tpy¹⁶, uncontrolled SO₂ emissions would be about 13 lb/ton of clinker. This is considered representative of a high uncontrolled SO₂ emission level. A moderate uncontrolled SO₂ emission rate of 1.3 lb/ton of clinker was selected and was based on the average of 18 data points for tested NSPS facilities.¹⁷

All of the SO₂ emission levels discussed above are based on long term average performance, typically 30 days. New cement kilns with SO₂ emission limits typically have continuous SO₂ monitors. In reviewing CEM data we noted that the averaging period affects the achievable SO₂ emission level. Longer averaging periods result in lower average SO₂ levels (since variability tends to be averaged out with multiple measurements over time).

¹⁵ PSD Application for Lehigh Mason City, 9/02.

¹⁶ PCA, U.S. and Canadian Portland Cement Industry, Plant Information Summary, December 31, 2006.

¹⁷ Memorandum, E. Heath, RTI, to J. Wood, EPA:OAQPS:ESD:MICG, April 9, 1996, Summary of impacts of control options on model kilns and clinker coolers. Item no. II-B-67, Docket no. A-92-53.

The first control option we considered was no additional control of SO₂ other than the inherent control achieved by the kiln and the raw mill. State BACT determinations usually identify inherent SO₂ removal as BACT (reflecting that most of these kilns are located in areas with low sulfur raw materials). Although many kilns have low sulfur emissions, the obvious deficiency of this option is that some kilns would have moderate or high uncontrolled emissions of SO₂, due to the presence of pyritic sulfur in their raw materials, which emissions would be readily controllable with air pollution control equipment which in fact is usually required in such instances.

The second option considered was 1.33 lb/ton of clinker based on a recent BACT determination level for a kiln where uncontrolled SO₂ emission levels were sufficiently high that an alkaline wet scrubber was installed to reduce SO₂ emissions. This option, and the additional numerical limits discussed below are based on continuous compliance with a 30-day rolling average as measured using an SO₂ continuous emissions monitor. The third option of 0.4 lb/ton of clinker represents the performance of a lime injection system applied to a kiln with a moderate level of sulfur in its raw materials. The fourth level evaluated was 0.2 lb/ton of clinker which was based on the lowest uncontrolled SO₂ permit levels from recent BACT determinations, and represents a level where moderate and high sulfur kilns will require the use

of a wet scrubber for SO₂ control. Several kilns in Florida are permitted at this level where very small amounts of sulfur are present in the raw materials.

We are proposing a limit for new kilns of 1.33 lb/ton of clinker, or alternatively, a 90 percent SO₂ emissions reduction measured across the control device, such as an alkaline scrubber.¹⁸ The alternative of 90 percent reduction is to account of situation where the sulfur content of the raw materials is so high that, even with the most efficient SO₂ control, a kiln cannot meet the 1.33 lb/ton of clinker emissions limit. Design and performance data indicate the 90 percent control is continuously achievable for a well designed and operated wet scrubber.¹⁹ Compliance with the 90 percent reduction would be determined by continuously monitoring SO₂ at the control device inlet and outlet. Continuous monitoring of SO₂ at the inlet and outlet is a positive demonstration that the standard is being continuously met.

We estimate that reducing high uncontrolled SO₂ emissions to a level of 1.33 lb/ton of clinker results in a \$28 million capital cost, an annual cost of \$5 million, and a cost

¹⁸ Section 111(b) specifically indicates that standards may be expressed as numerical limits or as percent reductions.

¹⁹ Summary of Cement Kiln Wet Scrubber and Lime Injection Design and Performance Data, May 29, 2008

effectiveness of less than \$1,000 per ton of SO₂ removal.²⁰ We consider this level of cost effectiveness to be reasonable as it falls at the lower end of the range of reference cost effectiveness for SO₂ emission controls considered to be "highly cost effective" (for purposes of CAA section 110(a)(2)(D) in the CAIR rule). See 70 FR 25204 (May 12, 2005). Under this option, only kilns with moderate or high uncontrolled SO₂ emission levels would likely need to install add-on controls. There are currently only five kilns out of 178 kilns in the U.S. where uncontrolled SO₂ emission levels required the addition of a wet scrubber. We estimate conservatively in costing this option that over the 5-year period following promulgation of these amendments, one out of every five new kilns would have uncontrolled SO₂ emission levels sufficient to warrant the use of a scrubber to reduce SO₂ emissions to the level of 1.33 lb/ton of clinker or, alternatively, demonstrate a 90 percent reduction in SO₂ emissions.

We rejected Options 3 and 4 because they would have resulted in cement kilns with moderate uncontrolled SO₂ emission levels having to apply add-on controls, either dry lime sprayers at a cost of approximately \$6,000 per ton of SO₂ reduction under Option 3 or a wet scrubber at a cost of approximately \$6,700 per

²⁰ Summary of Environmental and Cost Impacts of Proposed Revisions to Portland Cement New Source Performance Standards, May 29, 2008.

ton of SO₂ reduction under Option 4.²¹ Not only do these options result in a higher cost per ton of SO₂ reduction than Option 2, but Options 3 and 4 would not be likely to achieve any significant additional SO₂ emission reductions over Option 2 for kilns emitting high uncontrolled levels of SO₂ because Option 2 already represents a 90 percent emission reduction control for high sulfur raw materials.

The proposed SO₂ emissions limit of 1.33 lb/ton of clinker should not result in any non-air environmental impacts. Liquid waste from the scrubber can be dewatered and returned to the process. The resulting solids (gypsum) can be added to the clinker to produce cement. In cases where lime injection is used, the lime solids will be mixed in with the collected PM and returned to the process. There will be an energy impact as a result of increased electrical requirements to operate the control devices and, in the case of a wet scrubber, increased energy to operate the induced draft fans to overcome the wet scrubber pressure drop. These increases in energy use will be minimal compared to total kiln electrical energy demands.

Currently only five kilns, or less than 3 percent of all kilns, are using wet scrubbers to control SO₂ emissions. Since most new kilns will undoubtedly be located at existing cement plants where the amount of sulfur in limestone raw materials currently being used is low resulting in low uncontrolled SO₂

emissions, they will likely achieve the proposed standard without the need for add-on air pollution controls. For the few new greenfield kilns that will be built, the presence or absence of pyritic sulfur limestone, which can result in high uncontrolled SO₂ emissions, can be factored into any site selection decisions. The effect of the proposed limit will ensure that the typical performance of BDT control systems today is achieved for future affected kilns in those situations where the presence of pyritic sulfur raw materials would otherwise result in high uncontrolled SO₂ emissions.

5. VOC/CO

We are not proposing to establish limits for CO or volatile organic compound (VOC) emissions from cement kilns. VOC emissions from new cement kilns will mainly result from organics in the raw materials. Organic constituents in the raw materials can be driven off in the kiln preheater prior to reaching temperature zone that would result in combustion. All new cement kilns are currently subject to a continuous 20 parts per million volume (ppmv) total hydrocarbon (THC) emissions limit - THC serving as a surrogate for non-dioxin HAP -- by the Portland Cement NESHAP. See 71 FR 76530, December 20, 2006. Because most of the THC are also VOC, the THC limit also limits VOC, and serves as the baseline for the NSPS analysis. This limit is based on the best performance of the regenerative thermal

oxidizer add-on control, which is the most effective VOC emission control available for this source category. Therefore we determined that no additional regulation of VOC emissions is feasible.

EPA is currently reconsidering the Portland Cement NESHAP THC limit pursuant to section 307(d)(7)(B) of the CAA. See 71 FR 76553, December 20, 2006. However, based on the information currently available to us, there is no reason to assume that the THC limit after reconsideration will not still represent BDT for this source category.

Emissions of CO can come from two sources, unburned fuel from the precalciner and CO evolved from the raw materials by the same mechanism as the THC emissions. Unburned fuel represents an economic loss to the facility. Therefore, new precalciners are designed to combust fuel as efficiently as possible, and CO emissions from fuel combustion are minimized, regardless of any potential emission limit.

Emissions of CO evolved from raw materials can be significant if there are substantial levels of organics in the raw material. The only control technology identified to reduce CO emissions is a regenerative thermal oxidizer (RTO) (which also would concurrently reduce any VOC emissions, as just discussed). However, as is the case for VOC, facilities with moderate or high levels of organic materials in the feed would

emit THC at levels high enough that THC control would be required under the Portland Cement NESHAP. Therefore, the THC limit in the Portland Cement NESHAP also serves as the baseline of the CO analysis. As previously noted, the THC limit is based on the best performance of the regenerative thermal oxidizer add-on control, which is also the most effective CO emission control available for this source category. Therefore we determined that no additional regulation of CO emissions is feasible.

We also noted that in no cases had add-on controls for CO (or VOC) been required as BACT under new source review.

B. How is EPA proposing to amend the testing requirements?

Subpart F currently requires PCP to conduct an initial performance test to demonstrate compliance with the PM emission limits. There is no requirement for repeat performance tests. Under the proposed amendments, new kilns would be required to conduct repeat performance tests every 5 years following the initial performance test, as is done for compliance with the MACT standard for PM for kilns at major sources (64 FR 31903, June 14, 1999), and existing kilns subject to the NSPS would be required to begin testing every five years. We are also requiring existing kilns subject to the NSPS to begin testing every 5 years. We do not see this as a substantive change because the majority of kilns already have a similar testing

requirement under the Portland Cement NESHAP, 40 CFR 63, subpart LLL.

There are no NO_x or SO₂ compliance testing requirements; compliance is based on the use of a continuous emissions monitor (see below).

C. How is EPA proposing to amend the monitoring requirements?

We are proposing the use of a bag leak detection (BLD) system on fabric filters used to control PM emissions from new kilns and clinker coolers. We believe the use of BLD systems would be more effective in ensuring ongoing compliance with the PM limit than the current stack opacity limit in the current NSPS. Consequently, affected facilities under this rule would not be subject to an opacity standard to monitor compliance with the proposed PM standard. Bag leak detection systems must be installed and operated according to the proposed §60.63(f) requirements. If a new facility installs an ESP we are proposing to require use of an ESP predictive model to determine compliance. As with use of a bag leak detector, no opacity standard would apply.

As an option, we are allowing a facility to install a PM CEMS in lieu of using a BDL or using an ESP predictive model. If a facility elects this option, the PM CEMS should be installed and operated in accordance with proposed §60.63(g).

For existing sources that are currently subject to the NSPS, we are also providing an option to install a BLD to monitor compliance with the PM standard. We are also providing an option for any source subject to the NSPS PM limit to install a PM continuous monitoring system (PM CEMS). For any source that installs a BLD or PM CEMS, the opacity standard would no longer apply.²¹

For all emission sources other than the kiln and clinker cooler that are subject to the 10 percent opacity standard, we are requiring that they meet the monitoring requirements for these sources contained in the Portland Cement NESHAP, 40 CFR part 63, subpart LLL.

Under the proposed amendments, compliance with the emission limits for NO_x and SO₂ would be determined using continuous emissions monitoring systems (CEMS). This requirement is consistent with recent State permit requirements that require continuous monitoring for NO_x and SO₂. Requirements for the installation, operation, and calibration of each CEM, including minimum data requirements are specified in proposed §60.63(k) and (l). Kilns meeting the alternative SO₂ emission limit of 90 percent reduction would also be required to continuously monitor

²¹ Note that we are not proposing to change the requirements in paragraph §60.63(b). These requirements are in the proposed §60.63(b)(1)(i) and are reprinted as a convenience to the reader.

SO₂ emissions at the scrubber inlet. The cost impacts shown in the preamble include all monitoring costs.²¹

D. Why are we not proposing to revise the other emission limits in the NSPS?

The proposed revisions to the emission limits cover only the cement kiln and clinker cooler. The current NSPS also limits emissions from materials handling operations. These operations are potential emitters of PM, but do not emit other criteria pollutants.

Emissions from materials handling points are typically fugitive emissions, though in some cases emissions are captured and exhausted through a stack. The current opacity limit for these operations is 10 percent. We considered the possibility of setting a lower limit, but we do not have data to indicate that a lower limit is achievable or whether costs associated with a lower opacity limit are reasonable. We currently have no data to indicate that the current level is not what is being achieved in practice. We are requesting comment and any available data addressing capability, if any, to further reduce opacity and, if lower limits are feasible, what the associated costs would be.

E. What other changes are being proposed?

As previously noted, cement kilns are potentially subject to both the NSPS and the Portland Cement NESHAP (40 CFR part 63, subpart LLL). In §63.1356 of subpart LLL, we exempt any source subject to that subpart from applicable standards under the NSPS and the Metallic Minerals Processing NSPS (subpart 000). That language was appropriate because the NSPS only regulated PM, and the PM limits in the NSPS and NESHAP were identical. This is no longer the case. As a result, we are proposing to insert language in both the NSPS and the NESHAP to state that when there are emissions standards for a specific pollutant that apply to an affected sources in both the NESHAP and the NSPS, the source should comply with the most stringent limit, and is not subject to the less stringent limit.

F. What is EPA's sector-based approach and how is it relevant to this rulemaking?

In the National Academy of Science's 2004 report, "Air Quality Management in the United States," the National Research Council (NRC) recommended to EPA that standard setting, planning and control strategy development be based on integrated assessments that consider multiple pollutants and those integrated assessments be conducted in a comprehensive and coordinated manner. With these recommendations, EPA began to move towards establishing multi-pollutant and sector-based approaches to managing emissions and air quality. These sector-

based approaches essentially expand technical analyses on costs and benefits of particular technologies, and interactions of rules that regulate sources within facilities. The benefit of multi-pollutant and sector-based analyses and approaches include the ability to identify optimum strategies, considering feasibility, costs, and benefits across all pollutant types - criteria, toxics and others -- while streamlining administrative and compliance complexities and reducing conflicting and redundant requirements. With these recommendations, EPA's intent is to move toward multi-pollutant and sector-based approaches in managing emissions and air quality. One of the many ways we can address sector-based approaches is by reviewing multiple regulatory programs together when ever possible. This approach should result in added certainty and easier implementation of control strategies for the sector under consideration.

Multiple regulatory requirements currently apply to the cement industry sector. In an effort to facilitate sector-based approaches for the cement industry, EPA analyzed the interactions between the NSPS under review here and other regulatory requirements for portland cement facilities currently under review and/or reconsideration. The requirements analyzed would affect HAP and/or criteria pollutant emissions from cement kilns and comprise the NSPS, NESHAP reconsideration for mercury

(Hg) and THC, area source NESHAP, and NESHAP technology review and residual risk. The results of our analyses are described below.

The first interaction is the relationship between the NSPS VOC-CO standard and the NESHAP THC standard discussed above. As explained there, the 20 ppmv THC limit for new sources in the NESHAP will also control VOC and CO to the limit of technical feasibility.

Another interaction relates to the more stringent PM emission limit under NSPS and the PM emissions limit for new sources under the NESHAP. We are proposing a limit of 0.086 lb/ton of clinker as compared to the current new source PM limit in the NESHAP of 0.5 lb/ton of clinker (0.3 lb/ton of feed). This results in a situation where the MACT PM emissions limit for new sources is higher (less stringent) than the NSPS emissions limit. As a result, EPA will consider whether or not we should address the PM standard in the NESHAP as part of the ongoing reconsideration. At a minimum, and as just explained, we are proposing to place language in both the NESHAP and the NSPS making it clear that if a particular source has two different requirements for the same pollutant, they should comply with the most stringent emission limit, and are not subject to the less stringent limit.

The proposed NSPS PM limit also has implications for the PM limit for area sources under the NESHAP. We currently have a requirement to extend the PM limit in the NESHAP to kilns located at area sources in order to meet our requirements to subject to regulation area sources accounting for 90 percent of the emissions of the HAP identified in our Urban Air Toxics Strategy.²² Having a different limit for kilns under NESHAP and NSPS has implications for the appropriate PM level to apply to new kilns located at area sources under the NESHAP.

Another issue being addressed as part of our cement sector strategy is condensable PM. There are insufficient data to assess if the cement industry is a significant source of condensable PM. The measurement of condensable PM is important to EPA's goal of reducing ambient air concentrations of fine PM. While the Agency supports reducing condensable PM emissions, the amount of condensable PM captured by Method 5 (the PM compliance test method specified in the NSPS) is small relative to methods that specifically target condensable PM, such as Method 202 (40 CFR part 51, Appendix M). (It should be noted that all of the PM data previously discussed is based on the front half of the Method 5 train, so it does not include any condensable PM). Since promulgation of Method 202 in 1991, EPA has been working

²² Memo from K. Barnett, EPA to Sharon Nizich, EPA. Extension of Portland Cement NESHAP PM limits to Area Sources. May 2008.

to overcome problems associated with the accuracy of Method 202 and will promulgate improvements to the method in the future. In order to assist in future sector strategy development, we are specifically requesting comment on the levels of condensable PM emitted by the cement industry; any condensable PM emission test data collected using EPA Conditional Method 39, EPA Method 202 (40 CFR part 51, Appendix M), or their equivalent, factors affecting those condensable PM emissions, and potential controls.

In addition to the current regulatory efforts, we are required under CAA section 112(f) to evaluate the residual risk for toxic air pollutants emitted by this source category and to perform a technology review for this source category under section 112(d)(6). As we consider any changes in the PM limits under MACT and generally available control technology (GACT), we will also consider the implication these may have in developing future requirements under residual risk and technology review.

Another interaction with implications for the co-control of mercury is the proposed SO₂ standard under the NSPS. As described above, the proposed standard for SO₂ control is 1.33 lb/ton of clinker, or in the alternative, demonstration of a 90 percent SO₂ emissions reduction measured across the control device, such as an alkaline scrubber. Under the NESHAP reconsideration, EPA may amend the MACT standard for Hg for new

and existing sources. A facility that is considering adding a new source that may be subject to SO₂ add-on control requirements will have to consider the interaction of their choice of SO₂ and mercury controls. For example, a facility that determines a moderate level of SO₂ reduction would meet the SO₂ emission limit (i.e. 70 percent or less) might consider using a lime injection system because it is lower cost. However, if the same facility would have to use some type of add-on control to meet the current new source Hg emission limit of 41 micrograms per dry standard cubic meter (ug/dscm), then the cheapest overall alternative might be to use a wet scrubber for control of both SO₂ and mercury.

In general, we will ensure that our rulemaking recognizes that where monitoring is required, methods and reporting requirements should be consistent in the NSPS and NESHAP where the pollutants and emission sources have similar characteristics. As an example, we are proposing to add a requirement to the NSPS that a PM emissions compliance test on the kiln and clinker cooler be done every five years, as is currently required in the Portland Cement NESHAP for major sources, and we are incorporating the Portland Cement NESHAP monitoring requirements for sources other than kilns and clinker coolers into the NSPS.

In order to better analyze future sector-based approaches for the U.S. cement industry, EPA is developing a dynamic techno-economic model of this industry. Using this model, EPA will be able to analyze emission reduction strategies for multiple pollutants, while taking into account plant-level economic and technical factors such as the type of kiln, associated capacity, location, cost of production, applicable controls and costs. For each of the emission reduction strategies under consideration, the model will be able to provide information on optimal (least cost) industry operation and cost-effective controls, to meet the demand for cement and the emission reduction requirements over the time period of interest. More information on the model can be found in the rulemaking docket.

We welcome comments and suggestions related to the potential uses of our techno-economic model as well in the interaction of this proposed NSPS and other regulatory requirements in the context of the sector-based considerations described above.

G. How is EPA addressing greenhouse gas emissions from the portland cement industry?

While CAA section 111(b)(1)(B) permits EPA, under appropriate circumstances, to add new standards of performance for additional pollutants concurrent with the 8-year review of

existing standards, we are not at this time proposing performance standards for greenhouse gases (GHG) from cement kilns. Rather, for the reasons recently explained in the petroleum refineries NSPS final rule signed on April 30, 2008, we believe that it is appropriate to consider issues related to the regulation of GHGs under the CAA through the advance notice of proposed rulemaking announced by the Administrator on March 27, 2008.

V. Summary of Cost, Environmental, Energy, and Economic Impacts of the Proposed Amendments to Subpart F

In setting standards, the CAA requires us to consider alternative emission control approaches, taking into account the estimated costs as well as impacts on energy, solid waste, and other effects. We request comment on whether we have identified the appropriate alternatives and whether the proposed standards adequately take into consideration the incremental effects in terms of emission reductions, energy, and other effects. We will consider the available information in developing the final rule.

We are presenting estimates of the impacts for the proposed amendments to 40 CFR part 60, subpart F that change the performance standards. The cost, environmental, and economic impacts presented in this section are expressed as incremental differences between the impacts of PCP complying with the

proposed subpart F revisions and the baseline. The impacts are presented for new PCP affected facilities that commence construction, reconstruction, or modification over the 5 years following promulgation of the revised NSPS. The analyses and the documents referenced below can be found in Docket ID No. EPA-HQ-OAR-2007-0877.

In order to determine the incremental impacts of this proposed rule, we first estimated the number of new kilns that will begin operation over the 5-year period following promulgation of the final amendments. We estimate that 20 new kilns will be subject to the proposed amendments by the end of the 5th year after promulgation of the amendments representing approximately 24 million tpy of clinker capacity.¹

A. What are the air quality impacts?

The proposed PM emission limit represents a lowering of the PM emission limit from 0.5 lb/ton of clinker production to 0.086 lb/ton of clinker. Our review of the performance of recently installed fabric filters indicates that typical new kiln PM emissions are approximately 0.16 lb/ton of clinker rather than 0.5 lb/ton of clinker, the current NSPS limit. We estimate that the PM reduction per kiln as a result of the proposed PM emissions limits will be 44 tpy based on our 1.2 million tpy model kiln, and 888 tpy nationally in the fifth year after

promulgation of the standard. We estimate 45 percent (400 tpy) of the estimated PM reduction is PM fine.

Under the proposed limit for NO_x, we have estimated that the emission reduction for our 1.2 million tpy model kiln would be 600 tpy. The projected national emissions reduction 5 years after promulgation of the final standards will be 12,000 tpy.

Under the proposed limit for SO₂, we estimated that a new kiln processing raw materials containing high levels of sulfur would be required to install an alkaline scrubber in order to comply with the proposed limit. For our model kiln, emissions of SO₂ would be reduced by 7,410 tpy where high sulfur raw materials are being processed. We estimated that during the 5 years following promulgation of the final standard, four new kilns are expected to be required to install an alkaline scrubber to meet the proposed SO₂ emission limit. The national emissions reduction 5 years after promulgation of the final standards will be 29,640 tpy. This national emissions reduction may be less than estimated above if some kilns that would have to control SO₂ as a result of this proposed rule are required to apply wet scrubbers as a result of the current mercury emission requirements in the Portland Cement NESHAP (see further discussion in the cost impacts section).

Under the proposed standards, new monitoring requirements would be added. Bag leak detectors would be required on fabric

filters used to control new kilns and clinker coolers, and NOX and SO₂ CEMS would be installed to monitor compliance of new kilns with the new NOX and SO₂ emission limits. As a result of the shortened duration of excess emissions with the improved monitoring requirements we estimate potential excess emission reductions of 12.38 tpy for PM, 5.57 tpy for PM_{2.5}, 108 tpy for NOX, and 9.36 tpy for SO₂. For further detail on the methodology of these estimates, see Docket ID no. EPA-HQ-OAR-2007-0877.

B. What are the water quality impacts?

No water quality impacts for the proposed amendments are anticipated. The requirements for new sources that might result in the use of alkaline scrubber to control SO₂ will produce a scrubber slurry liquid waste stream. However, as noted above, we assume the scrubber slurry produced will be dewatered and added back into the cement-making process as gypsum. Water from the dewatering process will be recycled back to the scrubber.

C. What are the solid waste impacts?

The potential for solid waste impacts are associated with greater PM control for new kilns and solids resulting from solids in scrubber slurry water. Little or no solid waste is expected from the generation of scrubber slurry because (as just explained for the scrubber water) it is assumed that the slurry will be dewatered and the solids added back to the process as gypsum to make cement. The PM captured in the kiln fabric

filter (cement kiln dust) is essentially re-captured raw material and is recycled back to the kiln. Where equipped with an alkali bypass, captured PM is typically disposed of as solid waste. An alkali bypass is not required on all kilns. Where one is present, the amount of solid waste generated from the alkali bypass is minimal, usually about 1 percent of total cement kiln dust captured in control devices, because the bypass gas stream is a small percentage of total kiln exhaust gas flow and the bypass gas stream does not contact the feed stream in the raw mill.¹

D. What are the secondary impacts?

Indirect or secondary air quality impacts include impacts that would result from the increased electricity usage associated with the operation of control devices (e.g., increased secondary emissions of criteria pollutants from power plants) as well as water quality and solid waste impacts that would occur as a result of these proposed revisions (which are minimal, as just discussed). We estimate that these proposed revisions would increase emissions of pollutants from utility boilers that supply electricity to the portland cement facilities. We estimate increase energy demand associated with the installation of scrubbers to control SO₂ emissions. These increases are estimated to be 108 tpy of NO_x, 56 tpy of CO, 185 tpy of SO₂ and about 5 tpy of PM at the end of the 5th year after

promulgation. The increase in electricity usage for the pumps used in the SNCR system to deliver reagent to the kiln are negligible.

E. What are the energy impacts?

Energy impacts consist of the electricity needed to operate control devices and other equipment that would likely be utilized to comply with the proposed standards. This proposal will likely result in the addition of alkaline scrubbers to certain kilns to reduce SO₂ emissions. We estimate the additional national electrical demand to be 48 million kWhr per year by the end of the 5th year.

F. What are the cost impacts?

Under the proposed amendments, the cost for new kilns are based on the use of NO_x and SO₂ continuous emissions monitors, bag leak detectors, SNCR for NO_x control, and membrane bags in fabric filters. We estimate that four of the twenty new kilns will also need to install a wet scrubber to meet the proposed SO₂ emissions limits (based on our estimates of where the plants will be located and the sulfur content of the limestone in those areas). The total capital cost per kiln is estimated to be \$3,900,000 kilns that are not required to install wet scrubbers and \$32,000,000 for kilns that are required to install wet scrubbers. The cumulative capital cost in the fifth year is estimated to be \$190,000,000. The estimated total annualized

cost per new kiln will be \$1,500,000 for kilns that do not install wet scrubbers and \$6,400,000 for those that do install wet scrubbers. National annualized costs will be \$50,000,000.

The national costs shown above are considered to be a conservative estimate because they do not include the potential impact of requirements for new sources in the Portland Cement NESHAP, which limits mercury emission from new kilns to 41 micrograms per dry standard cubic meter (See 71 FR 76518). In this final rule we estimated that seven of the new cement kilns expected in the next five years will need to install a wet scrubber to meet the mercury emissions limit, and we assessed the costs of those scrubbers as part of our analysis of the NESHAP. There are no data to positively determine if the four cement kilns we project here as needing wet scrubbers to meet the proposed SO₂ emissions limit are among the seven kilns we projected as needing wet scrubbers to meet the mercury limit in the NESHAP. However, the available mercury test data for cement kilns that currently have wet scrubbers indicate that they all five of these kilns, if they were new sources, would have to apply mercury controls to meet the current mercury limit in the Portland Cement NESHAP. These kilns are also located in areas where the raw materials sulfur content is high enough that, if they were new sources, they would also have to apply controls too meet the proposed NSPS SO₂ emissions limit. Based on this,

we believe it is reasonable to assume there will be some overlap, and the national costs for the proposed NSPS, emissions reductions, and energy impacts will be reduced.

We are requesting comment on the size of model kiln used to assess the cost impacts shown above, our growth estimates, and the control cost estimates, including any appropriate cost credits for replacement of purchased gypsum with synthetic gypsum produced by wet scrubbers.

G. What are the economic impacts?

This proposal affects certain new and reconstructed/modified affected facilities found at PCP as defined earlier in this preamble. We performed an economic impact analysis that estimates changes in prices and output for portland cement manufacturing nationally using the annual compliance costs estimated for this proposal. All estimates are for the fifth year after promulgation since this is the year for which the compliance cost impacts are estimated.

Existing data on planned capacity expansions suggests 20 new kilns will be constructed in the next 5 years.¹ EPA estimates up to four of these kilns may use high sulfur raw materials while the remaining 16 will likely use moderate or low sulfur raw materials.

The engineering cost analysis suggests new kiln using high sulfur raw materials could potentially spend up to \$6.4 million

dollars per year to meet the selected control options for NO_x, SO₂, and PM (see Table 2 of this preamble). The average cost per ton of capacity is approximately \$5. In contrast, new kilns using moderate or low sulfur raw materials could potentially spend \$1.5 million dollars per year. The average cost per ton of capacity is approximately \$1.

Table 2. Model Plant Costs (Clinker Capacity =1.1 million metric tons per year)

Kiln type	Number of kilns (5-year period)	Total annualized costs (\$million)	New source unit cost (\$/metric ton of capacity)
High sulfur raw materials	4	\$6.4	\$5
Moderate or low sulfur raw materials	16	\$1.5	\$1

The USGS reports that the real price of cement per metric ton (2005 dollars) has typically ranged between \$75 and \$100 since 1990. For high sulfur raw material kilns, this implies a sales test ratio between 5 to 7 percent. For moderate/low sulfur raw material kilns, the sales test ratio is one to two percent. From 2000 to 2006, the Portland Cement Association (PCA, 2007) reports that the average operating profit rates for the industry ranged from 17 to 21 percent. If this profit data is representative of operating profit rates for new kilns, new kilns using high sulfur content raw materials could potentially have significantly reduced operating profits. As a result,

companies may have the incentive to look for less expensive alternatives to meet the SO₂ emission standards (e.g. lower sulfur content materials or technologies other than wet scrubbers). Although anecdotal evidence suggests these opportunities exist, EPA does not currently have sufficient information to do a formal evaluation of these alternatives.

We also considered potential market-level changes in prices and consumption for multiple geographic markets anticipating entry of new kilns. The sales tests suggest long run cement price changes could range from one to seven percent, depending on the actual baseline market cement price and the type of kiln entering the market. Applying EPA's econometric estimate of the cement demand elasticity (-0.88) to these price changes, cement consumption could potentially fall between one to six percent.

For more information, please refer to the economic impact analysis report that is in the docket for this proposed rule.

VI. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is a "significant regulatory action" because it may raise novel legal or policy issues. Accordingly, EPA submitted this action to OMB for review under Executive Order 12866, and any changes made in response to OMB recommendations have been documented in the docket for this action.

B. Paperwork Reduction Act

The information requirements in the proposed amendments have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. The Information Collection Request (ICR) document prepared by EPA has been assigned EPA ICR number 2307.01.

The proposed amendments to the NSPS for portland cement plants apply to affected facilities constructed, modified, or reconstructed after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. The owner or operator of a new kiln would be required to keep daily records of clinker production, conduct an initial performance test and repeat performance tests (PM), install and operate bag leak detection systems or PM CEMS for fabric filters used to meet the PM emission limit, and operate NO_x and SO₂ CEMS. These requirements are based on the recordkeeping and reporting requirements in the NSPS General Provisions (40 CFR part 60, subpart A) which are mandatory for all operators subject to new source performance standards. These recordkeeping and reporting requirements are specifically authorized by section 114 of the CAA (42 U.S.C. 7414). All information submitted to EPA pursuant to the recordkeeping and reporting requirements for which a claim of confidentiality is made is safeguarded according to EPA policies set forth in 40 CFR part 2, subpart B.

The annual burden for this information collection averaged over the first 3 years of this ICR is estimated to total 4,428 labor-hours per year at a cost of \$416,179 per year. The annualized capital costs are estimated at \$59,035 per year and operation and maintenance costs are estimated at \$73,852 per year. Burden is defined at 5 CFR 1320.3(b).

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

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, EPA has established a public docket for this rule, which includes this ICR, under Docket ID number EPA-HQ-OAR-2007-0877. Submit any comments related to the ICR for this proposed rule to EPA and OMB. See **ADDRESSES** section at the beginning of this document for where to submit comments to EPA. Send comments to OMB at the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW, Washington, DC 20503, Attention: Desk Office for EPA. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER], a comment to OMB is best assured of having its full effect if OMB receives it by [INSERT

DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impact of this rule on small entities, small entity is defined as: (1) a small business whose parent company has no more than 750 employees (as defined by Small Business Administration (SBA) size standards); (2) a small governmental jurisdiction that is a government of a city, county, town, school district, or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impact of this proposed rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small

entities. We estimate that up to 7 of the 44 existing PCP are small entities which would not incur any impacts under these proposed amendments unless an affected facility is constructed, modified, or reconstructed. Based on our economic analysis, 20 new kilns may be constructed during the next five years. One of these kilns may be operated by a PCP that is classified as small entities according to the SBA small business size standards. Of these 20 kilns, this small entity is expected to incur an annualized compliance cost of between 1.0 and 2.0 percent of sales to comply with the proposed action.

Although this proposed rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities by selection proposed emission level based on highly cost effective controls and specifying monitoring requirements that are the minimum to insure compliance. In the case where there are overlapping standards between this NSPS and the Portland Cement NESHAP, we have exempted source from the least stringent requirement thereby eliminated overlapping monitoring, testing and reporting requirements by proposing that the source comply with only the more stringent of the standards. We continue to be interested in the potential impacts of the proposed rule on small entities and welcome comments on issues related to such impacts.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act (UMRA) of 1995, Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures by State, local, and tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the

UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of \$100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. As discussed earlier in this preamble, the estimated expenditures for the private sector in the fifth year after promulgation are \$50 million. Thus, this rule is not subject to the requirements of section 202 and 205 of the UMRA. In addition, EPA has determined that this proposed action contains no regulatory requirements that might significantly or uniquely affect small governments. This rule contains no requirements that apply to such governments, imposes no obligations upon them, and would not result in expenditures by them of \$100 million or more in any one year or any disproportionate impacts on them. Therefore, this proposed action is not subject to the requirements of section 203 of the UMRA.

E. Executive Order 13132: Federalism

Executive Order 13132 (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. None of the affected facilities are owned or operated by State governments. Thus, Executive Order 13132 does not apply to this proposed rule.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed action from State and local officials.

F. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

Executive Order 13175, entitled "Consultation and Coordination with Indian Tribal Governments" (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure "meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications." This proposed rule does not have tribal implications, as specified in Executive Order 13175. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175. The proposed rule imposes requirements on owners and operators of specified industrial facilities and not tribal governments. Thus, Executive Order 13175 does not apply to this proposed rule. EPA specifically solicits additional comment on this proposed rule from tribal officials.

G. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

EPA interprets Executive Order 13045 as applying to those regulatory actions that concern health or safety risks, such that the analysis required under section 5-501 of the Order has the potential to influence the regulation. This action is not

subject to Executive Order 13045 because it is based solely on technology performance.

H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

This rule is not a "significant energy action" as defined in Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 FR 28355, May 22, 2001) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Further, we have concluded that this proposed rule is not likely to have any adverse energy effects. This proposal will result in the addition of alkaline scrubbers to certain kilns to reduce SO₂ emissions. We estimate the additional electrical demand to be 6.9 million kWhr per year by the end of the 5th year.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Public Law No. 104-113 (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards (VCS) in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed

or adopted by VCS bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable VCS.

This proposed rulemaking involves technical standards. EPA proposes to use the VCS ASME PTC 19.10-1981, "Flue and Exhaust Gas Analyses," for its manual methods of measuring the content of the exhaust gas. These parts of ASME PTC 19.10-1981 are acceptable alternatives to EPA Methods 3B, 6, 6A, 7, and 7C. This standard is available from the American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990.

While the Agency has identified 12 other VCS as being potentially applicable to this rule, we have decided not to use these VCS in this rulemaking. The use of these VCS would have been impractical because they do not meet the objectives of the standards cited in this rule. See the docket for this rule for the reasons for these determinations.

Under 40 CFR 60.13(i) of the NSPS General Provisions, a source may apply to EPA for permission to use alternative test methods or alternative monitoring requirements in place of any required testing methods, performance specifications, or procedures in the final rule and amendments.

EPA welcomes comments on this aspect of this proposed rulemaking and, specifically, invites the public to identify

potentially-applicable voluntary consensus standards and to explain why such standards should be used in this regulation.

J. Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629 (Feb. 16, 1994)) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States. EPA has determined that the proposed amendments will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because they would increase the level of environmental protection for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population. These proposed standards would reduce

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emissions of PM, NO_x, and SO₂ from all new, reconstructed, or modified affected facilities at PCP, decreasing the amount of such emissions to which all affected populations are exposed.

List of Subjects 40 CFR Part 60

Environmental protection, Administrative practice and procedure, Air pollution control, Incorporation by reference, Intergovernmental relations, Reporting and recordkeeping requirements.

List of Subjects 40 CFR Part 63

Environmental protection, Air pollution control.

Dated:

Stephen L. Johnson,
Administrator.

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

PART 60--[AMENDED]

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

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

Subpart A--[Amended]

2. Section 60.17 is amended by revising paragraph (h)(4) to read as follows:

§60.17 Incorporations by reference.

* * * * *

(h) * * *

(4) ANSI/ASME PTC 19.10-1981, Flue and Exhaust Gas Analyses [Part 10, Instruments and Apparatus], IBR approved for §60.63(i)(2) and (i)(4) of subpart F, Tables 1 and 3 of subpart EEEE, Tables 2 and 4 of subpart FFFF, Table 2 of subpart JJJJ, and §§60.4415(a)(2) and 60.4415(a)(3) of subpart KKKK of this part.

* * * * *

Subpart F--[AMENDED]

3. Section 60.62 is amended as follows:

- a. Revising the section heading.
- b. Revising paragraphs (a)(1) and (a)(2)

- c. Adding paragraphs (a)(3) and (a)(4);
- d. Revising paragraphs (b)(1) and (b)(2); and
- e. Adding paragraph (d) to read as follows:

§60.62 Standards.

(a) * * *

(1) Contain particulate matter (PM) in excess of:

(i) 0.15 kg per metric ton of feed (dry basis) to the kiln (0.30 lb per ton) if construction, reconstruction, or modification of the kiln commences after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER].

(ii) 0.086 pound per ton of clinker if construction, reconstruction, or modification of the kiln commences after [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER].

(2) Exhibit greater than 20 percent opacity, except that this opacity limit does not apply to a kiln subject to the PM limit in paragraph (a)(1)(i) of this section that uses a bag leak detection system, ESP predictive model, or a PM continuous emission monitoring system.

(3) Exceed 1.50 pounds of nitrogen oxide (NO_x) per ton of clinker on a 30-day rolling average if construction, reconstruction, or modification of the kiln commences after

[INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER].

(4) For sulfur dioxide (SO₂) emissions from a kiln for which construction, reconstruction, or modification commences after [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER]:

(i) Exceed 1.33 pounds per ton of clinker on a 30-day rolling average; or

(ii) The owner or operator must reduce SO₂ emissions exiting the kiln by 90 percent or greater.

(b) * * *

(1) Contain PM in excess of:

(i) 0.050 kg per metric ton of feed (dry basis) to the kiln (0.10 lb per ton) if construction, reconstruction, or modification of the clinker cooler commenced after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER].

(ii) 0.086 pound per ton of clinker if construction, reconstruction, or modification of the clinker cooler commences after [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER].

(2) Exhibit 10 percent opacity, or greater., except that this opacity limit does not apply to a clinker cooler subject to the PM limit in paragraph (b)(1)(i) of this section that uses a bag leak detection system, ESP predictive model or PM continuous emission monitoring system.

* * * * *

(d) If an affected facility subject to this subpart has a different emission limit or requirement for the same pollutant under another regulation in title 40 of this chapter, the owner or operator of the affected facility must comply with the most stringent emission limit or requirement and is not subject to the less stringent requirement.

4. Section 60.63 is amended by:

- a. Revising paragraph (a);
- b. Revising paragraph (b);
- c. Revising the first sentence in paragraph (c);
- d. Adding paragraphs (f) through (n) to read as follows:

§60.63 Monitoring of operations.

(a) The owner or operator of any portland cement plant subject to the provisions of this subpart shall record the daily clinker production rates and kiln feed rates.

(b) The owner or operator of a kiln or clinker cooler must monitor PM emissions according to the applicable requirements in paragraph (b)(1) or (2) of this section.

(1) For a kiln or clinker cooler that that was constructed, reconstructed, or modified after August 17, 1971 but on or before [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER], the owner or operator must:

(i) Install, calibrate, maintain, and operate in accordance with §60.13 a continuous opacity monitoring system (COMS) to measure the opacity of emissions discharged into the atmosphere from any kiln or clinker cooler except as provided in paragraph (c) of this section. Each owner or operator of an affected kiln or clinker cooler for which the performance test required under §60.8 has been completed on or prior to December 14, 1988, must install the COMS within 180 days after December 14, 1988. The COMS must be installed on each stack of any multiple stack control device for emissions from any kiln or clinker cooler. If there is a separate bypass stack installed, the owner or operator also must install, calibrate, maintain, and operate a COMS on each bypass stack in addition to the main control device stack; or

(ii) Install, operate, and maintain a bag leak detection system on each fabric filter used to control PM emissions according to the procedures in paragraph (f) of this section; or

(iii) Install, operate, and maintain an instrument for continuously monitoring and recording the concentration of PM emissions into the atmosphere according to the requirements in paragraph (g) of this section.

(2) For a kiln or clinker cooler that is constructed, modified, or reconstructed or after [INSERT DATE OF PUBLICATION OF PROPOSED RULE IN FEDERAL REGISTER], the owner or operator must:

(i) Install, operate, and maintain a bag leak detection system on each fabric filter used to control PM emissions according to the requirements in paragraph (f) of this section; and

(ii) Monitor the performance of any electrostatic precipitator (ESP) used to control PM emissions according to the requirements in paragraph (o) of this section; or

(iii) Install, operate, and maintain an instrument for continuously monitoring and recording the concentration of PM emissions into the atmosphere according to the requirements in paragraph (g) of this section.

(c) Each owner or operator of a kiln or clinker cooler that was constructed, reconstructed, or modified on or before [INSERT DATE OF PUBLICATION OF PROPOSED RULE IN FEDERAL REGISTER], using a positive-pressure fabric filter with multiple stacks, or a negative-pressure fabric filter with multiple stacks, or an electrostatic precipitator with multiple stacks may, instead of installing the COMS required by paragraph (b)(1)(i) of this section, monitor visible emissions at least once per day by using a certified visible emissions observer.

* * *

* * * * *

(f) The owner or operator must install, operate, and maintain the bag leak detection system according to paragraphs (f)(1) through (3) of this section.

(1) Each bag leak detection system must meet the specifications and requirements in paragraphs (f)(1)(i) through (viii) of this section.

(i) The bag leak detection system must be certified by the manufacturer to be capable of detecting PM emissions at concentrations of 1 milligram per dry standard cubic meter (0.00044 grains per actual cubic foot) or less.

(ii) The bag leak detection system sensor must provide output of relative PM loadings. The owner or operator shall

continuously record the output from the bag leak detection system using electronic or other means (e.g., using a strip chart recorder or a data logger).

(iii) The bag leak detection system must be equipped with an alarm system that will sound when the system detects an increase in relative particulate loading over the alarm set point established according to paragraph (f)(1)(iv) of this section, and the alarm must be located such that it can be heard by the appropriate plant personnel.

(iv) In the initial adjustment of the bag leak detection system, you must establish, at a minimum, the baseline output by adjusting the sensitivity (range) and the averaging period of the device, the alarm set points, and the alarm delay time.

(v) Following initial adjustment, you shall not adjust the averaging period, alarm set point, or alarm delay time without approval from the Administrator or delegated authority except as provided in paragraph (f)(1)(vi) of this section.

(vi) Once per quarter, you may adjust the sensitivity of the bag leak detection system to account for seasonal effects, including temperature and humidity, according to the procedures identified in the site-specific monitoring plan required by paragraph (c)(2) of this section.

(vii) You must install the bag leak detection sensor downstream of the fabric filter.

(viii) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors.

(2) You must develop and submit to the Administrator or delegated authority for approval a site-specific monitoring plan for each bag leak detection system. You must operate and maintain the bag leak detection system according to the site-specific monitoring plan at all times. Each monitoring plan must describe the items in paragraphs (f)(2)(i) through (vi) of this section.

(i) Installation of the bag leak detection system;

(ii) Initial and periodic adjustment of the bag leak detection system, including how the alarm set-point will be established;

(iii) Operation of the bag leak detection system, including quality assurance procedures;

(iv) How the bag leak detection system will be maintained, including a routine maintenance schedule and spare parts inventory list;

(v) How the bag leak detection system output will be recorded and stored; and

(vi) Corrective action procedures as specified in paragraph (f)(3) of this section. In approving the site-specific monitoring plan, the Administrator or delegated authority may allow owners and operators more than 3 hours to alleviate a specific condition that causes an alarm if the owner or operator identifies in the monitoring plan this specific condition as one that could lead to an alarm, adequately explains why it is not feasible to alleviate this condition within 3 hours of the time the alarm occurs, and demonstrates that the requested time will ensure alleviation of this condition as expeditiously as practicable.

(3) For each bag leak detection system, you must initiate procedures to determine the cause of every alarm within 1 hour of the alarm. Except as provided in paragraph (f)(2)(vi) of this section, you must alleviate the cause of the alarm within 3 hours of the alarm by taking whatever corrective action(s) are necessary. Corrective actions may include, but are not limited to the following:

(i) Inspecting the fabric filter for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in PM emissions;

(ii) Sealing off defective bags or filter media;

- (iii) Replacing defective bags or filter media or otherwise repairing the control device;
 - (iv) Sealing off a defective fabric filter compartment;
 - (v) Cleaning the bag leak detection system probe or otherwise repairing the bag leak detection system; or
 - (vi) Shutting down the process producing the PM emissions.
- (g) The owner or operator of a kiln or clinker cooler using a PM continuous emission monitoring system (CEMS) to demonstrate compliance with the emission limit in §60.62(a) or (b) must install, certify, operate, and maintain the CEMS as specified in paragraphs (g)(1) through (3) of this section.
- (1) The owner or operator must conduct a performance evaluation of the PM CEMS according to the applicable requirements of §60.13, Performance Specification 11 of Appendix B of part 60, and Procedure 2 of Appendix F to part 60.
 - (2) During each relative accuracy test run of the CEMS required by Performance Specification 11 of Appendix B to part 60, PM and oxygen (or carbon dioxide) data must be collected concurrently (or within a 30-to 60-minute period) during operation of the CEMS and when conducting performance tests using the following test methods:

(i) For PM, Method 5 or 5B of Appendix A-5 to part 60 or Method 17 of Appendix A-6 to part 60.

(ii) For oxygen (or carbon dioxide), Method 3, 3A, or 3B of Appendix A-2 to part 60, as applicable.

(3) Procedure 2 of Appendix F to part 60 for quarterly accuracy determinations and daily calibration drift tests. The owner or operator must perform Relative Response Audit's annually and Response Correlation Audits every 3 years.

(h) The owner or operator of a kiln constructed, modified or reconstructed on or after [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER] must install, calibrate, maintain and operate a permanent weigh scale system, or use another method approved by the Administrator, to measure and record weight rates in tons-mass per hour of the amount of clinker produced. The system of measuring hourly clinker production must be maintained within ± 5 percent accuracy.

(i) Each owner or operator subject to the NO_x emissions limit for a kiln in §60.62(a)(3) shall install, operate, calibrate, and maintain an instrument for continuously monitoring and recording the concentration by volume of NO_x emissions into the atmosphere.

(j) Each owner or operator subject to the SO_2 emissions limit in §60.62(a)(4) for a kiln shall install, operate,

calibrate, and maintain an instrument for continuously monitoring and recording the concentration by volume of SO₂ emissions into the atmosphere. If complying with the alternative 90 percent SO₂ emissions reduction emission limit, you must also for continuously monitor and record the concentration by volume of SO₂ emissions at the wet scrubber inlet.

(k) The owner or operator of each CEMS required under paragraphs (i) and (j) of this section, shall install, operate, and maintain each monitoring system according to Performance Specification 2 (40 CFR part 60, appendix B) and the requirements in paragraphs (k)(1) through (5) of this section.

(1) The span value of each NO_x monitor shall be set at 125 percent of the maximum estimated hourly potential NO_x emission concentration that translates to the applicable emission limit at full clinker production capacity.

(2) The owner or operator shall conduct performance evaluations of each NO_x monitor according to the requirements in §60.13(c) and Performance Specification 2 of Appendix B to part 60. The owner or operator shall use Methods 7, 7A, 7C, 7D, or 7E of appendix A-4 to part 60 for conducting the relative accuracy evaluations. The method ASME PTC 19.10-1981, "Flue and Exhaust Gas Analyses," (incorporated by reference-see §60.17) is

an acceptable alternative to EPA Method 7 or 7C of Appendix A-4 to part 60.

(3) The span value for the SO₂ monitor must be set at 125 percent of the maximum estimated hourly potential SO₂ emission concentration that translates to the applicable emission limit at full clinker production capacity.

(4) The owner or operator must conduct performance evaluations of each SO₂ monitor according to the requirements in §60.13(c) and Performance Specification 2 of Appendix B to part 60. The owner or operator shall use Methods 6, 6A, or 6C of Appendix A-4 to part 60 for conducting the relative accuracy evaluations. The method ASME PTC 19.10-1981, "Flue and Exhaust Gas Analyses," (incorporated by reference-see §60.17) is an acceptable alternative to EPA Method 6 or 6A of Appendix A-4 to part 60.

(5) The owner or operator must comply with the quality assurance requirements in Procedure 1 of Appendix F to part 60 for each monitor, including quarterly accuracy determinations for monitors, and daily calibration drift tests.

(1) The owner or operator of each CEMS required under paragraphs (i) and (j) of this section must operate the monitoring system and record data during all periods of operation of the affected facility including periods of startup,

shutdown, malfunction, except for continuous monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments.

(1) The owner or operator must obtain emission data for at least 18 hours in at least 22 out of 30 successive kiln operating days. For each valid hour, the owner or operator also must obtain valid exhaust flow rate data, as specified in paragraph (m)(6) of this section.

(2) The owner or operator must meet the requirements of §60.13(h) when determining the 1-hour averages of emissions data needed to meet the minimum data requirements specified in paragraph (l)(1) of this section.

(m) Each owner or operator of a kiln subject to the NO_x emissions limit in §60.62(a)(3) or the SO₂ emissions limit in §60.62(a)(4)(i) or (ii) must install, operate, calibrate, and maintain an instrument for continuously measuring and recording the exhaust flow rate to the atmosphere according to the requirements in paragraphs (m)(1) through (9) of this section.

(1) The owner or operator must install each sensor of the flow rate monitoring system in a location that provides representative measurement of the exhaust gas flow rate at the sampling location of the NO_x and SO₂ CEMS, taking into account the manufacturer's recommendations.

(2) The flow rate monitoring system must be designed to measure the exhaust flow rate over a range that extends from a value of at least 20 percent less than the lowest expected exhaust flow rate to a value of at least 20 percent greater than the highest expected exhaust flow rate.

(3) The flow rate monitoring system must have a minimum accuracy of 5 percent of the flow rate or greater.

(4) The flow rate monitoring system must be equipped with a data acquisition and recording system that is capable of recording values over the entire range specified in paragraph (1)(2) of this section.

(5) The signal conditioner, wiring, power supply, and data acquisition and recording system for the flow rate monitoring system must be compatible with the output signal of the flow rate sensors used in the monitoring system.

(6) The flow rate monitoring system must be designed to complete a minimum of one cycle of operation for each successive 15-minute period. To have a valid hour of data, the flow rate monitoring system must measure and record at least three of four equally-spaced data values (or at least 75 percent of the total number of values) for each hour (not including startup, shutdown, malfunction, or out-of-control periods).

(7) The owner or operator must perform an initial calibration of the flow rate monitoring system according to manufacturer's recommendations

(8) The owner or operator must check the accuracy of the monitoring system at least once per year according to manufacturer's recommendations.

(9) The owner or operator must operate the flow rate monitoring system and record data during all periods of operation of the affected facility including periods of startup, shutdown, malfunction, except for monitoring system breakdowns, repairs, and calibration checks.

(n) You must monitor the performance of any ESP specified in paragraph (b)(2)(ii) of this section in accordance with the requirements in paragraph (o)(1) through (5) of this section.

(1) You must calibrate the ESP predictive model with each PM control device used to comply with the applicable PM emissions limit in §60.62(a)(ii) or (b)(ii) operating under normal conditions. In cases when a wet scrubber is used in combination with an ESP to comply with the PM emissions limit, the daily average liquid-to-gas flow rate for the wet scrubber must be maintained at 90 percent of average ratio measured during all test run intervals for the performance test conducted according to paragraph (o)(1) of this section.

(2) You must develop a site-specific monitoring plan that includes a description of the ESP predictive model used, the model input parameters, and the procedures and criteria for establishing monitoring parameter baseline levels indicative of compliance with the PM emissions limit. You must submit the site-specific monitoring plan for approval by the permitting authority. For reference purposes in preparing the monitoring plan, see the OAQPS "Compliance Assurance Monitoring (CAM) Protocol for an Electrostatic Precipitator (ESP) Controlling Particulate Matter (PM) Emissions from a Coal-Fired Boiler." This document is available from the U.S. Environmental Protection Agency (U.S. EPA); Office of Air Quality Planning and Standards; Sector Policies and Programs Division; Measurement Policy Group (D243-02), Research Triangle Park, NC 27711. This document is also available on the Technology Transfer Network (TTN) under Emission Measurement Center Continuous Emission Monitoring.

(3) You must run the ESP predictive model using the applicable input data each boiler operating day and evaluate the model output for the preceding boiler operating day excluding periods of affected source startup, shutdown, or malfunction. If the values for one or more of the model parameters exceed the applicable baseline levels determined according to your approved site-specific monitoring plan, you must initiate investigation

of the relevant equipment and control systems within 24 hours of the first discovery of a model parameter deviation and, take the appropriate corrective action as soon as practicable to adjust control settings or repair equipment to return the model output to within the applicable baseline levels.

(4) You must record the ESP predictive model inputs and outputs and any corrective actions taken. The record of corrective action taken must include the date and time during which the model output values exceeded the applicable baseline levels, and the date, time, and description of the corrective action.

(5) If after 7 consecutive days a model parameter continues to exceed the applicable baseline level, then you must conduct a new PM performance test according to paragraph (o)(1) of this section. This new performance test must be conducted within 60 days of the date that the model parameter was first determined to exceed its baseline level unless a waiver is granted by the permitting authority.

5. Section 60.64 is amended by:

- a. Revising paragraph (b) introductory text and paragraph (b)(1); and
- b. Adding paragraphs (b)(5) and (b)(6);
- c. Adding paragraph to read as follows:

§60.64 Test methods and procedures.

* * * * *

(b) The owner or operator must determine compliance with the PM standard in §60.62(a)(1) as follows:

(1) The emission rate (E) of PM must be computed for each run using the Equation 1 of this section:

$$E = (c_s Q_{sd}) / (PK) \quad (\text{Eq. 1})$$

Where:

E = emission rate of particulate matter, kg/ metric ton (lb/ton) of kiln feed;

Cs = concentration of particulate matter, g/dscm (gr/dscf);

Qsd = volumetric flow rate of effluent gas, dscm/hr (dscf/hr);

P = total kiln feed (dry basis) rate, metric ton/ hr (ton/hr).

For kilns constructed, modified or reconstructed on or after [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER], p = total kiln clinker production rate; and

K = conversion factor, 1000 g/kg (7000 gr/lb).

* * * * *

(5) The owner or operator of a kiln (including any associated alkali bypass and clinker cooler) that is constructed, modified or reconstructed on or after [INSERT DATE OF PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER], must conduct a performance test every 5 years following the initial performance test. Kilns (including any associated alkali bypass and clinker cooler) constructed, reconstructed, or modified after August 17, 1971 but on or before [INSERT DATE OF

PUBLICATION OF THIS PROPOSED RULE IN FEDERAL REGISTER] must conduct a performance test every 5 years.

(6) Any sources other than kilns (including associated alkali bypass and cooler) subject to the 10 percent opacity limit must follow the appropriate monitoring procedures in §63.1350 of this chapter.

(c) The owner or operator must calculate and record the 30-day rolling emission rate of NO_x and SO₂ as the total of all hourly emissions data for a cement kiln in the preceding 30 days, divided by the total tons of clinker produced in that kiln during the same 30-day period using Equation 2 of this section:

$$E = (c_s Q_{sd}) / (PK) \quad (\text{Eq. 2})$$

Where:

E = emission rate of NO_x or SO₂, kg/metric ton (lb/ton) of clinker production;
 C_s = concentration of NO_x or SO₂, g/dscm (gr/dscf);
 Q_{sd} = volumetric flow rate of effluent gas, dscm/hr (dscf/hr);
 P = total kiln clinker production rate, metric ton/hr (ton/hr).;
 and
 K = conversion factor, 1000 g/kg (7000 gr/lb).

6. Section 60.66 is revised to read as follows:

§60.66 Delegation of authority.

(a) This subpart can be implemented and enforced by the U.S. EPA or a delegated authority such as a State, local, or tribal agency. You should contact your U.S. EPA Regional Office

to find out if this subpart is delegated to a State, local, or tribal agency within your State.

(b) In delegating implementation and enforcement authority to a State, local, or tribal agency, the approval authorities contained paragraphs (b)(1) through (4) of this section are retained by the Administrator of the U.S EPA and are not transferred to the State, local, or tribal agency.

(1) Approval of an alternative non-opacity emission standard.

(2) Approval of a major change to test methods under §60.8(b). A "major change to test method" is defined in 40 CFR 63.90.

(3) Approval of a major change to monitoring under §60.13(i). A "major change to monitoring" is defined in 40 CFR 63.90.

(4) Approval of a major change to recordkeeping/reporting under §60.7(b) through (f). A "major change to recordkeeping/reporting" is defined in 40 CFR 63.90.

PART 63—[AMENDED]

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

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

Subpart LLL—[Amended]

8. Section 63.1356 is revised to read as follows:

§63.1356 Sources with multiple Emission Limits

If an affected facility subject to this subpart has a different emission limit or requirement for the same pollutant under another regulation in title 40 of this chapter, the owner or operator of the affected facility must comply with the most stringent emission limit or requirement and is exempt from the less stringent requirement.