ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60 and 63

[EPA–HQ–OAR–2002–0051; EPA–HQ–OAR–2007–0877; FRL–9189–2]

RIN 2060–AO15, 2060–AO42

National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: EPA is finalizing amendments to the National Emission Standards for Hazardous Air Pollutants (NESHAP) from the Portland Cement Manufacturing Industry and to the New Source Performance Standards (NSPS) for Portland Cement Plants.

The final amendments to the NESHAP add or revise, as applicable, emission limits for mercury, total hydrocarbons (THC), and particulate matter (PM) from new and existing kilns located at major and area sources, and for hydrochloric acid (HCl) from new and existing kilns located at major sources. The standards for new kilns apply to facilities that commence construction, modification, or reconstruction after May 6, 2009.

The final amendments to the NSPS add or revise, as applicable, emission limits for PM, opacity, nitrogen oxides (NO_X), and sulfur dioxide (SO_2) for facilities that commence construction, modification, or reconstruction after June 16, 2008. The final rule also includes additional testing and monitoring requirements for affected sources.

DATES: These final rules are effective on November 8, 2010. The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register on November 8, 2010.

ADDRESSES: EPA has established two separate dockets for these actions: Docket ID No. EPA–HQ–OAR–2007–0877 for the amendments to the NSPS and Docket ID No. EPA–HQ–OAR–2002–0051 for the amendments to the NESHAP. All documents in the two dockets are listed in the *http://www.regulations.gov* index. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the EPA Docket Center, Standards of Performance 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 number: (919) 541–5605; fax number: (919) 541–5450; e-mail address: *barnett.keith@epa.gov.*

SUPPLEMENTARY INFORMATION: The supplementary information presented in this preamble is organized as follows:

I. General Information

A. Does this action apply to me?

Categories and entities potentially regulated by this final rule include:

Category	NAICS code[1]	Examples of regulated entities
Industry	327310	Portland cement manufacturing plants.
Federal government		Not affected.
State/local/Tribal government		Portland cement manufacturing plants.

[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 will be regulated by this action, you should examine the applicability criteria in 40 CFR 60.60 (subpart F) or in 40 CFR 63.1340 (subpart LLL). If you have any questions regarding the applicability of this final action to a particular entity, contact the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

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

In addition to being available in the docket, an electronic copy of this final action is available on the Worldwide Web (WWW) through the Technology Transfer Network (TTN). Following signature, a copy of this final 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.

C. Judicial Review

Under section 307(b)(1) of the Clean Air Act (CAA), judicial review of these final rules are available only by filing a petition for review in the United States Court of Appeals for the District of Columbia Circuit by November 8, 2010. Under section 307(b)(2) of the CAA, the requirements established by these final rules may not be challenged separately in any civil or criminal proceedings brought by EPA to enforce these requirements.

Section 307(d)(7)(B) of the CAA further provides that "[o]nly an objection to a rule or procedure which was raised with reasonable specificity during the period for public comment (including any public hearing) may be raised during judicial review." This section also provides a mechanism for EPA to convene a proceeding for reconsideration, "[i]f the person raising an objection can demonstrate to EPA that it was impracticable to raise such objection within [the period for public comment] or if the grounds for such objection arose after the period for public comment (but within the time specified for judicial review) and if such objection is of central relevance to the outcome of the rule." Any person seeking to make such a demonstration to us should submit a Petition for Reconsideration to the Office of the Administrator, U.S. EPA, Room 3000, Ariel Rios Building, 1200 Pennsylvania Ave., NW., Washington, DC 20460, with a copy to both the person(s) listed in the preceding **FOR FURTHER INFORMATION CONTACT** section, and the Associate General Counsel for the Air and Radiation Law Office, Office of General Counsel (Mail Code 2344A), U.S. EPA, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

II. Background Information on the NESHAP, 40 CFR Part 63, Subpart LLL

A. What is the statutory basis for the NESHAP in 40 CFR part 63, subpart LLL?

Section 112 of the CAA establishes a regulatory process to address emissions of hazardous air pollutants (HAP) from stationary sources. After EPA has identified categories of sources emitting one or more of the HAP listed in section 112(b) of the CAA, section 112(d) requires us to promulgate NESHAP for those sources. For "major sources" that emit or have the potential to emit 10 tons per year (tpy) or more of a single HAP or 25 tpy or more of a combination of HAP, these technology-based standards must reflect the maximum reductions of HAP achievable (after considering cost, energy requirements, and non-air quality health and environmental impacts) and are commonly referred to as maximum achievable control technology (MACT) standards.

The statute specifies certain minimum stringency requirements for MACT standards, which are referred to as "floor" requirements. *See* CAA section 112(d)(3). Specifically, for new sources, the MACT floor cannot be less stringent than the emission control that is achieved in practice by the best controlled similar source. The MACT standards for existing sources can be less stringent than standards for new sources, but they cannot be less stringent than the average emission limitation achieved by the best-performing 12 percent of existing sources (for which the Administrator has emissions information) in the category or subcategory (or the best-performing five sources for categories or subcategories with fewer than 30 sources).

In developing MACT, we must also consider control options that are more stringent than the floor. We may establish standards more stringent than the floor based on the consideration of the cost of achieving the emissions reductions, any non-air quality health and environmental impacts, and energy requirements. CAA section 112(d)(2).

Section 112(k)(3)(B) of the CAA requires EPA to identify at least 30 HAP that pose the greatest potential health threat in urban areas, and section 112(c)(3) requires EPA to regulate, under section 112(d) standards, the area source[1] categories that represent 90 percent of the emissions of the 30 "listed" HAP ("urban HAP"). We implemented these listing requirements through the Integrated Urban Air Toxics Strategy (64 FR 38715, July 19, 1999).[2]

The Portland cement manufacturing source category was listed for regulation under this 1999 Urban Strategy based on emissions of arsenic, cadmium, beryllium, lead, and polychlorinated biphenyls (PCB). The final NESHAP for the Portland Cement Manufacturing Industry (64 FR 31898, June 14, 1999) included emission limits based on performance of MACT for the control of THC emissions from area sources. This 1999 rule fulfills the requirement to regulate area source cement kiln emissions of PCB (for which THC is a surrogate). However, EPA did not include requirements for the control of the non-volatile metal HAP (arsenic, cadmium, beryllium, and lead) from area sources in the 1999 rule or in the 2006 amendments. To fulfill our requirements under CAA section 112(c)(3) and 112(k), EPA is thus setting emissions standards for these metal HAP from Portland cement manufacturing facilities that are area sources (using PM as a surrogate). In this final rule EPA is promulgating PM standards for area sources based on performance of MACT, PM being a surrogate for these (and other non-volatile) HAP metals.

Section 112(c)(6) requires that EPA list categories and subcategories of sources assuring that sources accounting for not less than 90 percent of the aggregate emissions of each of seven specified HAP are subject to standards under section 112(d)(2) or (d)(4). The seven HAP are as follows: Alkylated lead compounds; polycyclic organic matter; hexachlorobenzene; mercury; polychlorinated byphenyls; 2,3,7,8-tetrachlorodibenzofurans; and 2,3,7,8-tetrachloroidibenzo-p-dioxin. Standards established under CAA section 112(d)(2) must reflect the performance of MACT. "Portland cement manufacturing: Non-hazardous waste kilns" is listed as a source category pursuant to CAA section 112(c)(6) due to emissions of polycyclic organic matter (POM), mercury, and dioxin/furans. Consistent with the requirements of CAA section 112(c)(6), we set MACT standards for these pollutants. 63 FR 17838, 17848, April 10, 1998; *see also* 63 FR at 14193 (March 24, 1998) (area source cement kilns' emissions of mercury, dibenzo-p-dioxins and dibenzo-p-furans, POM, and PCB are subject to MACT).

Section 129(a)(1)(A) of the CAA requires EPA to establish specific performance standards, including emission limitations, for "solid waste incineration units" generally, and, in particular, for "solid waste incineration units combusting commercial or industrial waste" (CAA section 129(a)(1)(D)).[3]

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[1] An area source is a stationary source of HAP emissions that is not a major source. A major source is a stationary source that emits or has the potential to emit 10 tpy or more of any HAP or 25 tpy or more of any combination of HAP.

[2] Since its publication in the Integrated Urban Air Toxics Strategy in 1999, EPA has amended the area source category list several times.

[3] CAA section 129 refers to the Solid Waste Disposal Act (SWDA). However, this Act, as amended is commonly referred to as RCRA.

Section 129 of the CAA defines "solid waste incineration unit" as "a distinct operating unit of any facility which combusts any solid waste material from commercial or industrial establishments or the general public." CAA Section 129(g)(1). CAA Section 129 also provides that "solid waste" shall have the meaning established by EPA pursuant to its authority under the Resource Conservation and Recovery Act (RCRA). Section 129(g)(6).

In *Natural Resources Defense Council* v. *EPA,* 489 F. 3d 1250, 1257–61 (DC Cir. 2007), the Court vacated the Commercial and Industrial Solid Waste Incineration Units (CISWI) Definitions Rule, 70 FR 55568 (Sept. 22, 2005), which EPA issued pursuant to CAA section 129(a)(1)(D).

In response to the Court's remand and vacatur of the CISWI Definitions rule, EPA initiated a rulemaking to identify which secondary materials are non-hazardous "solid waste" for purposes of subtitle D (non-hazardous waste) of the RCRA when burned in a combustion unit. *See* 75 FR 31844 (June 4, 2010). Any final definition adopted in that rulemaking, in turn, will determine the applicability of CAA section 129(a) (*i.e.,* any combustion unit that burns any non-hazardous secondary material that is considered to be a solid waste would be subject to CAA section 129 requirements).

There is presently no Federal regulatory interpretation of "solid waste" for EPA to apply under Subtitle D of RCRA for purposes of CAA section 112 and 129. EPA is not prejudging, and cannot prejudge the outcome of the recently proposed non-hazardous solid waste rulemaking. EPA therefore cannot reliably determine at this time if the non-hazardous secondary materials combusted by cement kilns are to be classified as solid wastes. Accordingly, EPA is basing all determinations as to source classification on the emissions information now available, as required by CAA section 112(d)(3), and will necessarily continue to do so until the solid waste definition discussed above is promulgated. The current data base classifies all Portland cement kilns as CAA section 112 sources (*i.e.,* subject to regulation under CAA section 112).

We proposed amendments to the Portland Cement Manufacturing NESHAP on May 6, 2009. *See* 74 FR 21136. We received a total of 3,229 comments from the Portland cement industry, environmental groups, State environmental agencies and others during the comment period. This final rule reflects our consideration of all the comments we received. Detailed responses to the comments not included in this preamble are contained in the Summary of Public Comments and Responses document, which is included in the docket for this rulemaking.

B. Summary of the National Lime Association v. EPA Litigation

On June 14, 1999 (64 FR 31898), EPA issued the NESHAP for the Portland Cement Manufacturing Industry (40 CFR part 63, subpart LLL).[4] The 1999 final rule established emission limitations for PM as a surrogate for non-volatile HAP metals (major sources only), dioxins/furans, and for greenfield [5] new sources total THC as a surrogate for organic HAP. These standards were intended to be based on the performance of MACT pursuant to CAA sections 112(d)(2) and (3). We did not establish limits for THC for existing sources and non-greenfield new sources, nor for HCl or mercury for new or existing sources. We reasoned that emissions of these constituents were a function of raw material concentrations and so were essentially uncontrolled, the result being that there was no level of performance on which a floor could be based. EPA further found that beyond the floor standards for these HAP were not warranted.

Ruling on petitions for review of various environmental groups, the DC Circuit held that EPA had erred in failing to establish CAA section 112(d) standards for mercury, THC (except for greenfield new sources) and HCl. The court held that "[n]othing in the statute even suggests that EPA may set emission levels only for those * * * HAPs controlled with technology." *National Lime Ass'n* v. *EPA,* 233 F. 3d 625, 633 (DC Cir. 2000). The court also stated that EPA is obligated to consider other pollution–reducing measures such as process changes and material substitution. *Id.* at 634 ("the absence of technology-based pollution control devices for HCl, mercury, and total hydrocarbons did not excuse EPA from setting emission standards for those pollutants"). Later cases go on to hold that EPA must account for levels of HAP in raw materials and other inputs in establishing MACT floors, and further hold that sources with low HAP emission levels due to low levels of HAP in their raw materials can be considered best performers for purposes of establishing MACT floors. *See, e.g., Cement Kiln Recycling Coalition* v. *EPA,* 255 F. 2d 855, 865–66 (DC Cir. 2001); *Sierra Club* v. *EPA* ("Brick MACT"), 479 F. 3d 875, 882–83 (DC Cir. 2007).[6]

C. EPA's Response to the Remand

In response to the *National Lime Ass'n* mandate, on December 2, 2005, we proposed standards for mercury, THC, and HCl. (More information on the regulatory and litigation history may be found at 70 FR 72332, December 2, 2005.) We received over 1,700 comments on the proposed amendments. Most of these comments addressed the lack of a mercury emission limitation in the proposed amendments. On December 20, 2006 (71 FR 76518), EPA published final amendments to the NESHAP. The 2006 amendments contained a new source standard for mercury emissions from cement kilns and kilns/in-line raw mills of 41 micrograms per dry standard cubic meter, or alternatively the application of a limestone wet scrubber with a liquid-to-gas ratio of 30 gallons per 1,000 actual cubic feet per minute of exhaust gas. The final rule also adopted a standard for new and existing sources banning the use of utility boiler fly ash in cement kilns where the fly ash mercury content has been increased through the use of activated carbon or any other sorbent unless the cement kiln seeking to use the fly ash can demonstrate that the use of fly ash will not result in an increase in mercury emissions over its baseline mercury emissions (*i.e.,* emissions not using the mercury-laden fly ash). EPA also issued a THC standard for new cement kilns (except for greenfield cement kilns that commenced construction on or before December 2, 2005) of 20 parts per million (corrected to 7 percent oxygen) or 98 percent reduction in THC emissions from uncontrolled levels. EPA did not set a standard for HCl, determining that HCl was a pollutant for which a threshold had been established, and that no cement kiln, even under conservative operating conditions and exposure assumptions, would emit HCl at levels that would exceed that threshold level, allowing for an ample margin of safety. EPA pointed to CAA section 112(d)(4) authority as its rationale for not establishing HCl emissions limits.

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[4] Cement kilns which burn hazardous waste are a separate source category, since their emissions of many HAP differ from Portland cement kilns' as a result of the hazardous waste inputs. Rules for hazardous waste-burning cement kilns are found at subpart EEE of part 63.

[5] For purposes of the 1999 rule a new greenfield kiln is a kiln constructed after March 24, 1998, at a site where there are no existing kilns.

[6] In the remainder of the opinion, the Court in *National Lime Ass'n* upheld EPA's standards for PM and dioxin (on grounds that petitioner had not properly raised arguments in its opening brief), upheld EPA's use of PM as a surrogate for HAP metals, and remanded for further explanation EPA's choice of an analytic method for HCl.

D. Reconsideration of EPA Final Action in Response to the Remand

At the same time we issued the final amendments, EPA on its own initiative made a determination to reconsider the new source standard for mercury, the existing and new source standard banning cement kiln use of certain mercury-containing fly ash, and the new source standard for THC (71 FR 76553, December 20, 2006). EPA granted reconsideration of the new source mercury standard both due to substantive issues relating to the performance of wet scrubbers and because information about their performance in the industry had not been available for public comment at the time of proposal; that information is now available in the docket. We also committed to undertake a test program for mercury emissions from cement kilns equipped with wet scrubbers that would enable us to resolve these issues. We further explained that we were granting reconsideration of the work practice requirement banning the use of certain mercury-containing fly ash in cement kilns to allow further opportunity for comment on both the standard and the underlying rationale and because we did not feel we had the level of analysis we would like to have to support a beyond-the-floor determination. We granted reconsideration of the new source standard for THC because the information on which the standard was based arose after the period for public comment. We requested comment on the actual standard, whether the standard is appropriate for reconstructed new sources (if any should occur) and the information on which the standard is based. We specifically solicited data on THC emission levels from preheater/precalciner cement kilns. We stated that we would evaluate all data and comments received, and determine whether in light of those data and comments it was appropriate to amend the promulgated standards.

EPA received comments on the notice of reconsideration from two cement companies, three energy companies, three industry associations, a technical consultant, one State, one environmental group, one ash management company, one fuels company, and one private citizen. As part of these comments, one industry trade association submitted a petition to withdraw the new source MACT standards for mercury and THC and one environmental group submitted a petition for reconsideration of the 2006 final action. A summary of these comments is available in the docket for this rulemaking.[7]

In addition to the reconsideration discussed above, EPA received a petition from Sierra Club requesting reconsideration of the existing source standards for THC, mercury, and HCl, and judicial petitions for review challenging the final amendments. EPA granted the reconsideration petition. The judicial petitions have been combined and are being held in abeyance pending the results of the reconsideration.

In March 2007 the DC Circuit Court issued an opinion (*Sierra Club* v. *EPA,* 479 F.3d 875 (DC Cir. 2007) (*Brick MACT*)) vacating and remanding CAA section 112(d) MACT standards for the Brick and Structural Clay Ceramics source categories. Some key holdings in that case were:

- Floors for existing sources must reflect the average emission limitation achieved by the best performing 12 percent of existing sources, not levels EPA considers to be achievable by all sources (479 F. 3d at 880–81);
- EPA cannot set floors of "no control." The Court reiterated its prior holdings, including *National Lime Ass'n,* confirming that EPA must set floor standards for all HAP emitted by the major source, including those HAP that are not controlled by at-the-stack control devices (479 F. 3d at 883); and
- EPA cannot ignore non-technology factors that reduce HAP emissions, including when determining which sources are best performers for purposes of ascertaining the MACT floor. Specifically, the Court held that "EPA's decision to base floors exclusively on technology even though non-technology factors affect emissions violates the Act." (479 F. 3d at 883).

Based on the statute, as interpreted in the *Brick MACT* decision, we believe a source's performance resulting from the presence or absence of HAP in raw materials must be accounted for in establishing floors; *i.e.,* a low emitter due to low HAP proprietary raw materials can still be a best performer. In addition, the fact that a specific level of performance is not being intentionally achieved by the source is not a legal basis for excluding the source's performance from consideration. *Sierra Club* v. *EPA,* 479 F.3d at 631–34; *National Lime Ass'n,* 233 F. 3d at 640.

The *Brick MACT* decision also reiterated that EPA may account for variability in setting floors. However, the Court found that EPA erred in assessing variability because it relied on data from the worst performers to estimate best performers' variability, and held that "EPA may not use emission levels of the worst performers to estimate variability of the best performers without a demonstrated relationship between the two." 479 F. 3d at 882.

After considering the implications of this decision, EPA granted the petition for reconsideration of all the existing source standards in the 2006 rulemaking.

A second Court opinion of relevance to the Portland cement NESHAP amended here is *Sierra Club* v. *EPA,* 551 F. 3d 1019 (DC Cir. 2008). In that case, the court vacated the regulations contained in the General Provisions which exempt major sources from CAA section 112(d) standards during periods of startup, shutdown and malfunction (SSM). The regulations (in 40 CFR 63.6(f)(1) and 63.6(h)(1)) provided that sources need not comply with the relevant CAA section 112(d) standard during SSM events and instead must "minimize emissions * * * to the greatest extent which is consistent with safety and good air pollution control practices." The current Portland Cement NESHAP references the now-vacated rules in the General Provisions. As a result of the court's decision, we are removing the references to the vacated provisions and addressing SSM in this rulemaking. Discussion of this issue may be found in Section IV.A.

III. Background Information on the NSPS 40 CFR Part 60, Subpart F

NSPS implement CAA section 111(b) and are issued for categories of sources which 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 the 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 which, taking into consideration the cost of achieving such emission reductions, any non-air quality health and environmental impact and energy requirements, the Administrator determines has been adequately

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[7] Summary of Comments on December 20, 2006 Final Rule and Notice of Reconsideration. April 15, 2009.

demonstrated. This level of control is commonly referred to as best demonstrated technology (BDT). EPA promulgated Standards of Performance for Portland Cement Plants (40 CFR, part 61 subpart F) in 1971 ((36 FR 24876, December 23, 1971).

Section 111(b)(1)(B) of the CAA requires EPA to periodically review and revise the standards of performance, as necessary, to reflect improvements in methods for reducing emissions. 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).

We proposed the current review of the Portland Cement Plant NSPS on June 16, 2008. We received a total of 46 comments from the Portland cement industry, environmental groups, State environmental agencies and others during the comment period. This final rule reflects our consideration of all the comments we received. Detailed responses to the comments not included in this preamble are contained in the Summary of Public Comments and Responses document which is included in the docket for this rulemaking.

IV. Summary of EPA's Final Action on the Amendments

In this section we discuss the final amendments to 40 CFR part 63 subpart LLL and part 60 subpart F, the changes since proposal, and the rationale for the changes. Responses to specific comments may be found in the response to comment section of this document or in the response to comment documents contained in the dockets for this rulemaking.

As a preliminary matter, EPA notes that certain portions of the existing rules are not being amended substantively but are being reprinted, sometimes with editorial changes, in today's regulatory text. As explained at proposal, EPA did so either for readers' convenience or to make certain non-substantive "plain English" changes to rule text. 74 FR at 21140. The final rule text makes these same non-substantive changes (which did not occasion public comment), and reprints certain existing provisions. Provisions from the existing rules which do not change substantively include the PM emission limits for kilns currently subject to the NSPS, the opacity limits for raw materials dryers, raw mills, and finish mills, and the limits for dioxin furan (D/F) for cement kilns. We reorganized the testing and monitoring requirements of both rules to make them more consistent, and modified the rule language to better conform with the June 1, 1998, Executive Memorandum on Plain Language in Government Writing.

A. What are EPA's final actions on 40 CFR part 63, subpart LLL?

1. What are the final actions on emission limits under 40 CFR part 63, subpart LLL?

In this action, we are amending the emission limits for mercury, THC, and PM from new and existing kilns located at a major or area source, and for HCl from new and existing kilns located at major sources. We identify these standards below for the emission sources in a typical Portland cement production process. We have applied the limits for existing and new sources in this final rule for mercury and THC to area sources consistent with CAA section 112(c)(6). As noted above, mercury is one of the pollutants specifically singled out by Congress in CAA section 112(c)(6), and THC is a surrogate for POM and PCB, which are also section 112(c)(6) HAP. *See* 63 FR 14193, March 24, 1998 (determination to control all THC emissions from the source category under MACT standards). Finally, Portland cement kilns are a listed area source category for urban HAP metals pursuant to CAA section 112(c)(3), and control of these metal HAP emissions (via the standard for the PM non-mercury HAP metal surrogate) is required to ensure that area sources representing 90 percent of the area source emissions of urban metal HAP are subject to CAA section 112 control, as required by CAA section 112(c)(3). The PM standards for area sources reflect MACT, as explained below.

a. Changes to Overall Floor Setting Procedure

The MACT floor limits for each of the HAP and HAP surrogates (mercury, THC, HCl, and PM) are calculated based on the performance of the lowest emitting (considered best performing in this rulemaking) sources in each of the MACT floor pools for each HAP or HAP surrogate. We ranked all of the sources for which we had data based on their emissions and identified the lowest emitting 12 percent of the sources for which we had data, which ranged from two kilns for THC to 11 kilns for mercury for existing sources. For new source MACT, the floor was based on the best controlled source.

In assessing sources' performance, EPA may consider variability both in identifying which performers are "best" and in assessing their level of performance. *Brick MACT,* 479 F. 3d at 881–82; *see also Mossville Envt'l Action Now* v. *EPA,* 370 F.3d 1232, 1241–42 (DC Cir 2004) (EPA must exercise its judgment, based on an evaluation of the relevant factors and available data, to determine the level of emissions control that has been achieved by the best performing sources considering these sources' variability).

Variability in cement kilns' performance has a number of causes. For many of the pollutants, notably mercury and THC, most kilns do not have add-on control devices. The main source of variability for these pollutants consequently is the differing mercury and organic concentrations in the raw materials and fuels which are fed to the kiln. For particulate matter, which is well-controlled by baghouses, the variability is chiefly due to variations in performance of the control device for which both run-to-run and test-to-test variability must be accounted.[8]

In determining the MACT floor limits, we first determine the floor, which, as explained above, for existing sources is the level achieved in practice by the average of the top 12 percent of existing sources, or the level achieved in practice by the best controlled similar source for new sources. In this rule, EPA is using lowest emissions as the measure of best performance.

We then assess variability of the best performers by using a statistical formula designed to estimate a MACT floor level that is equivalent to the average of the best performing sources based on future compliance tests (or calculated inputs in the case of mercury). Specifically, the MACT floor limit is an upper prediction limit (UPL) calculated with the Student's t-test using the TINV function in Microsoft Excel®. The Student's t-test has also been used in other EPA rulemakings (*e.g.,* NSPS for Hospital/Medical/Infectious Waste Incinerators, NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters) in accounting for variability. A prediction interval for a future observation is an interval that will, with a specified degree of confidence, contain the next (or some other pre-specified) randomly selected observation from a population. In other words, the prediction interval estimates what the upper bound of future values will be, based upon present or past background samples taken. The UPL

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[8] Run-to-run variability is essentially within-test variability, and encompasses variability in individual runs comprising the compliance test, and includes uncertainties in correlation of monitoring parameters and emissions, and imprecision of stack test methods and laboratory analysis. 72 FR at 54877 (Sept. 27, 2007). Test-to-test variability results from variability in pollution device control efficiencies over time (depending on many factors, including for fabric filters the point in the maintenance cycle in which a fabric filter is tested). Test-to-test variability can be termed long-term variability. 72 FR at 54878.

consequently represents the value which we can expect the mean of future observations (3-run average for HCl, 30-day average for mercury, PM, HCl (sources not having wet scrubbers or otherwise electing CEM-based compliance), and THC) to fall below within a specified level of confidence, based upon the results of an independent sample from the same population. In other words, if we were to randomly select a future test condition from any of these sources (*i.e.,* average of 3 runs or 30-day average) we can be 99 percent confident that the reported level will fall at or below the UPL value. Use of the UPL is appropriate in this rulemaking because it sets a limit any single or future source can meet based on the performance of members of the MACT pool.

This formula uses a pooled variance (in the s^2 term) that encompasses all the data-point to data-point variability of the best performing sources comprising the MACT floor pool for each HAP. Where variability was calculated using the UPL statistical approach (*i.e.,* for the Hg, HCl, and PM standards), we used the average (or sample mean) and sample standard deviation, which are two statistical measures calculated from the data distributions for mercury, HCl, and PM. The average is a central value of a data set, and the standard deviation is the common measure of the dispersion of the data set around the average. We describe in detail in the preamble sections on mercury, HCl and PM and in the memorandum "Development of the MACT Floors for the Final NESHAP for Portland Cement", August 6, 2010" how these averages were developed. We note here that the methodology accounts for both short-term and long-term variability and encompasses run-to-run and test-to-test variability. The formula also applies differently depending on how the underlying data set is distributed. To this end, EPA carefully evaluated the data sets for each HAP to ascertain whether the data were normally distributed, or distributed in some other manner (*i.e.,* log normally). After applying standard and rigorous statistical tests (involving the degree of "skewness" of the data), we determined that the distributions for mercury and particulate matter were approximately a normal distribution, which in turn determined the final form of the UPL equation. *See* Floor Calculations for Final Portland Cement NESHAP, August 6, 2010; *see also* 75 FR at 32019–20.

EPA was able to reasonably calculate variability for the THC and HCl standards without needing to use predictive statistics. Specifically, the data set for THC contains a sufficient number of observations to estimate the variability without the need of any type of statistical intervals (no UPL needed to be calculated). For HCl, although EPA applied the UPL formula in developing the HCl standard, the key issue for the HCl data set is the HCl analytic method's detection limit, which ultimately dictated the level of the standard.

At proposal we adopted a form of the UPL equation that has been used in a previous rulemaking. 69 FR 21233 April 20, 2004. Commenters stated correctly that there was an error in the equation used at proposal. As a result of these comments, EPA corrected the formula in the final rule. The UPL used in the final rule is calculated by:

$$UPL = \bar{x} + t\left(0.99, n-1\right) \times \sqrt{s^2 \times \left(\frac{1}{n} + \frac{1}{m}\right)}$$

Where:

$\bar{x}$ = the mean of the sample data set
n = the number of test runs
m = the number of test runs in the compliance average
s^2 = observed variance
t = student t distribution statistic

This calculation was performed using the following Excel functions:

Normal distribution: 99 percent UPL = AVERAGE(Test Runs in Top 12percent) + [STDEV(Test Runs in Top 12percent) x TINV(2 x probability, n-1 degrees of freedom)*SQRT((1/n)+(1/m))], for a one-tailed t-value, probability of 0.01, and sample size of n

This is the same UPL equation that EPA used in more recent rulemakings. *See* 75 FR 32020 (June 4, 2010) and 75 FR 31905 (June 4, 2010). The value of "m" denotes the number of future observations, and it is used to calculate an estimate of the variance of the average of m-future observations. For example, if 30-day averages are used to determine compliance (m=30), the amount of variability in the 30-day average is much lower than the variability of the daily measurements in the data base, which results in a lower UPL for the 30-day average.

As an illustration of the effects that correcting the UPL had on the emission limits, we calculated the UPLs for mercury and PM using the proposal version of the UPL formula, and the version used in this final rule. The results of these calculations are presented in Table 1. Both calculated limits are about 20 percent lower when the corrected UPL formula is used.

TABLE 1—COMPARISON EMISSION LIMITS CALCULATED USING PROPOSAL UPL FORMULA VERSUS CORRECTED UPL FORMULA FOR EXISTING SOURCES

	Proposal (uncorrected UPL formula)	Proposal (corrected UPL formula)
Mercury, (lb/MM tons feed) [lb/MM tons clinker]	29.6 [48.8]	22.5 [37.1]
PM (lb/ton clinker)	0.05	0.04

b. Ramifications of EPA Statistical Approach

A number of commenters maintained that this final rule raises the (perceived) quandry voiced by Judge Williams in his concurring opinion in *Brick MACT* where an achieved level of performance for purposes of CAA section 112(d)(3) results in a standard which is unachievable under CAA section 112(d)(2) because it is too costly or not cost-effective. *Brick MACT,* 479 F. 3d at 884–85. EPA is of course mindful of the repeated admonitions (with accompanying vacaturs and remands) from the DC Circuit that MACT floors must reflect achieved performance, that HAP content of process inputs (raw materials and fuels) must be accounted for in ascertaining sources' performance, and that costs cannot be considered by EPA in ascertaining the level of the MACT floor. *See, e.g., Brick MACT,* 479 F. 3d at 880–81, 882–83; *NRDC* v. *EPA,* 489 F. 3d 1364, 1376 (DC Cir. 2007) ("Plywood MACT"); *see also Cement Kiln Recycling Coalition* v. *EPA,* 255 F. 3d 855, 861–62 (DC Cir. 2001) ("achievability" requirement of CAA section 112(d)(2) cannot override the requirement that floors be calculated on the basis of what best performers actually achieved). EPA is also mindful of the need to account for sources' variability (both due to control device performance and variability in inputs) in assessing sources' performance when developing technology-based standards. *See, e.g., Mossville Environmental Action Now* v. *EPA,* 370 F. 3d 1232, 1242 (DC Cir. 2004); *National Lime I,* 627 F. 2d 416,433–34(DC Cir. 1980). EPA has carefully developed data for each standard, assessing both technological controls and HAP inputs in doing so. For mercury, EPA used the pooled variance from all of the best performing kilns in the MACT floor pool in order to fully assess these kilns' intra-quarry and other variable mercury levels. EPA also used pooled variance to assess the variability of HCl and PM emissions for the MACT floor pool kilns. *See* 70 FR at 59438 (Oct. 12, 2005) (explaining when use of such pooled variances can be reasonable). EPA has also adopted 30-day averaging periods for all of the standards, further allowing short term fluctuations to be averaged out over the 30-day period.

The result are floors which reasonably estimate the performance over time of the best performing sources, as do the standards based on those floors. It is true that many sources will need to install controls to meet these standards, and that these controls have significant costs (although EPA estimates that the rule's costs are substantially outweighed by its benefits). *See* Section VI below. This is part of the expected MACT process where, by definition, the averaged performance of the very best performers sets the minimum level of the standard. The Agency believes that it has followed the statute and applicable case law in developing its floor methodology.

Industry commenters nonetheless maintained that EPA had not properly accounted for variability of the best performing sources because not even these sources can meet the standards which are predicated on their own performance without adding controls. This contention lacks a basis in the record. For mercury, all performers in the MACT floor pool—not just those with emissions below the average of the best performers— meet the promulgated standard (highest 30-day average in MACT pool is 41.63 lb/MM tons clinker; the standard is 55 lb/MM tons clinker (30-day average). In addition, several additional kilns, which are not in the pool of best performers, meet the standards. For THC, all kilns in the pool of best performers meet the promulgated standard (highest 30-day average in MACT pool is 5.68 ppmv; the standard is 24 ppmv). In addition, seven additional kilns which are not in the pool of best performers meet the standards. Indeed, nine of the 11 kilns for which EPA has CEM data are meeting the promulgated standards for THC. For PM, all six kilns in the MACT pool as well as twelve kilns overall meet the promulgated 30-day standard even though the measurements in the data base are stack tests (*i.e.,* unlike for mercury and THC, these are not averaged values).[9] Virtually all kilns in the MACT floor pool are meeting the HCl standard, although this is largely the result of setting the standard at a level reflecting analytic method quantitation limits.

Commenters presented virtually no quantified data that floor plants are unable to meet the standards. *See National Association of Metal Finishers* v. *EPA,* 719 F. 2d 624, 649 (3d Cir. 1983) (unquantified assertions are entitled to little if any weight). Rather, their comments (comment 2845 at Table 1, echoed by many other industry commenters) provided narrative descriptions purporting to demonstrate that floor plants would not be able to achieve the standards.[10] In those instances where commenters provided actual data on these plants' performance, EPA took the information into account in developing the final standards. Indeed, EPA adjusted all of the standards based on actual data presented. However, EPA is not willing to act on pure supposition and conjecture regarding variability, particularly in the face of record information indicating that not only all floor plants but a number of additional plants are already meeting the promulgated standards.

c. Mercury Limits for Kilns

i. Floor Determination. We proposed mercury emissions limits of 43 lb/million (MM) tons clinker for existing sources and 14 lb/MM tons clinker for new sources. The proposed floor was based on 30 days of data on all kiln inputs for 89 kilns. *See* 74 FR at 21142–43. For all kilns but the five equipped with wet scrubbers, emissions were assumed to equal the total mass of mercury fed to each kiln. Scrubber-equipped kilns were considered to emit all mercury minus an assumed amount representing the average performance of the wet scrubbers. For kilns that waste cement kiln dust (CKD), the mercury component of the CKD was subtracted from inputs to calculate emissions. *Id.* By conducting a total mass balance for mercury and then assuming that all mercury inputted is emitted (minus conservatively estimated removals for scrubber usage and dust wastage), EPA made a near worst case assumption as to kilns' mercury emission levels. The kilns were then ranked from best to worst based on the extrapolated mercury emissions, normalized to clinker production. EPA further proposed that no beyond the floor standard was appropriate for either existing or new sources. *Id.* at 21149.

Since proposal we received updated data on certain kilns' raw materials usage and mercury content[11] and used that data to revise our average mercury emissions estimates from the best performing kilns at proposal.[12] We have also revised upward the floor kilns' projected emissions based on their reasonably estimated intra-quarry variability (explained further below). As a result, estimated emissions from these kilns increased, and one of the kilns in the group of sources used to set the existing source floor is no longer one of the best performing kilns. At proposal, the average mercury emissions of the top 12 percent of the kilns was 27.4 pounds per million (lb/MM) tons clinker, and the average emissions of the best performing source were 13.4 lb/MM ton clinker. After revising our mercury emissions estimates, the averages were 32 and 14 lb/MM tons clinker, respectively, as shown in Table 2.

TABLE 2—MERCURY MACT FLOOR

Kiln code	Mercury emissions (lb/MM ton feed)
1589	8.48
1650	9.53
1315	15.26
1302	15.28
1248	16.63
1259	21.33
1286	22.65
1594	25.23
1435	25.51
1484	25.51
1364	25.91
MACT—Existing Kilns	
Average: lb/MM tons feed (lb/MM tons clinker)	19.21 (31.7)
Total variance	272.3

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[9] Development of The MACT Floors For The Final NESHAP For Portland Cement. August 6, 2010.

[10] For example, the commenter asserted, without providing support, that for the floor kilns the standards were "achieved in practice, but not under foreseeable operations"; "achieved in practice based on limited stack tests"; "data shows that proposed standard was not achieved in practice when malfunction emission [sic] are included in compliance determination" (although no such data were provided to EPA).

[11] *See* Portland Cement Association Comments on the NESHAP–Proposed Rule (Docket Number: EPA–HQ–OAR–2002–0051) (September 4, 2009) at pp. 31–35.

[12] Development of The MACT Floors For The Final NESHAP For Portland Cement, August 6, 2010.

TABLE 2—MERCURY MACT FLOOR—Continued

Kiln code	Mercury emissions (lb/MM ton feed)
UPL: lb/MM tons feed (lb/MM tons clinker) ..	32.8 (54.1)
MACT—New Kilns	
Average: lb/MM tons feed (lb/MM tons clinker)	8.48 (14.0)
Total variance	35.2
UPL: lb/MM tons feed (lb/MM tons clinker) ..	12.3 (20.3)

As noted above, we are taking into account operating variability of the best performing kilns, or in the case of new source MACT the single best controlled kiln, in assessing their performance (*i.e.,* both in determining which performers are best, and calculating what their performance is). When we calculated the UPL with 99 percent confidence for the best performing sources (or in the case of new source MACT the best controlled single source), we calculated a mercury floor of 55 lb/MM tons clinker for existing sources and 21 lb/MM tons clinker for new sources. We chose a 30-day averaging period for the mercury emission limit. As noted above, the use of a 30-day average (as opposed to hourly or daily averages) tends to reduce variability, and also best reflects the nature of the data from which the floor was derived and assures that several operating cycles of raw mill on and off are included in each average. *Id.* at 21144.

Industry commenters stated that we should account for additional sources of variability in this floor determination, namely intra-quarry variability and variability of the mercury content in local coals which kilns could utilize. As explained below, beyond those situations where commenters documented that sources actually used inputs with greater mercury content than used during the 30-day test period (*see* note 11 above), or where further intra-quarry mercury variability could reasonably be estimated, we did not do so.

EPA is of course aware that limestone quarries are immense, and are customarily used from periods of 50 to 100 years. Taking the average of 30 days of sampling data from one part of the quarry would not necessarily encompass all of the different mercury levels throughout the quarry.

Although industry commenters originally raised the issue of long term intra-quarry variability during the initial May 2007 30-day data collection, no plant chose to perform additional sampling and analysis of their raw materials and feed that would have allowed this issue to be directly addressed. Certain industry commenters did point, however, to data from the 30-day sampling effort as providing useful information on potential intra-quarry mercury variability of the two best performers. The data come from 30-day sampling conducted at four sources (three of which are located at a single facility), which all quarry limestone from a common geologic limestone formation.[13] All six kilns (the two floor kilns, and the other four kilns in the immediate vicinity) are in the same city and within 9 miles of each other. It is a reasonable assumption that variability of mercury levels (as opposed to mercury levels themselves) across this formation are substantially the same and therefore that the variability of mercury levels in the two best performers' quarries can be adjusted to reflect the variability seen in the other quarries which are part of the common geologic formation. *See Brick MACT,* 479 F. 3d at 881–882 (EPA may look at performance of sources which are not among the best in estimating variability of best performers if there is a demonstrated relationship between the two).

EPA further applied these estimates of intra-quarry variability to the mercury data for the other best performing kilns (*i.e.,* applied the same RSD to the other best performing sources). EPA did so to more robustly characterize long-term variability of these sources' quarries' mercury levels. The fact that intra-quarry variability of the two lowest emitting sources increased somewhat after examination with other quarries in the common geologic formation confirms that there can be further variability. Since the intra-quarry variability comes from quarries servicing the two lowest emitting kilns, EPA would not expect intra-quarry variability to be lower for the other best performing sources. In no other instance did commenters provide data that we could use to determine intra-quarry variability for kilns in the MACT floor pool.[14]

Commenters also maintained that because cement kilns can burn different types of coal, variability of coal mercury content needs to be factored into estimates of sources' performance. Commenters maintained that they obtained coal from a "local market" and so might eventually use any coal from that market. The comments did not further link coal to individual mines or to other particularized sources. Commenters appear to be asking for an upward adjustment of the MACT floors based on coal they might potentially use but never had used. EPA believes that allowing for any inputs that might conceivably be used in the future, including from sources in an area which a source has never used to date, goes beyond a reasonable estimate of performance over time and invites inflated estimates of variability based only on hypothesized possibilities, not on actual behavior.[15] EPA not only does not believe such methodology is a reasonable means of calculating sources' achieved performance, but also believes that such an approach creates a perverse incentive to build in compliance margins based on seeking out more polluted inputs.

For example, the price of lower mercury coal may increase as a result of this rule (it may be more desirable as a means of keeping mercury emissions low), so plants may seek out higher mercury coal which they otherwise have never used. This type of volitional activity does not seem to be within the ambit of normal variability of process inputs. In addition, facilities do have choices for coal. As noted in the comments, some facilities obtain coals from several States, while others appear to limit themselves to more local areas. However, coal is a commodity that can be transported long distances to fuel utility boilers. Therefore, we believe that a facility should have sufficient coals available that they would not be compelled to use a higher mercury coal just because it happens to be near the plant.

ii. Decision Regarding Whether To Create a Subcategory Based on Limestone Mercury Content

EPA may create subcategories which distinguish among "classes, types, and sizes of sources." CAA section 112(d)(1). EPA reads this provision to provide the Agency with discretion to subcategorize,

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[13] Memorandum. Intra-quarry Variability Estimate, July 21, 2010.

[14] For example, one industry commenter submitted core (unground, unprocessed) samples from its quarry which samples differed in mercury content by approximately one order of magnitude. This facility is not a best performer, the samples are single measurements (rather than 30-day measurements or some longer duration), and (unlike the 30-day measurements used as the basis for the standard) have not been processed (*i.e.,* passed through the quarry crushers and mixed in the storage pile which would tend to make the material more homogeneous). Therefore, these data are not comparable to the data used to set the MACT floors.

[15] The situation differs from use of limestone from a proprietary quarry. Not only have sources used the quarry in the past but will necessarily continue to do so in the future.

and EPA may exercise that discretion if sources are rationally distinguishable due to some difference in class, type or size. *See Lignite Energy Council* v. *EPA,* 198 F. 3d 930, 933 (DC Cir. 1999) ("EPA is not required by law to subcategorize—section 111[b][2] merely states that 'the Administrator *may* distinguish among classes, types, and sizes within categories of new sources' " (emphasis original)). Moreover, as we noted at proposal, "normally, any basis for subcategorizing must be related to an effect on emissions, rather than to some difference among sources which does not affect emissions performance." 74 FR at 21145. EPA may also exercise this discretion on a pollutant-specific basis, since the difference in class, type or size may only have practical significance for certain HAP. In this final rule, EPA carefully considered the possibility of creating different subcategories of cement kilns with respect to mercury emissions.

The subcategorization possibilities for mercury which we considered and rejected at rule proposal were the type of kiln, presence of an inline raw mill, practice of wasting cement kiln dust, total mercury inputs, or geographic location. *See* 74 FR 21144–21145. We likewise reject these bases in this final rules for the reasons already stated.

At proposal we also considered subcategorizing by the mercury concentration of the limestone in the kiln's proprietary quarry. We did not propose to create this type of subcategory, and also choose not to do so in this final rule.

As we explained at proposal, the facts do not indicate sharp disparities in limestone mercury content that readily differentiate among types of sources for most of the facilities for which we have data, and thus do not support this subcategorization approach for the majority of the facilities. *See* Figure 1 showing a gradual continuum of mercury concentrations in limestone for all but two outlying plants.

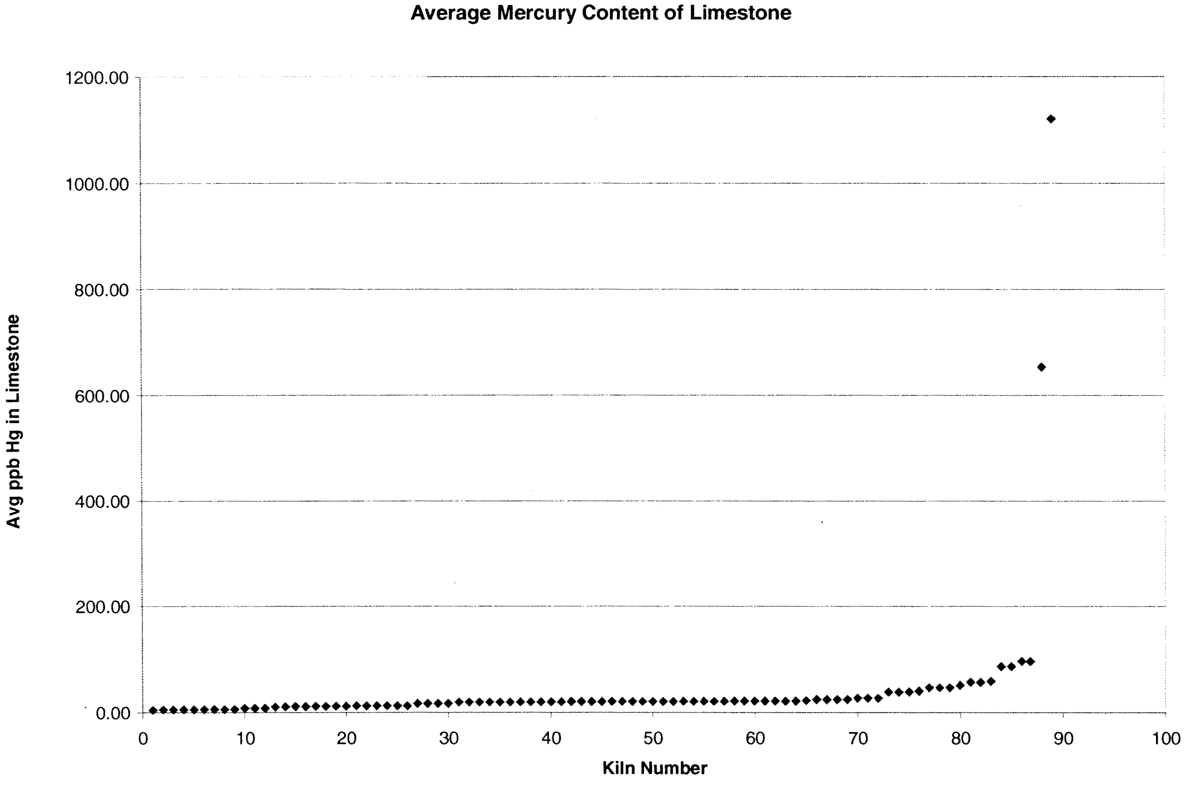

Figure 1. Average Mercury Concentration of Limestone

Industry commenters who supported creating a separate subcategory for the two highest mercury emitting sources based on limestone mercury content agreed with this assessment. Thus, EPA sees no technical justification to subcategorize by limestone quarry mercury content for the majority of the source category.

However, as also shown in Figure 1, there is a sharp disparity for two kilns which have the highest quarry mercury contents. These sources' mercury emissions are also disproportionately higher than all other cement kilns', and are related almost entirely to the limestone mercury content, not to mercury content of other inputs. Commenters who supported subcategorization by quarry mercury levels recommended that EPA create a separate source category for these two kilns based on their uniquely high quarry mercury contents.

If we were to set a separate subcategory for these two kilns, we determined that the floor level of control would be approximately 2100 lb/MM tons clinker. Due to the high level of this floor, we evaluated a beyond-the-floor option of 85 percent reduction in emission for the highest emitting kiln. This level would represent the highest level of mercury control believed achievable for the highest emitting facility based on test data on a pilot mercury control system for that facility.[16] This level of control would result in an emissions limit of

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[16] Letter, C. Lesslie, Ash Grove Cement to P. Tsirigotis, U.S. EPA, April 22, 2010.

approximately 500 lb/MM tons clinker. This level is over 10 times the level that will be required for all other kilns, and even exceeds every other kiln's uncontrolled mercury emissions levels which range from 20 to 400 lb/MM tons clinker.

Mercury in the air eventually settles into water or onto land where it can be washed into water. Once deposited, certain microorganisms can change it into methylmercury, a highly toxic form that builds up in fish, shellfish and animals that eat fish. Fish and shellfish are the main sources of methylmercury exposure to humans. Methylmercury builds up more in some types of fish and shellfish than in others. The levels of methylmercury in fish and shellfish depend on what they eat, how long they live and how high they are in the food chain. Mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages. Research shows that most people's fish consumption does not cause a health concern. However, it has been demonstrated that high levels of methylmercury in the bloodstream of unborn babies and young children may harm the developing nervous system, making the child less able to think and learn.[17] Heightened concern for mercury's toxic effects is reflected directly in the structure of section 112 of the Act. Mercury is one of the pollutants identified for MACT-level control under the CAA's air toxics provision even (in most instances) when emitted by area sources (*see* CAA section 112(c)(6)).

Thus, creating a high-mercury subcategory for two kilns based on limestone mercury content would result in standards allowing emissions of 500 lb/MM tons of clinker. Based on 2008 production rates, this would allow 1,020 pounds of mercury emissions per year from the potential two-plant subcategory. To put this in perspective, the rest of the industry (92 plants) would be allowed to emit 1,012 pounds tons of mercury per year (again based on 2008 production rates), and the two high-emitting plants would be allowed to emit 1,020 pounds per year. This would result in a doubling of mercury emissions from this source category after the application of MACT. Moreover, national mercury emissions for industrial sources are approximately 50 tpy.[18] That would mean that these two sources alone would constitute 1 percent of the industrial mercury emissions for the U.S. EPA believes it is a reasonable exercise of discretion not to create a subcategory, where, as here, doing so would allow on-going emissions of a disproportionately high volume of a high-toxicity pollutant.

Due to mercury's high toxicity and the extremely high mercury emissions that would result, the Administrator is thus not exercising her discretion to subcategorize in setting the final mercury emissions limit. In light of this decision, it is unnecessary for EPA to address the further question of whether subcategorizing by raw material content of proprietary quarries is permissible under section 112 of the Act.

Although the Agency has concluded that it is reasonable to set the same mercury standard for all cement kilns, we acknowledge the unique challenges that the highest emitting sources may face in meeting the reductions within the regulatory compliance timeline. In particular, as discussed at length above, the two highest emitting kilns—the kilns located in Durkee and Tehachapi—have unusually high levels of mercury in their proprietary limestone quarries, which, as typifies this sector, are located proximate to kiln operations. The mercury content of source material is the key factor in the high levels of emissions experienced at these kilns and a complicating consideration in their ability to achieve compliance in a timely manner.

We also recognize that this challenge presents a unique opportunity to achieve substantial reductions in this naturally occurring, persistent, and widespread contaminant in an amount and on a schedule that exceeds what will be required in the final rule. The Agency believes that the two sources in question may be able in the near term to install aggressive controls, including activated carbon injection, that would result in dramatic near term reductions in mercury emissions (as much as 90 percent or two tons of mercury emissions in the first two years of operation). If they were to do so, these sources would emit substantially less mercury in the next few years than the alternative of allowing these facilities to continue to emit at current levels for three additional years, as would otherwise be the case. This would be a very substantial reduction in emissions of this pollutant. Annual emissions of mercury from all sources (not just cement kilns) are estimated to be 50 tpy,[19] and emissions from the entire source category are approximately 7.5 tons per year,[20] so that a two ton reduction is a substantial reduction of mercury emissions.

We understand that one of the two high emitting kilns has already installed activated carbon injection, but that its performance could be further optimized. *See* 74 FR 21148. The other kiln would have to install activated carbon injection and both kilns would need to install dust shuttling. The net benefit to the environment and public health would extend a number of years beyond the MACT compliance deadline.

If the Durkee and Tehachapi kilns were willing to make a near term reduction (*e.g.,* 90 percent) in their mercury emissions significantly before the compliance date in the rule, the Agency would consider providing these kilns a compliance schedule that extends beyond the three to four years specified in this rule. The purpose of such an approach would be to provide a substantial net benefit to the environment; therefore ultimate compliance with the MACT standard would need to be by a date that ensures the long term emissions from these sources would be significantly lower than their emissions from meeting the standard on the schedule in the rule. Given the nature of mercury and the additional reductions that could be obtained, the Agency is interested in exploring this concept.

Finally, EPA notes that the same early reduction opportunities for mercury do not appear to exist for the rest of the Portland cement industry. It typically takes on the order of three years to install activated carbon injection technology. One of the high mercury plants has recently completed installation of ACI and has just commenced full scale operation of the kiln with ACI installed. The other kiln faces fewer installation barriers than other kilns. This is because the company has tested carbon injection and dust shuttling on one of its other kilns, and is already using dust shuttling to reduce emissions at another kiln, and is therefore better positioned to rapidly install controls after one year. To our knowledge, these circumstances are not applicable to the rest of the Portland cement source category, and could not even be duplicated at all the other facilities owned by these companies due to limitations in

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[17] For more information *see http://www.epa.gov/mercury/about.htm.*

[18] Mercury Emission in the U.S. by Source Category 1990 to 1993, 2002, and 2005. *http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewMidImg&ch=46&lShowInd=0&subtop=341&lv=list.listByChapter&r=188199.*

[19] Mercury Emission in the U.S. by Source Category 1990 to 1993, 2002, and 2005. *http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewMidImg&ch=46&lShowInd=0&subtop=341&lv=list.listByChapter&r=188199.*

[20] Summary of Environmental And Cost Impacts For Final Portland Cement NESHAP And NSPS August 6, 2010.

infrastructure available to design and build these systems.

iii. Beyond the Floor Determinations for Mercury

We are basing the final mercury standard on the floor level of control. When we establish a beyond the floor standard we typically identify control techniques that have the ability to achieve an emissions limit more stringent than the MACT floor. Under these final amendments, most existing kilns would have to have installed both a wet scrubber and activated carbon injection (ACI) for control of mercury, HCl and THC.[21] To achieve further reductions in mercury beyond what can be achieved using wet scrubber and ACI in combination, the available options would include closing the kiln and relocating to a limestone quarry having lower mercury concentrations in the limestone, transporting low-mercury limestone in from long distances, switching other raw materials to lower the amount of limestone in the feed, wasting CKD, and installing additional add-on control devices. These options were discussed at proposal, and were rejected as either technically infeasible or not cost-effective. Consideration of non-air quality impacts and energy requirements do not change this conclusion. *See* 74 FR at 22249–50. We received no comments that would cause us to change that determination.

We did receive one comment from an environmental group requesting EPA explore fuel switching as a beyond the floor option. However, EPA thoroughly explored fuel switching as a control option in the 2006 rulemaking and determined that there were problems with fuel availability and the costs were prohibitive. *See* 70 FR 72340. EPA is not presently aware of facts that would justify a different approach in this final rule.

As a result of these analyses, we determined that, considering the technical feasibility and costs, there is no reasonable beyond the floor control option, and the final mercury emission limit is based on the MACT floor level of control.

c. THC Limits for Kilns and Raw Material Dryers

The limits for existing and new sources in this final rule apply to both area and major sources. As noted earlier, we have applied these limits to area sources consistent with CAA section 112(c)(6).

i. Floor Determination. EPA proposed THC emissions limits of 7 and 6 parts per million by volume dry (ppmvd) for existing and new sources respectively for both cement kilns and raw material dryers. The existing source standard was based on the performance of the best performing 12 percent of cement kilns for which we had THC CEMS data. At proposal we requested comment on the issue of whether or not we should base the existing source floor on the best performing five kilns, rather than on the best performing 12 percent (two kilns). Industry commenters supported the use of the best five kilns stating that this would be in keeping with what appeared to be the intent of Congress that five kilns should be the minimum number of sources on which to set an existing source floor. However, other commenters noted that a plain reading of the statute is that when the source category has 30 or more sources, the top performing 12 percent for which the Administrator has data must be used, even if this results in less than five facilities due to lack of available data. In this final rule we are reaffirming our decision at proposal to use the best performing 12 percent rather that the best performing five facilities because we believe this result to be unavoidably compelled by the literal language of the statute.

At proposal we set the emissions limit based on the 99th percentile of the available data. As a result of new data received after the comment period, we recalculated the averages of the kilns for which we had CEMS data and selected the best performing two kilns (12 percent of 15 total kilns) based on their average emissions. *See* Calculations of Floors for Final Portland Cement NESHAP dated August 6, 2010. Because these were large data sets (688 and 274 readings), we directly calculated the 99th percentile of the 30-day averages to determine the MACT floor which is 24 ppmvd.[22] This is shown in Table 3.

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[21] Summary of Environmental and Cost Impacts of Proposed Revisions to Portland Cement NESHAP (40 CFR Part 63, subpart LLL), April 15, 2009.

[22] In other words, as noted above, EPA possesses sufficient THC data that it is not necessary to estimate variability by use of the UPL equation. Rather, variability is calculated directly from the THC data set comprised of the two lowest emitting sources.

Table 3. Summary of THC CEMS Data and MACT Floor

Kiln	**Average (ppmvd at 7% O2, propane)**	**Number of readings**	**Kiln type**	**In-line raw mill**
Kiln 1	4.7	668	Preheater/precalciner	yes
Kiln 2	5.7	274	Precalciner	yes
Existing Source Average	5.2			
Existing Source 99th percentile	24			
New Source Average	4.7			
New Source 99th percentile	24			

For new sources, we analyzed the data from the kiln with the lower numeric average to determine the 99th percentile of its performance. The result of this analysis was also a 24 ppmvd standard because this kiln had more variability (although a lower average performance) than the other kiln in the data set. This emission limit is based on a concentration measured dry, corrected to 7 percent oxygen and a 30-day average measured using a CEM.

ii. Additional THC data received too late to be considered in this rulemaking. In addition to the THC CEMS data just discussed, we received another set of THC CEMS data from the Portland Cement Association (PCA). These data were not submitted to EPA until mid-June 2010, virtually too late for any consideration, much less considered analysis. This set consisted of THC CEMS data collected over periods ranging from 31 to 90 days for additional kilns not in the data base discussed above, as well as additional data from some of the kilns already in our data base. These additional data increased the total number of kilns with THC CEMS data to 30 kilns. The PCA also provided a floor analysis on this data set and recommended THC emissions limits. The data set as presented by PCA is shown in Table 4.

TABLE 4—PORTLAND CEMENT ASSOCIATION: DETERMINATION OF SIZE OF BEST PERFORMING POOL FOR PROPOSED SUB-CATEGORIES FOR THC

[Mid-June 2010 data submission]

Sub category	Estimated U.S. population	Kilns for which data are available	Procedure for selecting pool of best performing kilns		
			Existing units		New units
			Rule	Pool size	
Major Non-Commingled Kilns	> 30	17	Best 12%	3	Best 1.
Major Commingled Kilns	< 30	7	Best 5	5	Best 1.
Area Kilns	< 30	6	Work Practices Standard.		

In this analysis, the PCA proposed two subcategories: Kilns where the coal preparation mill exhaust is comingled with the kiln exhaust, and kilns where the coal preparation mill has a separate stack. The PCA maintains that subcategories are needed because emissions for the coal preparation mill (which are believed to be chiefly methane from the coal) will, all other things being equal, elevate the THC emissions of the kiln exhaust. *See also* 74 FR at 21152. The PCA recommended floors are shown in Tables 5 and 6 below:

TABLE 5—ALTERNATIVE MACT FLOORS FOR THC MAJOR NON-COMMINGLED KILNS

	Existing units (ppm)	New units (ppm)
99th Percentile	30	11
99.9th Percentile	36	12

TABLE 6—ALTERNATIVE MACT FLOORS FOR THC MAJOR COMMINGLED KILNS

	Existing units (ppm)	New units (ppm)
99th Percentile	70	17
99.9th Percentile	80	20

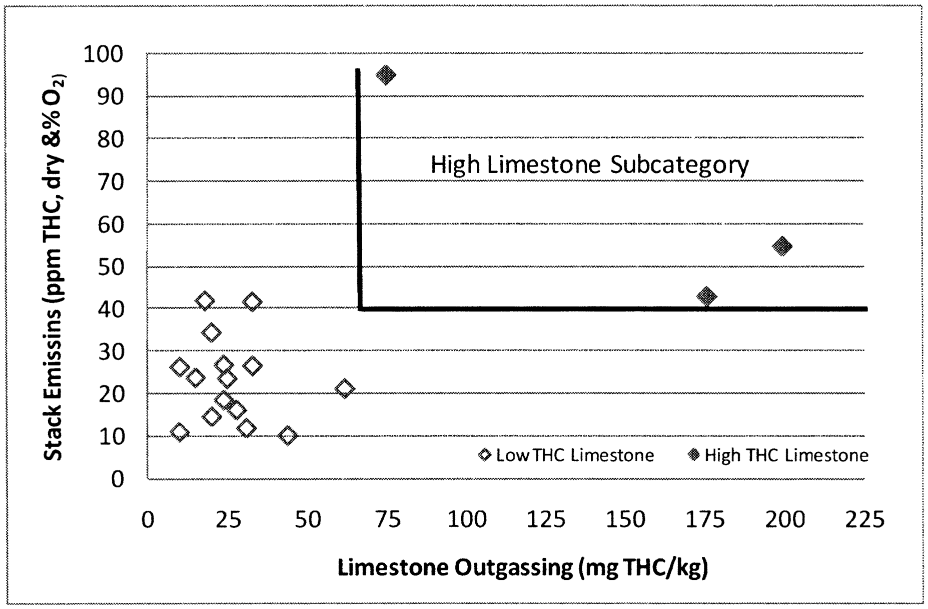
However, the PCA MACT analysis suffers from one major deficiency because it excludes area sources from the MACT floor analysis, and assumes a work practice for these sources. As previously noted, THC emissions serve as surrogates for POM and PCB emissions. CAA section 112(c)(6) requires EPA to list, and to regulate under standards established pursuant to CAA section 112(d)(2) or (d)(4), categories of sources accounting for not less than 90 percent of emissions of these HAP standards established under CAA section 112(d)(2) must reflect the performance of MACT. Again, as explained above, EPA has long since determined that area source cement kilns' THC emissions must be controlled under CAA section 112 (d)(2) or (d)(4) in order to satisfy the 90 percent requirement. Therefore, these area sources should have been included in the MACT floor analysis.

If this error in the floor analysis is corrected, the MACT floor for the kilns with comingled exhaust would be unchanged from the PCA analysis of 70 ppmvd for existing and 17 ppmvd for new (assuming the statistical calculations were done correctly).

However, this estimate is premised on the assumption that there are less than 30 kilns in this subcategory (so that 5 sources would be used to establish the floor). That assumption is based on data provided in the PCA report that indicated, of the 87 kilns that provided data to PCA on their coal preparation stack configurations, 13 had comingled exhaust. If there are actually 30 or more kilns with this configuration, the MACT floor would have to be based on the best performing 12 percent of 8 kilns (the 7 major source comingled kilns plus one area source comingled kiln) which would be one kiln, Lehigh at Union Bridge. If one kiln is used for the existing source floor, the existing source MACT limit would be 17 ppmvd using the 99th percentile. The estimate of 26 versus 30 or more sources causes a high level of uncertainty in this analysis.

For sources that do not comingle the exhaust, the floor would appear to be approximately 13 ppmvd when the area sources are included in the analysis. This is also lower than the floor calculated from the long term data set out above (and would result in a standard roughly 50 percent more stringent than that which EPA is adopting).

The PCA analysis also recommended a separate subcategory for kilns with high limestone outgassing based on the information shown below:



The limestone outgassing factor is determined by heating a sample of the limestone from the kiln's proprietary quarry to determine the potential for THC emissions based on the amount and types of organic materials present. The premise here is basically the same as previously discussed for subcategorization by limestone mercury content when setting mercury emissions limits, because the kiln is tied to its limestone quarry. The subcategory proposed was for sources with THC outgassing ≥ 65 mg/kg. The recommended THC emissions limits for this subcategory were 170 and 62 ppmvd for new and existing sources respectively. This analysis, however, suffers from the same defect previously discussed in that for a subcategory with only three sources where we have data, the best performing 12 percent would be one kiln, so the actual limit for new and existing would be 62 ppmvd. We rejected this option because it suffers from the same defects as subcategorization by limestone mercury content. First, the choice of high versus low organics appears arbitrary. A level between 75 and 175 could just as easily have been chosen. The selection of 65 appears to be an attempt to move the high THC emitting facility into a subcategory with a high limit. Second, subcategorizing in this manner could result in situations where a few facilities would be allowed to emit at levels well above the remainder of the sources in this source category. Third, although the two kilns with the highest outgassing limestone appear to be outliers (similar to the two facilities with unusually high limestone mercury contents), we do not have data on a majority of the kilns (as we do with mercury) and it is possible that if we had more data, the two facilities that appear to be outliers would be part of a gradual continuum, which would mean the level we chose to separate high and low outgassing limestone would be mistaken.

We also considered combining all the THC CEMS data (the more recent PCA data, data used at proposal, and data received during the comment period which would create a data set of 34 kilns). The results of this analysis was a floor (based on the 99th percentile of the data) of 24 ppmvd for existing sources (the same standard adopted in the final rule) and 3 ppmvd for new sources (more stringent than the new source standard in the final rule). Given the short time available to review the PCA data, the uncertainty concerning the actual size of one of the subcategories, the fact that these data would not in our view significantly change the levels of the standard for most kilns, and the concerns we have with subcategorization by limestone organic outgassing potential, we conclude that there is no compelling reason to change our floor determination based on this new information, which again was submitted only days before the final rule requirements had to be determined in order to meet the court ordered deadline for this rule.

iii. Beyond the floor determination. At proposal we evaluated several practices and technologies that are available to cement kilns to control emissions of organic HAP at a level beyond the floor. 74 FR at 21152. These practices include raw materials substitution, ACI systems and limestone scrubber and regenerative thermal oxidizer (RTO). We rejected each of these alternatives based on technical limitations or poor cost-effectiveness. Consideration of non-air quality impacts and energy support this determination as well (RTOs in particular being associated with appreciable energy penalties). 74 FR at 21152. We received no comments that have caused us to change that proposed decision. Therefore, we are choosing the floor level of control for the final THC emissions limit.

iv. Standards for THC. We are establishing the emissions limit for THC at the floor level of control. In addition, because the final existing source standard will be more stringent than the new source standard of 50 ppmvd for greenfield new sources contained in the 1999 final rule, we are also removing the 50 ppmvd standard for both kilns and raw material dryers.

EPA proposed an alternative floor for non-dioxin organic HAP, based on measuring the organic HAP itself rather than the THC surrogate. This equivalent alternative limit would provide additional flexibility in determining compliance, and it would be appropriate for those cases in which methane and ethane comprise a disproportionately high amount of the organic compounds in the feed because these non-HAP compounds could be emitted and would be measured as THC. At proposal we determined that organic HAP averaged 24 percent of the THC. Since proposal we have reevaluated these data and recalculated an average organic HAP concentration of 35 percent. Based on this percentage, and the fact that the THC emission limit is now 24 ppmvd, we are promulgating an alternative organic HAP limit of 9 ppmvd, corrected to 7 percent oxygen (or 19 percent oxygen for raw material dryers), for new and existing sources. The specific organic compounds that will be measured to determine compliance with the alternative to the THC limit are benzene, toluene, styrene, xylene (ortho-, meta-, and para-), acetaldehyde, formaldehyde, and naphthalene. These were the organic HAP species that were measured along with THC in the cement kiln emissions tests that were reviewed. Nearly all of these organic HAP species also were identified in an earlier analysis of the organic HAP concentrations in THC in which the average concentration of organic HAP in THC was 35 percent.[23]

The alternative standard will be based on organic HAP average concentration of organic HAP in THC was 35 percent.[24] The alternative standard will be based on organic HAP emission testing and concurrent THC CEMS measurements that will establish a site specific THC limit that will demonstrate compliance with the total organic HAP limit. The site specific THC limit will be measured as a 30 day rolling average.

iv. THC Emissions from Raw Material Dryers. As we noted at proposal, some plants may dry their raw materials in separate dryers prior to or during grinding. *See* 74 FR at 21153; *see also* 63 FR at 14204. This drying process can potentially lead to organic HAP and THC emissions in a manner analogous to the release of organic HAP and THC emissions from kilns when hot kiln gas contacts incoming feed materials. The methods available for reducing THC emissions (and organic HAP) is the same technology described for reducing THC emissions from kilns and in-line kiln/raw mills. Based on the similarity of the emissions source and controls, we proposed to set the THC emissions limit of materials dryers at the same levels as the kilns.

Commenters noted that stand alone raw materials dryers have higher gas flows relative to the amounts of fuels burned. This results in higher oxygen concentrations, typically as high as 19 percent. They also noted that raw material dryers may have higher THC and lower HAP emissions because raw materials dryers operate at lower temperature than kilns (since the dryer only needs to operate at the temperature needed to remove free water), and that the residence times for dryers is considerably longer than for kilns.

However, although we agree that the exhaust oxygen contents of raw material dryers may be higher than occurs with a cement kiln, there are reasons to believe that dryers actually emit less hydrocarbons than kilns. Operating at lower temperatures, we would expect any hydrocarbons that are emitted from dryers to be only those with the highest volatility, and therefore that the potential for emissions of organic HAP would be less for dryers than for kilns. However, the longer residence times could tend to increase emissions. Therefore, making any conclusions on the emission of dryers relative to kilns is difficult. We also note that we are allowing dryers to also use the alternative organic HAP emissions limit, so if the surmise that organic HAP emissions are low relative to the cement kilns is correct, this alternative should be very viable for these sources.

In short, we received no data indicating that the same limit as for kilns was infeasible, or that would otherwise allow us to set a different THC emissions limit for raw materials dryers. Therefore, in these final amendments we are setting the THC emissions limit at the same level as the cement kiln's, which is 24 ppmvd measured as propane.

However, because raw material dryers have high oxygen contents due to their inherent operation characteristics (and not due to the addition of dilution air), referencing the raw material dryer standard to 7 percent oxygen would actually result in a more stringent standard than for cement kilns. For example, given the typical oxygen contents of kiln exhaust (7 to 12 percent), a kiln just meeting the THC limit of 24 ppmvd would have an actual stack measurement of approximately 16 to 24 ppmvd. If the raw material dryer standard is referenced to the same oxygen level, they would have to meet a measured THC limit of approximately 3 ppmvd. For this reason, we are referencing the oxygen level of the standard for raw materials dryers to 19 percent oxygen, which is the typical oxygen level found in the exhaust of these devices.

d. Hydrochloric Acid Emissions From Kilns

In the proposed rule we based the proposed HCl emission limit for major sources on HCl data measured at 27 kilns using Method 321. The data in ppmvd corrected to 7 percent oxygen (O_2) were ranked by emissions level and the top 12 percent (4 kilns) lowest emitting kilns identified as best

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[23] Summary of Organic HAP Test Data. August 6, 2010.

[24] Ibid.

performing existing sources. The calculated MACT floors were 2 ppmvd and 0.1 ppmvd respectively.

i. Floor Determination. Subsequent to proposal, we received comments that indicated we had inappropriately (albeit inadvertently) included certain natural area sources in the MACT floor analysis. We have removed those natural area sources from the floor analysis. In addition, many of the source tests were not actually EPA Method 321 tests; others lacked important quality assurance information. As a result, we issued letters under CAA section 114 authority requiring facilities that were major sources and that had previously submitted data to retest their facilities. We used this new data set to calculate a MACT floor. The data from the best performing three sources, as determined by average emissions during the test, are shown below in Table 7.

TABLE 7—HCL MACT FLOOR

Kiln	HCl emissions (ppmvd at 7% O_2)
1	0.34
2	0.44
3	0.46
MACT—Existing	
Average (Top 3)	0.41
Variance	0.02
UPL	0.52
MACT—New	
Average	0.34
Variance	0.0
UPL	0.34

However, these measurements are very close to the detection limit for analytic method 321 actually calculated in the field for HCl—from 0.2 to 0.3 parts per million by volume (ppmv) as measured in the stack.[25] The expected measurement imprecision for an emissions value occurring at or near the method detection level is in fact about 40 to 50 percent. This large measure of analytic uncertainty decreases as measured values increase: Pollutant measurement imprecision decreases to a consistent relative 10 to 15 percent for values measured at a level about three times the method detection level. *See* American Society of Mechanical Engineers, *Reference Method Accuracy and Precision (ReMAP): Phase 1, Precision of Manual Stack Emission Measurements,* CRTD Vol. 60, February 2001. Thus, if the value equal to three times the representative method detection level were greater than the calculated floor emissions limit, we would conclude that the calculated floor emissions limit does not account entirely for measurement variability.

That is the case here with HCl. The calculated standard (not accounting for the inherent analytical variability in the measurements) is 0.52 ppm (*see* Table 7 above). In order to account for measurement variability, we multiplied the highest reported minimum detection level for the analytic method by a factor of three which results in a level of 0.9 ppmv. This represents the lowest level that can be reliably measured using this test method, and we therefore believe that it is the lowest level we can set as the MACT limit taking the appropriate measurement variability into account. Converting this level to a dry basis at 7 percent oxygen results in a floor of 3 ppmvd for both new and existing sources. As explained further below, we are using a CEM to measure this standard, and it is a 30-day average.

ii. Beyond the Floor Determination. At proposal we examined the use of a packed bed scrubber, which was assumed to have a higher HCl removal efficiency than the spray tower limestone scrubbers typically used in this industry. Considering the high costs, high cost-effectiveness and small additional emissions reduction (and adverse cross-media impacts), we did not believe that a beyond-the-floor standard for HCl is justified. We received no comment that would change that decision. In addition, the current HCl floor limit is actually set at the lowest level we believe can be accurately quantified by the applicable test method. Therefore, a lower standard could not be reliably quantified. For these reasons we selected the floor level of control as MACT for HCl for major sources.

iii. Compliance Mechanisms. As proposed, kilns equipped with wet scrubbers may demonstrate compliance by means of stack testing at intervals of 30 months, plus utilize continuous monitoring of specified parameters. All other kilns are required to use a CEMS, with compliance based on a 30-day rolling average. Although the underlying data were obtained via stack tests, rather than with continuous monitors, EPA believes that because the HCl standard is established at a level higher than all measured values (to account for the inability to reliably measure any lower standard) and measured based on 30-day averages, it provides an ample compliance margin.

iv. Determination not to Establish a Risk-Based Standard for HCl. At proposal, EPA elected not to exercise its discretion under CAA section 112(d)(4) and proposed a major source standard for HCl based on MACT. The primary basis for not setting a health-based standard was that setting a MACT standard for HCl not only controlled HCl but also co-controlled other HAP (such as HF, Chlorine (Cl_2), and hydrogen cyanide (HCN)) and criteria pollutants yielding very substantial environmental benefits. However, we also requested comment on whether we had the legal authority to establish a standard for HCl, and, if so, whether we should exercise our discretion to do so. 74 FR at 21154. After considering comments, EPA has decided not to exercise its discretion to establish a risk-based standard for HCl under CAA section 112(d)(4), opting instead to promulgate a standard for HCl based on the performance of MACT in this final rule. This section discusses the basis for that decision.

Setting technology-based MACT standards for HCl will result in significant reductions in emissions of other pollutants, most notably SO_2, and would likely also result in additional reductions in emissions of mercury, along with condensable PM, ammonia, and semi-volatile compounds. The additional reductions of SO_2 alone attributable to the MACT standard for HCl are estimated to be 124,000 tons per year in the third year following promulgation of the proposed HCl standard. These are substantial reductions with substantial public health benefits. SO_2 emissions are associated with a variety of human health, ecosystem, and visibility effects. 75 FR at 35525–27 (June 22, 2010). Even more significantly, SO_2 is also a precursor to $PM_{2.5}$. Reducing SO_2 emissions also reduces $PM_{2.5}$ formation, human exposure, and the incidence of $PM_{2.5}$-related health effects, among them premature mortality and cardiovascular and respiratory morbidity. *See* detailed discussion of $PM_{2.5}$ health effects in the text at Table 13 below.

For these rules the SO_2 reductions represent a large fraction of the total monetized benefits from reducing $PM_{2.5}$, but it is not possible to isolate the portion if the total monetized benefits attributable to the emission reductions of SO_2 resulting from the application of HCl controls. The benefits models assume that all fine particles, regardless of their chemical composition, are equally potent in causing premature mortality because there is no clear scientific evidence that would support the development of differential effects estimates by particle type.

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[25] Memorandum. EPA Method 321 Detection Limits and Minimum Quantification Limit, July 26, 2010.

We estimate the number of premature mortalities avoided each year due to the reductions in $PM_{2.5}$ exposure attributable to this standard to be in the thousands. RIA Table 6–3. We also estimate there to be over 2800 instances of annual cardiovascular and respiratory morbidity cases avoided, and hundreds of thousands of work loss days avoided. *Id.* The monetized benefits just from premature mortality avoided attributable to $PM_{2.5}$ reductions from this standard are estimated to be $7.4 billion to $18 billion at the three percent discount rate and $6.7 billion to $17 billion at a seven percent discount rate, nearly an order of magnitude higher than the rule's estimated social costs. *See* Table 13 below. Although MACT standards may directly regulate only HAPs and not criteria pollutants, Congress did recognize, in the legislative history to section 112(d)(4), that MACT standards would have the collateral benefit of controlling criteria pollutants as well and viewed this as an important benefit of the air toxics program.[26] The EPA believes these health and environmental benefits to be large and important and fully in keeping with the paramount goal of the Clean Air Act "to protect and enhance the quality of the Nation's air" (CAA section 101(b)(1)), and so is adopting MACT standards for HCl.[27]

Commenters from industry urged EPA to retain a risk-based standard but did not challenge EPA's finding or quantification that there would be these enormous health and environmental benefits to setting a standard reflecting MACT to control HCl. The commenters nonetheless urged EPA to retain a risk-based standard, noting that EPA had done so in the predecessor to this rule and for other source categories, and that HCl is a threshold pollutant within the meaning of CAA section 112(d)(4) so that there is a technical basis for such a standard. These arguments do not persuade the Agency to forego the very significant benefits just outlined. However, even if (contrary to the analysis just set out) EPA were inclined to adopt a risk-based standard here, there would be technical obstacles to doing so, as described at the final part of this section.

As we noted in the proposed rule, as a general matter, CAA section 112(d) requires MACT standards at least as stringent as the MACT floor to be set for all HAP emitted from major sources. However, CAA section 112(d)(4) provides that for HAP with established health thresholds, EPA has the discretionary authority to consider such health thresholds with an ample margin of safety when establishing emission standards under CAA section 112(d). This provision is intended to allow EPA to establish emission standards other than technology-based MACT standards in cases where a less stringent emission standard will still ensure that the health threshold will not be exceeded, with an ample margin of safety. In order to exercise this discretion, EPA must first conclude that the HAP at issue has an established health threshold and must then provide for an ample margin of safety when considering the health threshold to set an emission standard. We discussed this issue at length in the recent proposed Industrial Boiler MACT. *See* 75 FR at 32020–33 (June 4, 2010) (declining to propose a risk-based standard for HCl emissions).

The legislative history of section 112(d)(4) indicates that Congress did not intend for this provision to provide a mechanism for EPA to delay issuance of emission standards for sources of HAPs. The legislative history also indicates that a health-based emission limit under section 112(d)(4) should be set at the level at which no observable effects occur, with an ample margin of safety. S. Rep. 101–228 at 171–72. The legislative history further states that employing a section 112(d)(4) standard rather than a conventional MACT standard "shall not result in adverse environmental effects which would otherwise be reduced or eliminated." *Id.*

It is clear that EPA may exercise its discretionary authority under 112(d)(4) only with respect to pollutants with an established health threshold. Where there is an established threshold, EPA has, in the proposed rule on industrial boilers, interpreted section 112(d)(4) to allow us to weigh additional factors, beyond any established health threshold, in making a judgment whether to set a standard for a specific pollutant based on the threshold, or instead follow the traditional path of developing a MACT standard after determining a MACT floor (75 FR 32030). In deciding whether to exercise its discretion for a threshold pollutant for a given source category, EPA has interpreted section 112(d)(4) to allow us to take into account factors such as the following: The potential for cumulative adverse health effects due to concurrent exposure to other HAPs with similar biological endpoints, from either the same or other source categories, where the concentration of the threshold pollutant emitted from the given source category is below the threshold; the potential impacts on ecosystems of releases of the pollutant; and reductions in criteria pollutant emissions and other co-benefits that would be achieved via the MACT standard—the decisive factor here. Each of these factors is directly relevant to the health and environmental outcomes at which section 112 of the Clean Air Act is fundamentally aimed. If EPA does determine that it is appropriate to set a standard based on a health threshold, we must develop emission standards that will ensure the public will not be exposed to levels of the pertinent HAP in excess of the health threshold, with an ample margin of safety.

Since any emission standard under section 112(d)(4) must consider the established health threshold level, with an ample margin of safety, in this rulemaking EPA has considered the adverse health effects of the HAP acid gases, beginning with HCl. Research indicates that HCl is associated with chronic respiratory toxicity. In the case of HCl, this means that chronic inhalation of HCl can cause tissue damage in humans. Among other things, it is corrosive to mucous membranes and can cause damage to eyes, nose, throat, and the upper respiratory tract as well as pulmonary edema, bronchitis, gastritis, and dermatitis. Considering this respiratory toxicity, EPA has established a chronic reference concentration (RfC) for the inhalation of HCl of 20 $\mu g/m^3$. (*See http://www.epa.gov/ncea/iris/subst/0396.htm.*) An RfC is defined as an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups[28]) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The IRIS health assessment evaluated chronic non-cancer risks and did not include an evaluation of carcinogenic effects (on which there are very limited studies). As a reference value for a single pollutant, RfCs do not reflect any

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[26] *See* S. Rep. No. 101–228, 101st Cong. 1st sess. at 172. EPA consequently does not accept the argument that it cannot consider reductions of criteria pollutants in determining whether to exercise its discretion to adopt a risk-based standard under section 112(d)(4). There appears to be no valid reason that EPA must ignore controls which further the health and environmental outcomes at which section 112(d) of the Act is fundamentally aimed.

[27] We further note that HCl is not the only acid gas HAP emitted by Portland cement plants. Hydrogen fluoride, HCN, ammonia, and chlorine may also present and were not accounted for in the risk analysis. Setting an HCl standard under 112(d)(2) and (3) allows the Agency to also address these other HAPs as they are co-controlled by wet scrubbers along with HCl.

[28] "Sensitive subgroups" may refer to particular life stages, such as children or the elderly, or to those with particular medical conditions, such as asthmatics.

potential cumulative or synergistic effects of an individual's exposure to multiple HAPs or to a combination of HAPs and criteria pollutants. Similarly, an RfC evaluation does not focus on potential environmental impacts.

With respect to the potential health effects of HCl, we know the following:

1. Chronic exposure to concentrations at or below the RfC is not expected to cause chronic respiratory effects;

2. Little research has been conducted on its carcinogenicity. The one occupational study of which we are aware found no evidence of carcinogenicity;

3. There is a significant body of scientific literature addressing the health effects of acute exposure to HCl (California Office of Health Hazard Assessment, 2008. Acute Toxicity Summary for Hydrogen Chloride, *http://www.oehha.ca.gov/air/hot_spots/2008/AppendixD2_final.pdf#page=112* EPA, 2001). However, we currently lack information on the peak short-term emissions of HCl from cement kilns which might allow us to determine whether a chronic health-based emission standard for HCl would ensure that acute exposures will not pose health concerns.

4. We are aware of no studies explicitly addressing the toxicity of mixtures of HCl with other respiratory irritants. However, many of the other HAPs (and criteria pollutants) emitted by cement kilns also are respiratory irritants, and in the absence of information on interactions, EPA assumes an additive cumulative effect (Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures. *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=20533*).

Cement kilns also emit other acid gases along with HCl, including chlorine (Cl_2), HCN and hydrogen fluoride (HF), all of which are HAPs. Like HCl, these HAP gases have established chronic health thresholds below which they are not expected to pose any significant risk of chronic respiratory effects, have no evidence to suggest that they may pose carcinogenic effects, and have an established body of literature regarding acute respiratory health effects. They are also controlled during the process of controlling HCl emissions from cement kilns using a wet scrubber. As such, their health impacts must be taken into account when considering a health-based emission limit for HCl.

In the 2006 final rule, EPA did not set any standard for HCl.[29] The Agency reasoned that no further control was necessary for Portland cement emissions of HCl because HCl is a "health threshold pollutant" and human health is protected with an ample margin of safety at current HCl emission levels. 71 FR at 76527. Underlying this conclusion was EPA's analysis of a tiered screening study of dispersion modeling of cement facilities' worst-case and actual HCl emissions. This study was conducted by the Portland Cement Association for about two-thirds of operating U.S. cement plants. Dispersion modeling results were evaluated against the RfC for HCl.[30] The screening analysis involved making conservative assumptions regarding HCl emission concentrations and plants' operating conditions (greater concentrations than known to be emitted and perpetual operation at maximum capacity). All plants in the analysis, with five exceptions, had HCl levels well below a Hazard Quotient (HQ) level of 1.0, the ratio of exposure (or modeled concentration) to the health reference value or threshold level. The remaining five plants in the analysis had HQ levels greater than 1.0 assuming maximum emissions, but less than 1.0 when their actual emissions were used in the dispersion models. *Id.* at 76528–29.

At proposal of these amendments, recognizing that the 2006 determination was deficient, if for no other reason because it failed to establish any emission standard whatever, EPA conducted its own analysis to determine what numerical standard for HCl would be necessary to at least assure that, for the sources in the controlled category or subcategory, persons exposed to emissions of HCl would not experience the adverse health effects on which the threshold is based. In order to determine this level, in the proposed rule we conducted a risk analysis of the same 68 facilities analyzed by PCA using a screening level dispersion model (AERSCREEN). Using the site specific stack parameters provided by the PCA and conservative meteorological conditions (taken from the PCA analysis), the AERSCREEN modeling predicted the highest long term ground level concentration surrounding each facility, and used this concentration to back calculate the highest allowable HCl emissions rate that could occur without exceeding the allowable RfC. The results of this analysis indicated that an HCl emission limit of 23 ppmv or less (an order of magnitude higher than the MACT standard) would result in no exceedances of the RfC for HCl for any of the facilities assessed.[31]

Based on further consideration, EPA now believes that the 2006 PCA study and analysis has the following deficiencies. First of all, not all cement plants were evaluated (the PCA study covered about two thirds of the plants in the source category), and among those not evaluated were cement plants with the most likelihood of posing risk at ground level from HCl emissions due to use of positive pressure baghouses with monovents or multiple short stacks. Secondly, the analysis did not consider the impacts of the co-emitted acid gases, an important consideration in determining an ample margin of safety. In addition, no data were provided, nor do we have data, on other pollutants in the vicinity of these cement facilities, or background concentration data for HCl to determine cumulative impacts of HCl emissions for these facilities.[32] EPA's analysis of 2009 could not improve on the PCA study, given the lack of robust emissions data for Cl_2, HF, and HCN, and the lack of any additional data for the cement kilns not included in the original study. As a result, EPA cannot ensure that the resulting derivation of 23 ppmv as a possible health-based emission standard for HCl would result in chronic ambient levels of acid gases that would not pose significant health risks. EPA has no data that would allow us to extend that analysis to cover all acid gases and all facilities.

In addition to potential health impacts, EPA has evaluated the potential for environmental impacts when considering whether to exercise discretion under section 112(d)(4). When HCl gas encounters water in the

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[29] Although the decision not to set a standard in 2006 was based on the authority of section 112(d)(4), we note that the statute in fact states: "the Administrator may consider such threshold level, with an ample margin of safety, *when establishing emission standards* under this subsection." Section 112(d)(4), emphasis added.

[30] In the previous study EPA also evaluated dispersion modeling results against an acute exposure guideline level (AEGL) below which acute effects would not be expected to occur. However, even given the uncertainties mentioned for short term HCl emissions, that analysis indicated that chronic effects would be of the most concern.

[31] Derivation of a Health-Based Stack Gas Concentration Limit for HCl in Support of the National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry, April 10, 2009.

[32] It should be noted that large amounts of site-specific information both on kiln operation and local meteorological information is needed to obtain meaningful results from AERSCREEN and other dispersion models. This information is in the ready possession of the industrial sources themselves, but for unknown reasons, was not provided by industry to EPA either as part of the 2006 PCA analysis or in response to subsequent data solicitations by EPA.

atmosphere, it forms an acidic solution of HCl. In areas where the deposition of acids derived from emissions of sulfur and nitrogen oxides are causing aquatic and/or terrestrial acidification, with accompanying ecological impacts, the deposition of HCl could exacerbate these impacts. Being mindful of the explicit legislative history, and in keeping with past EPA practice, it is appropriate to consider potential adverse environmental effects in addition to adverse health effects when setting an emission standard for HCl under section 112(d)(4). The co-emissions of HF, HCN, and Cl_2 from cement kilns could serve to further aggravate these environmental acidification impacts, but EPA has no data to determine these impacts.

Although the PCA analysis did not include an assessment of potential environmental effects, for the 2006 final Portland cement rule, EPA conducted its own analysis of potential effects of cement kilns' HCl emissions to wildlife, aquatic life, and other natural resources. The Agency concluded at the time that acute and chronic exposures to expected HCl concentration around cement kilns are not expected to result in adverse environmental toxicity effects. *Id.* at 76529. EPA accordingly declined to establish any standard for HCl.

At this time, we now believe the ecological risk analysis performed in 2006 is insufficient, as it was merely a literature review and not a formal ecological assessment, and, as discussed in the previous paragraphs, it did not cover the impacts of the other acid gases, nor did it cover about one third of the existing cement plants. No additional information was provided during the comment period which addressed these various technical issues, notwithstanding EPA's solicitation of data.

Consequently, although EPA is declining to adopt a section 112(d)(4) risk-based standard for HCl emissions from Portland cement facilities for the sound policy reasons discussed herein, we further note that there remain technical issues as to the appropriateness of such a standard even if EPA were inclined to exercise that discretion. We also do not view ourselves as bound by the technical determinations made in the 2006 rulemaking for the reasons just explained.

EPA also has concluded that the facts here are distinguishable from those in other rulemakings in which it exercised its discretionary authority under section 112(d)(4). In the case of the Pulp and Paper MACT (63 FR at 18765 (April 15, 1998)), the risk analysis indicated, at the 95 percent confidence interval, that the maximum concentration predicted to which people were estimated to be exposed was 0.3 g/m_3, 60 times less than the inhalation reference concentration. This is a much lower value than present in the Portland cement risk analysis discussed above. In the case of the Lime Manufacturing NESHAP (67 FR at 78054 (Dec. 20, 2002)), there are two key distinctions. First, the technical information available to EPA covered 100 percent of all lime kilns in the U.S., which is not the case for the Portland cement risk analysis. Second, EPA did a worst case analysis as a supplement to the industry analysis and determined that the highest hazard index under that scenario was 0.21. Based on the EPA analysis determining a health based limit for Portland cement, if we were to allow the same level of risk as we determined in Lime NESHAP analysis, the health based emission limit would be 2 ppmvd, which is almost the same level as the MACT standard we are finalizing in this action.

EPA also considers the alternative standard for total chlorine in the Hazardous Waste Combustor MACT (70 FR at 59555 (Oct. 12, 2005)) to be distinguishable. That rule, under the authority of section 112(d)(4) establishes a site-specific risk-based standard for total chlorine (of which HCl is the largest component), whereby, in lieu of meeting the MACT standard, sources may emit total chlorine at higher levels if they demonstrate that their emissions of total chlorine from all hazardous waste combustor sources at a facility do not exceed both acute (one-hour) and chronic (annual) exposure thresholds. The demonstration must account for all relevant site-specific conditions, or be based on worst-case screening assumptions. If sources satisfy these criteria, the amount of their total chlorine emissions is still capped by the technology-based limit to which these sources were previously subject. The site-specific demonstrations, applicability to all combustor sources at a facility, use of acute and chronic health benchmarks, and capping of emission limits are all unique to that rule.

e. PM Emissions From Kilns

Particulate matter serves as a surrogate for non-volatile metal HAP (a determination upheld for this source category in *National Lime Ass'n,* 233 F. 3d at 637–39). Existing and new major sources are presently subject to a PM limit of 0.3 lb/ton of feed which is equivalent to 0.5 lb/ton clinker. EPA is amending this standard for major sources, and also adding PM standards for existing and new area source cement kilns. In all instances, EPA is revising these limits because they do not represent MACT, but rather a level which is achievable by the bulk of the industry. *See* 63 FR at 14198 (March 24, 1998); *see also* 233 F. 3d at 633 (indicating that the standards for PM were likely legally deficient but that the argument had not been properly preserved for the court to adjudicate). This is not legally permissible. *Brick MACT,* 479 F. 3d at 880–81. EPA thus does not accept the argument of some commenters that EPA may only amend promulgated MACT standards by means of the periodic review procedures of section 112(d)(6), which does not include re-determining floor levels. Section 112(d)(6)does not indicate that it is the exclusive means of amending MACT standards, and in particular does not speak to a situation where an original floor was palpably short of statutory requirements and where that floor became the ultimate standard. EPA consequently believes it has discretion to reconsider and redo the MACT floor analysis for PM, and to amend the standard as appropriate.

Other commenters suggested that even if EPA has such discretion, it would (or should) be limited to a reanalysis of the original database for the 1999 rule and so should not consider kilns' subsequent performance. Were EPA to take that approach here, the floor (and standard) for PM would be more stringent than the floor (and standard) in this rule.[33] Because EPA considers the database for the current rule to be more representative of performance capabilities of best performing kilns than the sparser 1999 database, EPA is basing its determination on the more representative data.

EPA is setting a PM standard based on MACT for existing and new area source cement kilns. As noted at proposal, Portland cement kilns are a listed area source category for urban HAP metals pursuant to section 112(c)(3), and control of these metal HAP emissions (via the standard for the PM metal surrogate) is required to ensure that area sources representing 90 percent of the area source emissions of urban metal HAP are subject to section 112 control, as required by section 112(c)(3). EPA has determined that this standard should reflect MACT, rather than GACT, because there is no essential difference between area source and major source cement kilns with respect to emissions

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[33] Calculation of PM MACT Floor Based on Data in 1998 Proposal. July 7, 2010.

of either HAP metals or PM. Thus, the factors that determine whether a cement kiln is major or area are typically a function of the source's HCl or formaldehyde emissions, rather than its emissions of HAP metals. As a result, there are kilns that are physically quite large that are area sources, and kilns that are small that are major sources. Both large and small kilns have similar HAP metal and PM emissions characteristics and controls.

Given that EPA is developing major and area source standards for PM at the same time in this rulemaking, a common control strategy consequently appears warranted for these emissions. We thus have included all cement kilns in the floor calculations for the final PM standard, and have developed common PM limits based on MACT for both major and area sources.

i. *Floor Determination.* At proposal we had compiled PM stack test data for 45 kilns from the period 1998 to 2007. EPA ranked the data by emissions level and the lowest emitting 12 percent, 6 kilns, was used to develop the proposed existing source MACT floors of 0.085 and 0.08 lb/ton clinker for new and existing sources respectively.

Commenters noted that we had omitted some of the data already submitted to EPA in developing the MACT floor. In addition, we noted for two of the best performing facilities we had only one emissions test. Therefore we requested these sources to submit additional PM emission test data and the source sent two additional PM emissions tests for each kiln to allow us to better characterize emissions variability. We modified the PM data base to reflect these submissions. Another change made since proposal is that we have changed the compliance requirement to require a PM CEMS. This requires that we establish an averaging period. We chose a period of 30 days (rolling average) to be consistent with requirements for mercury and THC, and because PM emissions on a lb/ton basis are affected by raw mill cycles (typically encompassed within 30-days, *see* 74 FR at 21144) for kilns with in-line raw mills. We have converted the concentrations obtained from 3-hour tests into 30-day values by means of the UPL equation previously described. It should be noted that due to the longer averaging periods, the actual limit will be a lower number compared to the shorter compliance interval in the proposed rule (30 days versus a three hour test). This damping of variability when a longer averaging period is used is well established where continuous monitors have been used to measure emissions, and is also accounted for in the "m" term of the UPL equation. The results of the new MACT analysis are shown in Table 8.

TABLE 8—PM MACT FLOOR

Kiln	PM emissions (lb/ton clinker)
1	0.01
2	0.01
3	0.01
4	0.03
5	0.04
6	0.04
MACT—Existing	
Average	0.02
Variance	0.001
UPL	0.04
MACT—New	
Average	0.01
Variance	0.00001
UPL	0.01

EPA proposed use of PM CEMS as an alternative to using a bag leak detector, and also solicited comment on requiring their use generally. 74 FR at 21157. As we noted there, performance specifications for PM CEMS are now available, and continuous monitors "give a far better measure of sources' performance over time than periodic stack tests". After considering the public comments, EPA continues to believe that this is the case. *See also* further discussion of this issue at Section A.3 of this preamble below.

EPA does not agree with the comment that use of a CEM renders the standard more stringent and so results in floors (and standards) more stringent than those achieved by average of the best performing sources. First, the continuous collection of data used to assess compliance with this standard does not create a limit more stringent that otherwise allowed. As discussed in the preamble to the Credible Evidence Rule, "* * * continuous monitoring of the standards (has) no effect on the stringency of the standard * * *" (62 FR at 8326, February 24, 1997).

Further, a statistically-based adjustment to account for emissions variability, and which, in this case, increases the numerical value of the standard (and its longer averaging period) by fifty percent, does not make the standard more stringent. Finally, increasing the averaging period beyond the duration associated with conducting a performance test (typically three hours) to 30 days normally makes a standard more lenient because there is more opportunity to average out individual results. As mentioned in the description of the Salo and Pederson memoranda cited in Section 4.1.2.1 of the Credible Evidence Rule Response to Comment Document, "* * * (t)he effect of the change from a 3-hour averaging time to a 30-day averaging time is to make the standard more lenient * * *".[34]

ii. *Beyond the Floor Determination.* EPA did not propose beyond-the-floor standards for PM. This was because the cost effectiveness of adopting beyond-the-floor controls was several orders of magnitude greater than EPA has accepted for PM reductions in other rules where standards allow consideration of costs, and because the incremental amount of PM removed was very small (3 tpy nationwide). Consideration of non-air quality issues did not change this conclusion. 74 FR at 21155. Commenters did not challenge this analysis. EPA accordingly is not adopting beyond-the-floor standards for PM.

The final PM emissions limit for existing sources is 0.04 pounds per ton (lb/ton) clinker for and 0.01 lb/tons clinker for new sources (30-day average). Kilns where the clinker cooler gas is combined with the kiln exhaust and sent to a single control device for energy efficiency purposes (*i.e.,* to extract heat from the clinker cooler exhaust) will be allowed to adjust the PM standard to an equivalent level accounting for the increased gas flow due to combining of kiln and clinker cooler exhaust (an action for which EPA received no adverse comment). *See* 74 FR at 21156 and 73 FR at 64090–91 (Oct. 28, 2008) (explaining the equivalency of this standard and the energy efficiency benefits resulting from combining these gas flows). The PM standard is a 30-day rolling average and is measured with a CEM.

iii. Compliance Alternative for Comingled Kiln/Clinker Cooler Exhaust.

As we noted at proposal, some kilns combine the clinker cooler gas with the kiln exhaust and send the combined emissions to a single control device. There are significant energy savings (and attendant greenhouse gas emission reductions) associated with this practice, since heat can be extracted from the clinker cooler exhaust. However, there need to be different conversion factors from concentration to mass per unit clinker in these cases to allow for the increased gas flow, which result in a different PM emissions limit. We proposed adjustment factors that would account for these differences and create a site specific PM emission limit

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[34] Available at *http://www.epa.gov/ttncaaa1/t1/fr_notices/certcfin.pdf.*

of this situation. *See* 74 FR 21155–56 and 21184. We received no comments on these factors and are thus adopting them as proposed, except that the factors have been changed to account for changes in the underlying kiln and clinker cooler emissions limits. Note that adjustments would also be necessary for kilns subject to the NSPS PM limit. Thus, we are including a cross reference for the NSPS to the appropriate section of the NESHAP rule.

f. Opacity Standards for Kilns and Clinker Coolers

We are removing all opacity standards for kilns and clinker coolers because these sources will be required to monitor compliance with the PM emissions limits by more accurate means. Although some commenters requested retention of opacity as a backup standard, and others as an alternative, none of these comments offered any convincing information or other justification for perpetuating a less reliable compliance methodology. Though we have preserved some regulation text, any kiln or clinker cooler that uses a PM CEMS to monitor compliance with the PM emission limit is exempt from opacity standards.

g. PM Standard for Clinker Coolers

In addition to amending the PM standard for kilns we are similarly amending the PM emissions limit for clinker coolers. Fabric filters are the usual control for both cement kilns and clinker coolers. As EPA noted in our proposed revision to the NSPS (73 FR 34078, June 16, 2008), we believe that the current clinker cooler controls can meet the same level of PM control that can be met by the cement kiln. No commenter challenged this. One commenter did state that PM limits for clinker coolers should not be changed, but we disagree with that comment for the reasons previously discussed on the PM limit for kilns. Therefore, we are setting the same PM emissions limits and compliance requirements for both clinker coolers and kilns.

h. Standards for Open Clinker Piles

At proposal we noted that open clinker piles were currently unregulated, and that hexavalent chromium emissions had been detected in fugitive dust from these piles. *See* 74 FR at 21163. We requested comment and information as to how common the practice of open clinker storage is, appropriate ways to detect or measure fugitive emissions (ranging from open-path techniques to continuous digital or intermittent manual visible emissions techniques), any measurements of emissions of hexavalent chromium (or other HAP) from these open storage piles, potential controls to reduce emissions, or any other factors we should consider.

Commenters did not provide data on this practice. Industry commenters stated emission were *de minimis* and should not be regulated. Other commenters noted that the fact that we know these sources emit HAP is sufficient to necessitate regulation.

We agree that these operations do emit HAP and that regulation of these sources is necessary. *See National Lime,* 233 F. 3d at 640 (upholding EPA position that de minimis exceptions are not to be read into the MACT standard setting process). Because the emissions in question are fugitive dust for which measurement is not feasible since (by definition) the emissions are not emitted through a conveyance or other device which allows their measurement (*see* section 112 (h)(1) and (2)(A)), we are adopting the work practice standards and opacity emissions limits contained in Rule 1156 as amended by the South Coast Air Quality Management District on March 6, 2009 and incorporating them into this rule. There are only two plants which EPA can state definitively have open storage piles and are complying with Rule 1156, so these existing regulatory standards would constitute a floor level of control (and EPA does not believe beyond-the-floor controls are needed, since utilizing some type of enclosure should well control fugitive emissions). A summary of the requirements are as follows:

If clinker material storage and handling activities occur more than 1,000 feet from the facility property-line,

○ Utilize a three-sided barrier with roof, provided the open side is covered with a wind fence material of a maximum 20 percent porosity, allowing a removable opening for vehicle access. The removable wind fence for vehicle access may be removed only during minor or routine maintenance activities, the creation or reclamation of outside storage piles, the importation of clinker from outside the facility, and reclamation of plant clean-up materials. The removable opening shall be less than 50 percent of the total surface area of the wind fence and the amount of time shall be minimized to the extent feasible;

○ Storage and handling of material that is immediately adjacent to the three-sided barrier due to space limitations inside the structure shall be contained within an area next to the structure with a wind fence on at least two sides, with at least a 5 foot freeboard above the top of the storage pile to provide wind sheltering, and shall be completely covered with an impervious tarp, revealing only the active disturbed portion during material loading and unloading activities;

○ Storage and handling of other active clinker material shall be conducted within an area surrounded on three sides by a barrier or wind fences with one side of the wind fence facing the prevailing wind and at least a 5-foot freeboard above the top of the storage pile to provide wind sheltering. The clinker shall remain completely covered at all times with an impervious tarp, revealing only the active disturbed portion during material loading and unloading activities. The barrier or wind fence shall extend at least 20 feet beyond the active portion of the material at all times; and

○ Inactive clinker material may be alternatively stored using a continuous and impervious tarp, covered at all times, provided records are kept demonstrating the inactive status of such stored material.

- If clinker material storage and handling activities occur 1,000 feet or less from the facility property-line these activities must be in an enclosed storage area.

In the SCAQMD regulation, there are different requirements for active vs. inactive open clinker piles. An inactive pile is one that had not been disturbed for 30 consecutive days. In addition, the ACAQMD rule has different requirements for clinker piles that are 1,000 feet or less form the facility property-line. This 1000 foot criterion was a mutually agreed number among the stakeholders (both industry and environmental groups) involved in developing the regulation.[35] Given the lack of additional data, we saw no reason to change these criterion. More information on this rule is available at *http://www.aqmd.gov/hb/gb_cal95.html.*

Industry commenters also maintained that regulation of open storage piles would violate a 2001 settlement agreement between EPA and the industry in which EPA agreed that the 1999 rule did not apply to fugitive emission sources. But nothing in that settlement agreement prevents EPA from amending its regulations if it is appropriate to do so (nor could EPA legally bind itself in such a way). The agreement in fact states that "[n]othing in this Agreement shall be construed to limit or modify EPA's discretion to alter, amend, or revise, or to promulgate regulations that supersede, the

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[35] Telecon with Tuyet-Le Pham, South Coast Air Quality Management District. June 29, 2010.

regulations identified in section III of this Agreement.” Consequently, EPA’s action today properly amends the current regulation, and does not violate any provisions of the settlement agreement.

i. Format of the Normalized Standards in the NESHAP and the NSPS

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. As we noted at the NSPS proposal, the current NSPS and limits (and NESHAP limits before today’s amendments) for PM are expressed on a pound of PM per ton (lb/ton) of dry feed input format. *See* 73 FR at 34075–76. In this final NESHAP (and NSPS) we are adopting a new normalizing parameter of lb/ton of clinker—*i.e.,* normalizing based on kiln output rather than input for both PM and mercury.

We noted at proposal of the NSPS that 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. 73 FR at 34076. EPA therefore proposed that all of the NSPS (for PM, NO_x, and SO_2) be normalized by ton of clinker produced, and later proposed the same parameter for the two standards in the NESHAP which are normalized, mercury and PM. 73 FR at 34076; 74 FR at 21140.

In this final NESHAP (and NSPS) we are therefore adopting a new normalizing parameter of lb/ton of clinker—*i.e.* normalizing based on kiln output rather than input—for mercury and PM in the NESHAP, and for PM, NO_x, and SO_2 in the NSPS. Commenters either supported this proposal, or did not question that normalizing by output promotes more efficient production. However, commenters from industry raised technical objections and concerns to the proposal. They maintained that the measurement of kiln output is not as exact as the measurement of kiln input, and that many kilns have not installed clinker measuring equipment. These objections do not necessitate normalizing by inputs. Most commenters also stated that kiln feed could be accurately measured and also indicated that most facilities currently derive reasonable feed-to-clinker conversion factors from these measurements. Kilns already calculate clinker production in this way when required to meet emissions limits normalized by clinker production, as many NSR and PSD permits for cement kilns presently do.[36]

Since it appears from comments that the equipment to accurately measure clinker is not typically installed in this industry, we must assume these facilities use a feed-to-clinker conversion factor to calculate clinker production on whatever time basis is necessary (*e.g.,* daily, hourly, *etc.*). Therefore, we have modified the rule language to more clearly provide the option allowing facilities to measure feed inputs and to use their site specific feed/clinker ratio to calculate clinker production (and to make clear that no prior approval from a regulatory authority is necessary to do so). Facilities would be allowed to use a constant feed/clinker ratio in accord with their usual cycles for determining such ratios, typically on a monthly basis when clinker inventories are reconciled.

Commenters were nonetheless concerned that because clinker/feed ratios change somewhat and are only re-determined at the end of a cycle, a slight change in clinker/feed ratio, determined at the end of the cycle, could show lack of compliance without even an opportunity to alter operation. To obviate this legitimate concern, the rule provides that facilities are not required to retroactively update clinker production estimates after recomputing feed/clinker ratios. We would not expect that the clinker/feed ratio will change significantly from month to month, so we do not see this as creating a situation where facilities will be able to have large amounts of excess emissions but still be considered in compliance (especially since the 30-day standards are all rolling averages).

So, for these reasons above we are adopting emission limits normalized by kiln output for PM in both the NESHAP and the NSPS, for mercury in the NESHAP, and for NO_X and SO_2 in the NSPS (the same analysis applying to the limits in the NSPS).

2. What are the final operating limits under subpart LLL?

EPA is eliminating the restriction, adopted in the 2006 rule, on the use of fly ash where the mercury content of the fly ash has been increased through the use of activated carbon once the kiln has complied with a numerical mercury emissions limit. Given the emission limitation for mercury, whereby kilns must continuously meet the mercury emission limits described above (including when using these materials) there does not appear to be a need for such a provision. This provision is removed once a kiln is in compliance with the mercury limitations adopted in this. We are removing the requirement at compliance, rather than when the rule takes effect, to prevent the possibility of additional mercury emissions between the rule’s effective date and the required compliance date. However, once the rule takes effect EPA is removing the requirement to maintain the amount of cement kiln dust wasted during testing of a control device, and the provision requiring that kilns remove from the kiln system sufficient amounts of dust so as not to impair product quality for the same reasons. In this case, we do not see immediate removal of these provisions as creating a likelihood of increased mercury emissions prior to the compliance date.

3. What are the final testing and monitoring requirements under subpart LLL?

Kilns will be required to meet the following changed monitoring/testing requirements:

- CEMS (PS–12A) or sorbent trap monitors (PS–12B) to continuously measure mercury emissions, along with Procedure 5 for ongoing quality assurance.
- CEMS meeting the requirement of PS–8 to measure THC emissions for existing sources. (New sources are already required to monitor THC with such a CEMS). Kilns meeting the organic HAP alternative to the THC limit will still be required to continuously monitor THC (based on the results of THC monitoring done concurrently with the Method 320 test), and will also be required to test emissions using EPA Method 320 or ASTM D6348–03 every 30 months to identify the organic HAP component of their THC emissions.
- Installation and operation of a PM CEMS that meets the requirements of PS–11.
- CEMS meeting the requirements of PS–15 will be required to demonstrate compliance with the HCl standard for all kilns except those using a caustic scrubber. If a facility is using a caustic scrubber to meet the standard, EPA Test Method 321 and ongoing continuous parameter monitoring of the scrubber may be used in lieu of a CEMS to demonstrate compliance. The M321 test must be repeated every 30 months.

Raw material dryers that are existing sources will also be required to install and operate CEMS meeting the requirement of PS–8 to measure THC emissions. (New raw material dryer sources are already required to monitor THC with a CEMS). Raw material dryers

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[36] RACT/BACT/LAER Clearing house Report for Portland Cement. November 25, 2009.

meeting the organic HAP alternative to the THC limit will still be required to continuously monitor THC (based on the results of THC monitoring done concurrently with the Method 320 test), and will also be required to test emissions using EPA Method 320 or ASTM D6348–03 every 30 months to identify the organic HAP component of their THC emissions.

New or reconstructed raw material dryers and raw or finish mills will be subject to longer Method 22 and, potentially, to longer Method 9 tests. The increase in test length duration is necessary to better reflect the operating characteristics of sources subject to the rule. EPA has included the costs associated with increased test duration in its estimates of the rule's costs.

The requirements above are the same as those proposed with the following exceptions.

For kilns and clinker coolers, EPA proposed to require bag leak detection systems for fabric filters and an ESP predictive model to monitor performance of an ESP. In this final rule we are requiring the use of a PM CEMS for all PM control devices. We did receive comments on technical issues associated with PM CEMS, which we have addressed in the Comments and Responses Document in the docket to this rulemaking. As explained earlier, we continue to believe that these devices provide the most positive indication that a facility is actually complying with the PM emissions limit. We also note that we promulgated a requirement for PM CEMS in the 1999 final rule but deferred the compliance date until the establishment of performance specifications. These specifications have now been established as EPA Performance Specification 11.

In the proposed rule we specified that THC CEMS must meet the requirements of performance specification 8A. Commenters correctly pointed out certain deficiencies of the 8A method as applied to this source category. In response to those comments we have changed the requirement to PS–8.

Where periodic performance tests are required for HCl we changed the test frequency to 30 months because a commenter noted both chlorine inputs and scrubber performance may change significantly over five years. For similar reasons we changed the testing frequency for the organic HAP option to 30 months. We believe aligning the test schedules for all pollutants (dioxin furan, organic HAP, and HCl) to the same testing schedule will allow for more efficient use of testing resources.

4. Standards for Startup and Shutdown

As noted above, the United States Court of Appeals for the District of Columbia Circuit vacated portions of two provisions in EPA's CAA section 112 regulations governing the emissions of HAP during periods of SSM. *Sierra Club* v. *EPA,* 551 F.3d 1019 (DC Cir. 2008), *cert. denied,* 130 S. Ct. 1735 (U.S. 2010). Specifically, the Court vacated the SSM exemption contained in 40 CFR 63.6(f)(1) and 40 CFR 63.6(h)(1), that are part of a regulation, commonly referred to as the "General Provisions Rule," that EPA promulgated under section 112 of the CAA. When incorporated into CAA section 112(d) regulations for specific source categories, these two provisions exempt sources from the requirement to comply with the otherwise applicable CAA section 112(d) emission standard during periods of SSM.

The effect of the vacatur is that the cross-reference to 40 CFR 63.6(f)(1) and 40 CFR 63.6(h)(1) in Table 2 to subpart LLL no longer operates to incorporate an SSM exemption.

In light of the *Sierra Club* decision, EPA proposed to require that sources be in continuous compliance with emissions limits at all times, even during startup, shutdown, and malfunction. 74 FR at 21161–62. We proposed that these sources meet the same standards at all times. *Id.* We also specifically asked for information on emissions during startup, shutdown, and malfunction.

In these final amendments we have eliminated the cross-reference to the vacated General Provisions' exemptions contained in Table 1 of current subpart LLL. In establishing the standards in this rule, EPA has taken into account cement kilns' operating properties during startup and shutdown periods and, for the reasons explained below, has established different standards for those periods. EPA is not setting separate standards for malfunctions so that, for the reasons explained below, the standard that applies during normal operations applies during periods of malfunctions. We have also revised Table 2 (the General Provisions table) in several respects. For example, we have eliminated the General Provisions' requirement that the source develop an SSM plan. We have also removed certain recordkeeping and reporting requirements related to the SSM exemption. EPA has attempted to ensure that we have not incorporated into the regulatory text any provisions that are inappropriate, unnecessary, or redundant in the absence of the SSM exemption.

Startup is the period of time between when fuel is first introduced into a cement kiln that is not firing fuel, and when the kiln temperatures are within normal operating limits, the kiln is using its normal operating fuel, and the kiln is producing clinker. During kiln startup, fuel is first introduced into the kiln to raise the kiln to the appropriate operating temperatures. In the case of a cold start the fuel is typically a natural gas or distillate fuel. Once the kiln reaches certain temperatures, the normal operation fuel is introduced. After the kiln reaches stable operating temperatures, kiln feed is introduced in low amounts which are gradually increased. Because the kiln feed is a significant source of most kiln emissions (HAP and otherwise) we would consequently expect that kiln emissions, on a concentration basis, would not be any higher during startup than during normal operations, with any potential short-term emission spikes due to transient conditions or release of emissions from materials left in the kiln from the last operating period being accommodated through an averaging period. Indeed, on a pure concentration basis, kiln emissions over time would likely be lower than during normal operation given the lesser volume of inputs being processed, and (at startup) the cleaner fuel being used to heat the kiln to normal operating conditions.

Notwithstanding that stack concentrations over time would likely be the same or less than during normal operation, in some cases, the manner in which the standard is expressed is not appropriate during startup. Most particularly, the mercury and PM standards are normalized to kiln production (amount of pollutant allowed being linked to a ton of clinker produced). During startup, production is by definition either non-existent or very low. Even where there is a modest amount of production during startup, relationships between HAP concentration and amount of product are skewed so as to make this means of measurement inappropriate. In addition, normalized standards require accurate measurements of kiln volumetric flow rate (used to convert concentration into mass) and kiln flow rate, which changes in important ways from normal values during startup. When considered along with such phenomena as varying kiln stack moisture contents and flow rate, flow rate measurements are significantly less accurate during startup than during normal operation.

For these reasons, we are establishing standards for mercury and PM by converting the normal operation standards to a concentration basis.

These conversions are as follows: 55 lb mercury/MM tons clinker is equivalent to 10 micrograms per dry standard cubic meter (ug/dscm); 21 lb mercury/MM tons clinker is equivalent to 4 ug/dscm; 0.04 lb PM/ton clinker is equivalent to 0.004 grains per dry standard cubic foot (gr/dscf); and 0.01 lb PM/ton clinker is equivalent to 0.0008 gr/dscf. Mercury and PM would be measured during startup with a CEMS (as during normal operation) and the concentration standard would be met on the basis of 7-day averages. We do not believe a 30-day average is appropriate for these periods because they are of short duration, and it might take a period of 1 year or more to accumulate 30 days of startup operation. We considered an averaging period equal to the time period of each startup, but that would have meant different averaging periods for each event. Therefore, we chose 7 days as a period short enough to accumulate the data necessary to calculate the average over a reasonable period (certainly less than a year) but long enough to allow averaging out any transient spikes that may occur. In this way, short-term spikes which occur during startup would be averaged against the lower concentrations which otherwise typically maintained. A consequence of this compliance regime (as for the standards which apply during normal operation), is that a source (at least initially) cannot determine compliance based on any single startup (or shutdown) event. Seven days of data will need to be averaged.

All of the discussion above applies to THC emissions during startup: Feed (the main source of THC emissions) is introduced gradually so THC emissions should ordinarily be lower, cleaner fuels are initially used to heat the kiln to normal temperatures, *etc.* The difference is that the THC standard is already expressed as a concentration, so the measurement difficulties with a normalized standard do not exist. However, during normal operation the THC standard is corrected to a specified oxygen concentration to avoid the situation where a facility uses dilution air to lower the measured concentration. At startup, oxygen concentrations may be higher than during normal operation, and may also fluctuate more. This could have the effect of actually making the standard more stringent during startup. Consequently, EPA is adopting the same concentration standard for THC during startup as applies during normal operation, but is removing the oxygen concentration correction factor. The standard is measured with a CEMS and is based on a 7-day average so, that, again the lower concentrations which ordinarily maintain at startup should balance out any transient events that occur because the kiln is not yet in steady state mode.

HCl is also expressed as an un-normalized stack concentration corrected to a specific oxygen concentration. Where measured with a CEMS, EPA knows of no reason the same standard as applies during normal operation should not be met during startup, except that the averaging period would be 7 days and the oxygen correction factor would be removed for the reasons noted above. However, for those units equipped with wet scrubbers, sources may choose to demonstrate compliance by means of stack testing and parametric monitoring. *See* Section IV.A.3. In such a circumstance, there are no parameters to measure because HCl will not be emitted. This is because HCl is emitted only as kilns begin burning normal fuel, not the natural gas or distillate used as a fuel during startup. Consequently, EPA is providing that emissions of HCl shall be zero at all such times as distillate or natural gas is used to fire the kiln (and that is the parameter which would be measured).

The current standard for dioxins and furans is expressed either as a concentration, or a combination of concentration and temperature control at the inlet to the PM control device. Continuous compliance is determined based on demonstrating the measured temperature at the inlet to the PM control device does not exceed the limit established during dioxin compliance testing. This is because higher PM control inlet temperature can increase dioxin emissions. *See* 63 FR 14196, March 24, 1998. Based on a comment indicating that there can be an increase in short-term temperature fluctuations during startup (and shutdown), EPA is indicating in the startup standard that temperature measurements can increase by 10 percent during these periods.

Shutdown is the period of time between when kiln raw material feed is shutoff and gas flow through the kiln ceases. Shutdown operations are in many ways a mirror image of startup. During shutdown, the same transient conditions and low product production rates occur as during startup. Cement kilns cannot be immediately shut off. Even after the feed is stopped, gas flow must be continued through the kiln and the kiln continues to rotate to prevent kiln overheating and/or warping. Moreover, the concerns about inability to have normalized standards or standards with oxygen correction factors, air pollution control inlet temperature variability, and lack of measureable HCl emissions when the kiln is fired with distillate or natural gas and is not HCl CEM-equipped, all apply at shutdown for the same reasons as at startup. For this reason, we are setting the same limits for kilns during shutdown operations as during startup.

Periods of startup, normal operations, and shutdown are all predictable and routine aspects of a source's operations. In the proposed rule, EPA expressed the view that there are different modes of operation for any stationary source, and that these modes generally include startup, normal operations, shutdown, and malfunctions. 74 FR at 21162. However, after considering the issue of malfunctions more carefully, EPA believes that malfunctions are distinguishable from startup, shutdown and normal operations. Malfunction is defined as a "sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment or a process to operate in a normal or usual manner * * *" (40 CFR 63.2). EPA has determined that malfunctions should not be viewed as a distinct operating mode or condition and, therefore, any emissions that occur at such times do not need to be factored into development of CAA section 112(d) standards, which, once promulgated, apply at all times. In *Mossville Environmental Action Now* v. *EPA,* 370 F.3d 1232, 1242 (DC Cir. 2004), the court upheld as reasonable standards that had factored in variability of emissions under all operating conditions. However, nothing in section 112(d) or in caselaw requires that EPA anticipate and account for the innumerable types of potential malfunction events in setting emission standards. *See, Weyerhaeuser* v *Costle,* 590 F.2d 1011, 1058 (DC Cir. 1978) ("In the nature of things, no general limit, individual permit, or even any upset provision can anticipate all upset situations. After a certain point, the transgression of regulatory limits caused by 'uncontrollable acts of third parties,' such as strikes, sabotage, operator intoxication or insanity, and a variety of other eventualities, must be a matter for the administrative exercise of case-by-case enforcement discretion, not for specification in advance by regulation.")

Further, it is reasonable to interpret section 112(d) as not requiring EPA to account for malfunctions in setting emissions standards. For example, we note that Section 112 uses the concept of "best performing" sources in defining MACT, the level of stringency that major source standards must meet. Applying the concept of "best performing" to a source that is malfunctioning presents significant difficulties. The goal of best performing sources is to operate in such a way as to avoid malfunctions of their units.

Moreover, even if malfunctions were considered a distinct operating mode, we believe it would be impracticable to take malfunctions into account in setting CAA section 112(d) standards for this (or any other) source category. As noted above, by definition, malfunctions are sudden and unexpected events and it would be difficult to set a standard that takes into account the myriad different types of malfunctions that can occur across all sources in the category. Moreover, malfunctions can vary in frequency, degree, and duration, further complicating standard setting.

In the event that a source fails to comply with the applicable CAA section 112(d) standards as a result of a malfunction event, EPA would, of course, determine an appropriate response based on, among other things, the good faith efforts of the source to minimize emissions during malfunction periods, including preventative and corrective actions, as well as root cause analyses to ascertain and rectify excess emissions. EPA would also consider whether the source's failure to comply with the CAA section 112(d) standard was, in fact, "sudden, infrequent, not reasonably preventable" and was not instead "caused in part by poor maintenance or careless operation." 40 CFR 63.2 (definition of malfunction).

In response to comments urging that EPA not apply the same standards to malfunctions as to normal operation, EPA recognizes that even equipment that is properly designed and maintained can sometimes fail and that such failure can sometimes cause (or in the case of 30-day averages, contribute to) an exceedance of the relevant emission standard. (*See, e.g.,* State Implementation Plans: Policy Regarding Excessive Emissions During Malfunctions, Startup, and Shutdown (Sept. 20, 1999); Policy on Excess Emissions During Startup, Shutdown, Maintenance, and Malfunctions (Feb. 15, 1983)). EPA is therefore adding to the final rule an affirmative defense to civil penalties for exceedances of emission limits that are caused by malfunctions. *See* 40 CFR 63.1341 (defining "affirmative defense" to mean, in the context of an enforcement proceeding, a response or defense put forward by a defendant, regarding which the defendant has the burden of proof, and the merits of which are independently and objectively evaluated in a judicial or administrative proceeding). We also added other regulatory provisions to specify the elements that are necessary to establish this affirmative defense; the source must prove by a preponderance of the evidence that it has met all of the elements set forth in 63.1344. (*See* 40 CFR 22.24). The criteria ensure that the affirmative defense is available only where the event that causes an exceedance of the emission limit meets the narrow definition of malfunction in 40 CFR 63.2 (sudden, infrequent, not reasonable preventable and not caused by poor maintenance and or careless operation). The criteria also are designed to ensure that steps are taken to correct the malfunction, to minimize emissions in accordance with section 63.1348(d) and to prevent future malfunctions. In any judicial or administrative proceeding, the Administrator may challenge the assertion of the affirmative defense and, if the respondent has not met its burden of proving all of the requirements in the affirmative defense, appropriate penalties may be assessed in accordance with Section 113 of the Clean Air Act (*see also* 40 CFR Part 22.77).

5. What are EPA's final actions on compliance dates?

For existing sources we proposed a compliance date of 3 years after the promulgation of the new emission limits for mercury, THC, PM, and HCl to take effect. This is the maximum period allowed by law. *See* section 112(i)(3)(A). We continue to believe a 3 year compliance period is justified because most facilities will have to install emissions control devices (and in some cases multiple devices) to comply with the proposed emissions limits. Therefore, we have retained a 3 year compliance data in this final rule.

For new sources, the compliance date will be the effective date of this final rule or startup, whichever is later. Because this is a major rule as defined by the Congressional Review Act, the effective date of the rule is 60 days after publication of the **Federal Register**.

In determining the proposal date that determines if a source is existing or new, we have decided to select the proposal date of these final amendments, which is May 6, 2009, for all the standards.

At proposal, we considered three possible dates, including March 24, 1998; December 5, 2005; and the proposal date of these final amendments, which was May 6, 2009. As we noted at proposal, Section 112 (a)(4) of the Act states that a new source is a stationary source if "the construction or reconstruction of which is commenced after the Administrator first proposes regulations under this section establishing an emissions standard applicable to such source." "First proposes" could refer to the date EPA first proposes standards for the source category as a whole, or could refer to the date the agency first proposes standards under a particular rulemaking record or first proposes the particular standards at issue. The definition is also ambiguous with regard to whether it refers to a standard for the source as a whole, or to a HAP-specific standard (so that there could be different new source standards for different HAP which are regulated at different times).[37] At proposal we chose the date of December 5, 2005, as the proposal date that determines if a source is new or existing for the mercury, HCl, and THC, and the May 6, 2009, date for PM.

After consideration of comments on the selection of the date for mercury, THC, and HCl, we believe that the May 6, 2009, date for all pollutants is more in keeping with the evident intent of Section 112(a)(4) that source should have sufficient notice that new source controls requirements can be considered in the initial design. We accept commenters' argument that sources coming into existence between the proposed date of the 2006 standards and the May 6, 2009, proposal date of these amendments would have no reasonable means of ascertaining the standards' final content and so lacked notice of what controls and strategies to adopt. Since this is antithetical to the policy underlying new source standards, EPA is adopting May 6, 2009, as the date which determines if a source is existing or new.

We note that there are currently sources subject to new source limits for mercury and THC contained in the December 20, 2006, rule. However, the mercury the new source standards in this final rule are significantly different than the limits in the December 20, 2006, rule, and we do not see how the affected sources could have anticipated this change prior to proposal of these amendments. Accordingly, we have selected a date that allows these facilities to design and install the required control equipment.

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[37] *See also* 74 FR at 21158 n. 41 citing other statutory provisions indicating that the phrase "first proposes" can have a number of meanings.

B. What are EPA's final actions on 40 CFR part 60, subpart F?

1. What are the final kiln and clinker cooler emissions limits under 40 CFR part 60, subpart F?

For "new" affected facilities constructed, modified, or reconstructed after June 16, 2008, the final emission limits amend the existing rules as follows:

- Change the format of the PM emission limits from lb/ton of dry feed to lb/ton of clinker product;
- Reduce the PM emission limit for kilns from 0.3 lb/ton of dry feed to 0.01 lb/ton of clinker;
- Set a limit on NO_X emissions from kilns of 1.50 lb/ton of clinker; and
- Set a limit on SO_2 emissions from kilns of 0.4 lb/ton of clinker, or, as an alternative, demonstrate a reduction in SO_2 emissions from the kiln of at least 90 percent; and
- Reduce the PM emissions limit for clinker coolers from 0.1 lb/ton dry feed to 0.01 lb/ton of clinker.

The emission limits for affected facilities constructed, modified, or reconstructed before June 16, 2008, remain unchanged in this subpart. The rationale for these actions is discussed below.

a. NO_X Limits for Kilns

EPA proposed an NO_X limit of 1.5 lb/ton of clinker based on application of Selective Non-Catalytic Reduction (SNCR) to a new precalciner kiln. At proposal we also considered a level of 1.95 lb/ton clinker based on the use of SNCR control technology, and a limit of 0.5 lb/ton clinker based on the use of selective catalytic reduction (SCR) technology.

After evaluation of the comments, we have decided to adopt the level of 1.5 lb/ton clinker in this final rule, as proposed. In general, commenters agreed with the selection of SNCR as the basis of the standard (*i.e.,* it represents the performance of BDT). However, there was disagreement over the appropriate emission limit that represents BDT.

Industry commenters requested a higher limit, claiming that site specific properties of raw materials could create a situation where application of SNCR technology to a well designed preheater/precalciner kiln could not achieve the level of 1.5 lb/ton clinker without high ammonia injection rates that would result in significant ammonia emissions. To support their arguments they noted that EPA based the 1.5 lb/ton clinker level on the assumption that a well designed new preheater/precalciner kiln could meet a level of 3.0 lb/ton clinker without SNCR, so that this 3.0 lb/ton clinker should be the baseline from which performance of SNCR is evaluated. 73 FR at 34079. They pointed to several newer kilns that had difficulty meeting a level of 3.0 lb/ton clinker without SNCR, and attributed this difficulty to "hard to burn" raw materials at certain sites.

We have rejected the industry argument that 1.5 lb/ton clinker is not achievable for all new kilns using SNCR technology for the following reasons. First, the commenters note some kilns without SNCR cannot meet an NO_X level of 3.0 lb/ton clinker. However, they did not provide the actual levels of NO_X emissions the sources were designed to meet. The NO_X emissions for a new preheater/precalciner kiln are primarily a function of precalciner design. Though two kilns may have the same basic precalciner design, certain site specific design parameters will also affect NO_X emissions. A precalciner designed to meet a level above 3.0 lb/ton clinker, will not necessarily be designed exactly the same way as one designed to meet 3.0 lb/ton clinker. We are also aware that there are kiln precalciner designs that were installed that do not represent best design. We thus do not believe that these kilns' performance alters the baseline from which performance of SNCR is evaluated. In addition, we have enough examples of new preheater/precalciner kilns in various locations in the country to indicate to us that an NO_X limit of 3.0 lb/ton clinker is generally achievable, regardless of location, if the precalciner is properly designed. For example, several kilns in Florida and a kiln in California have NO_X emissions below 2.0 lb/ton clinker with no add-on controls. According to our information, raw materials in Florida can be considered "hard to burn" because of the significantly different hardness of Florida limestone and silica (limestone being soft which create a fine grind, the silica being harder which creates a more coarse grind) creates problems with size distribution for the raw material necessitating more fuel use and higher kiln temperatures with a consequent increase in NO_X emissions. Additional test data for two plants with reported "hard to burn" mix were 1.89 and 2.4 lb/ton. Given these facts, we believe the assumption that a new kiln without add-on controls can meet a level of 3.0 lb/ton clinker over the long term is very reasonable and so should represent a baseline for application of SNCR performance. *See also* 73 FR at 34079 noting many other examples of kilns without end-of-stack controls burning hard-to-burn inputs meeting a level of 2.5 lb/ton of clinker.

Second, although we based our 1.5 lb/ton clinker level on an SNCR emission reduction of 50 percent, there are numerous examples of SNCR systems achieving emission reductions greater than 50 percent and as high as 80 percent or more. *Id.* These reductions were achieved without appreciable ammonia slip. So even if a new kiln were to emit at levels above 3.0 lb/ton clinker without end-of-stack controls, application of SNCR would allow such a kiln to meet the 1.5 lb/ton clinker level. For example, a new kiln emitting at 4.0 lb/ton clinker would only need an emission reduction of 63 percent to meet the 1.5 lb/ton clinker level for NO_X.

Finally, the NO_X limit is based on a 30-day averaging period to be consistent with the averaging periods for other regulated kiln pollutants, and to allow for averaging of raw mill on and off emissions. *See* 74 FR at 21144. Compared to other averaging options (hourly or daily), this longer averaging time allows additional operating flexibility to meet the limit.

Based on comments received, we also considered setting an NO_X limit lower than 1.5 lb/ton clinker based on performance of SNCR. However, we also rejected that option. We do have data that indicate that some cement kilns are below 1.5 lb/ton clinker, but we do not believe the current data support that any new kiln, regardless of location (and consequent raw material inputs), could meet a level that low.

At proposal we also considered an NO_X emissions level of 0.5 lb/ton clinker based on performance of SCR. We rejected that option because at that time we did not believe that SCR was sufficiently demonstrated technology for this industry. We are aware that there have been three cement kilns in Europe that have successfully used SCR, and that SCR technology is a demonstrated control technology for NO_X control for other source categories, such as utility boilers. We also are aware that that one domestic cement company has agreed to install SCR technology on one kiln as part of a settlement agreement. However, we continue to question if SCR technology would be effective at all locations where new kilns might be installed. The main concern is the potential for dust buildup on the catalyst, which can be influenced by site specific raw material characteristics present in the facility's proprietary quarry, such as trace contaminants that may produce a stickier particulate than is experienced at sites where the technology has been installed. This buildup could reduce the effectiveness of the SCR technology, and make cleaning of the catalyst difficult resulting in kiln downtime and significant costs. We were unable to estimate these costs and did not include these costs in our overall cost estimates for SCR. For these reasons, we have not selected SCR technology as the basis of BDT. We will continue to follow this technology as it is applied in the U.S., and will reconsider this decision in the next review of this standard.

Kilns equipped with alkali bypasses cannot be expected to meet the NO_X limit for the portion of the exhaust that goes to bypass. Bypass gases are quickly cooled and do not remain at a temperature long enough to treat using an SNCR system. For that reason, we have revised the rule to clarify that for kilns with an alkali bypass, only the main kiln exhaust gases are subject to the NO_X limit. Because all kilns do not require an alkali bypass and the bypass gas stream is a small fraction of the total kiln exhaust gas flow, any additional NO_X emission resulting from this exclusion will be minimal.

b. SO_2 Limits for Kilns

EPA proposed an emissions limit of 1.33 lb/ton clinker or 90 percent emissions reduction SO_2 based on the performance of a limestone wet scrubber applied to a kiln with high sulfur raw materials. 73 FR at 34080. Commenters noted that this level was considerably above the level of many of the recent best available control technology (BACT) determinations, and was also above the level actually achieved by the facility EPA used as the basis of this proposed standard.

At the time EPA proposed the 1.33 lb/ton clinker limit, we also considered a limit of 0.4 lb/ton clinker based on the average of recent BACT determinations for cement kilns. We chose the higher limit at proposal because the 0.4 lb/ton limit would have resulted in new kilns with moderate sulfur content raw materials experiencing a cost per ton of SO_2 removed of $6,000. However, we have changed our proposed decision for two reasons. First, as a result of the NESHAP requirement to meet a HCl emissions level of 3 ppmvd, we estimate that all new kilns will have to install wet scrubbers for HCl control. *See* section VI below. Hence, the cost of meeting the 0.4 lb/ton clinker limit in the NSPS is minimal, only the cost of the SO_2 CEM. Second, since proposal we have revised our costs for dry lime injection, which is the most cost-effective control technology for controlling a moderate sulfur raw material kiln to the 0.4 lb/ton clinker level. Based on our revised information, the cost of meeting a 0.4 lb/ton clinker emission limit now ranges from $470 to $1430/ton SO_2 for a kiln with high or moderate sulfur raw materials, even if these costs are attributed to the NSPS rather than to the NESHAP. Kilns with low sulfur raw materials can meet the 0.4 lb/ton clinker level with no add-on controls. We consider these to be reasonable costs, comparable with other costs for SO_2 control EPA has deemed reasonable such as those in the Clean Air Interstate Rule. *See* 70 FR at 25201 (May 12, 2005). So, even if a new facility is able to meet the NESHAP HCl limit without any acid gas controls, the cost per ton to meet a 0.4 lb/ton SO_2 NSPS limit is still reasonable.

In the proposal, we considered a SO_2 emissions level of 0.2 lb/ton clinker. However, this level adds little environmental benefit beyond the 0.4 lb/ton limit, and for many facilities would not be achievable based on the use of wet scrubber technology, which means these facilities would opt for the 90 percent emission reduction alternative (discussed below). For these reasons, we did not choose this level as BDT.

We also proposed a 90 percent reduction as an alternative limit to the 1.33 lb/ton emissions limit. We are retaining this alternative in the final rule.[38] The alternative 90 percent reduction is to account for situations where the sulfur content of the raw materials is so high that, even with the most efficient SO_2 control, a kiln cannot meet the 0.4 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.[39] Compliance with the 90 percent reduction would be determined by continuously monitoring SO_2 at the control device inlet and outlet. Continuous monitoring of SO_2 at the inlet and outlet is a positive demonstration that the standard is being continuously met.

c. PM Emissions Limits for Kilns and Clinker Coolers

We proposed a PM emissions limit of 0.86 lb/ton clinker based on fabric filters using membrane bags. This specific level was chosen because it is representative of the performance of this technology and was equivalent to the new source limit contained in the Hazardous Waste Combustor (HWC) NESHAP for cement kilns burning hazardous waste. This rationale is no longer applicable, since EPA is reassessing the PM limit in the HWC NESHAP. *See* USEPA Motion for Voluntary Remand in # 05–1441 (DC Circuit, August 29, 2008).

As previously discussed in section IV.A., in this action we are setting PM limits under the Portland Cement NESHAP of 0.04 lb/ton clinker for existing sources and 0.01 lb/ton clinker for new sources based on a 30 day rolling average. We project that new cement kilns meeting the 0.01 lb/ton clinker limit will be using the same technology which formed the basis of the proposed NSPS PM limit, namely fabric filters and membrane bags. It should also be noted that we estimate that many new facilities will need to install fabric filters in series as part of mercury controls. This means that a new kiln will install PM controls required to meet the 0.01 lb/ton limit in any case, so establishing the same limit for PM in the NSPS not only is technically justified, but has no cost. We also assessed the costs of installing and operating fabric filters with membrane bags at proposal, and found this to be a cost-effective control technology in any case. 73 FR at 34077. The technology would now be evaluated as more cost-effective than at proposal, since greater PM reductions will result from its use. Therefore, we are establishing an NSPS PM limit of 0.01 lb/ton clinker in this final NSPS, averaged over 30 days (rolling average) and measured with a CEM. For reasons previously discussed, we are setting the same limit for clinker coolers. *See* section IV.A.g of this preamble above. *See* section V for a discussion on measuring compliance with a PM CEM.

d. Change in Format of the Standard From lb/ton Feed to lb/ton Clinker

The change in format of the standard from feed to lb/ton clinker was actually proposed in the NSPS. However, this issue was also raised in response to the proposed PM and mercury limits in the NESHAP, and was previously discussed in section IV.A.1.i.

e. Applicability of NSPS Limits to Modified Kilns

At proposal we had one set of emission limits for PM, SO_2 and NO_X that were applicable to all new, reconstructed, and modified kilns. Commenters expressed concerns of the ability of a modified kiln to meet the same limits as a newly constructed kiln.

The PM and SO_2 limits are based on control technologies that can be applied

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

[39] Summary of Cement Kiln Wet Scrubber and Lime Injection Design and Performance Data, May 29, 2008.

to any kiln type and achieve the same control levels that would be expected with a new kiln at similar costs. We see no issue here as to technical feasibility. However, this is not necessarily the case with NO_X. New preheater/precalciner kilns with staged combustion achieve NO_X levels in the 2.0 to 3.0 lb/ton clinker range. As discussed above, in developing the NO_X limit, we assumed this level as baseline in assessing the level achievable with SNCR, which is the technology basis of BDT. However, older kiln designs can have much higher NO_X levels, ranging from 2.0 to 8.0 lb/ton clinker. Kilns in the higher end of the range might need to achieve an 80 percent emissions reduction to meet the 1.5 lb/ton clinker NO_X limit. Industry commenters requested that EPA either exempt modification from the NSPS, or set separate limits.

In this final rule we are still including modified kilns as an affected source. The suggestion that modified kilns be outright exempted from these NSPS revisions appears legally strained, given that modified sources are a type of new source for which EPA is obligated to develop, and review and revise as appropriate. Moreover, if we were to exempt modified kilns, then such sources would be free to increase emissions without application of BDT, a particular concern with respect to pollutants like NO_X which are not presently regulated by the NSPS. This would undermine the basis of section 111 standards, where Congress wanted to assure that BDT was applied to modified sources qualifying as "new." The purpose of the Act is to enhance the Nation's air quality (CAA section 101 (b)(1)), and new source performance standards under section 111 serve that goal. *Asarco* v. *EPA,* 578 F. 2d 319, 327 (DC Cir. 1978). Commenters had also claimed that other regulatory programs, most notably new source review, would result in a site specific BACT determination if emissions increased. Though we are always mindful of the interrelationship of different EPA regulatory programs and their effects, we do not see this as sufficient reason not to establish a NO_X emissions limits for modified kilns.

We further investigated whether we should set a different NO_X emissions limit for modified kilns. However, we believe the BDT is the same, and are therefore establishing the 1.5 lb/ton clinker as the limit for modified kilns. We have two reasons for doing so. First, we note that there are kilns of older design that meet levels below 1.5 lb/ton clinker, and in some cases below 1.0 lb/ton clinker, with SNCR control. Therefore, modified kilns would not necessarily be unable to meet the 1.5 lb/ton clinker limit. However, sources always have the option of adding sufficient NO_X control to avoid an hourly emissions increase and avoid thus triggering the modification provision. Cf. *Asarco,* 578 F. 2d at 328 ("the operator of an existing facility can make any alternations he wishes in the facility without becoming subject to the NSPS as long as the level of emissions from the altered facility does not increase. Thus, the level of emissions before alterations take place, rather than the strict NSPS, effectively defines the standard that an altered facility must meet"; the Court did not rule on the validity of these unchallenged provisions (*id.* at n. 32)). The NO_X controls available to cement kilns which could be utilized to prevent an increase in NO_X emissions, in addition to SNCR, are conversion to indirect firing, mid-kiln fuel injection, mid-kiln air injection, and substitution of steel slag for some limestone.

f. Regulation of VOC/CO

We are not establishing 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 will be subject to a continuous 24 ppmvd THC emissions limit by the Portland Cement NESHAP previously discussed. Because most of the THC are also VOC, the THC limit also directly limits VOC, and serves as the baseline for the NSPS analysis. This limit is also the new source limit based on the best performing source. Therefore we determined that no additional regulation of VOC emissions is necessary or feasible.

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. As noted at proposal, the only control technology identified to reduce CO emissions is a RTO (which also would concurrently reduce any VOC emissions). However, we believe application of an RTO as BDT for CO would result in significant cost and adverse energy impacts. 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.

g. Regulation of Greenhouse Gases (GHGs)

In the proposal we did not propose standards of performance covering GHGs due to concerns about "issues related to the regulation of GHGs under the CAA" and noted that we were in the process of evaluating avenues for addressing such concerns. *See* 73 FR at 34,084. These concerns were specifically related to the Prevention of Significant Deterioration and Title V permitting programs and the unmanageable permitting burden that we anticipated would arise should GHGs become subject to these programs as a result of regulation under the Act.

Since that time, we have issued regulations for GHG emissions under the CAA through the light duty vehicle rule (75 FR 25324, (May 7, 2010)) and have finalized the greenhouse gas "tailoring" rule (75 FR 31514 (June 3, 2010)) and the Johnson memo reconsideration (75 FR 17004 (April 2, 2010)). As a result of these actions, as of January 2, 2011, GHGs will become "subject to regulation" under the Act. Accordingly, the Agency has now finalized a framework addressing the concerns that were the basis of our decision not to propose standards of performance for GHG emissions from this industry at the time we proposed this 8-year review action.

Today's final rule does not include a standard of performance for GHG. There are two reasons for this. First, we did not propose such a standard. Promulgating such a standard without providing opportunity to comment on it would not be a logical outgrowth of the proposal and would, accordingly, violate the norms of notice and comment rulemaking. Second, we do not yet have adequate information about GHG emissions sufficient to set a standard. This information forms the basis of standards of performance, which must take into account achievability and cost of such controls.

This is not the end of the matter. To the contrary, based on our current knowledge we believe that it may be appropriate for the Agency to set a standard of performance for GHGs. We have historically declined to propose standards for a pollutant where it is emitting in low amounts or where we determined that a BDT analysis would result in no control. *National Lime Assoc'n* v. *EPA,* 627 F.2d at 426. Based on current information we do not believe such circumstances are present here. Without prejudging the outcome of a future regulatory process, we note the following considerations.

First, Portland cement is one of the largest stationary source categories of GHG emissions, ranking as the third highest U.S. source of CO_2 emissions. Second, based on our initial evaluation it appears that there are cost-effective control strategies for this source category that would provide an appropriate basis for establishing a standard of performance for GHG emissions. *See* 73 FR 44491, July 30, 2008. These control strategies include, for example, energy efficiency measures, reductions in cement clinker content, and raw materials substitution. There may be other cost-effective controls as well.

Based upon this preliminary evaluation, the Agency is working towards a proposal for GHG standards from Portland cement facilities. We are not, however, proposing such standards at this time because in order to develop proposed standards we need additional information on site specific factors that affect performance of these controls, where they are currently applied, and control costs. We would also solicit information on overall facility energy management practices. To this end, the Agency will be sending out information requests to fill these information gaps so that we are able to propose a standard addressing GHGs in a timeframe that would allow the regulated community to make sound investment decisions in response to these MACT and NSPS requirements.

2. What is our final action on the other emission limits in the NSPS?

We did not propose changes to the other emissions limits in the NSPS, such as materials handling operations. We received one comment recommending that we promulgate NSPS limits for clinker storage piles, raw materials handling, and baghouse fall-out. Open clinker piles are being regulated as part of the NESHAP as previously discussed. Materials handling operations are currently regulated under NESHAP. We believe baghouse fall out would be regulated as part of materials handling standards.

3. What other changes are being promulgated?

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 OOO). That language was appropriate because the NSPS only regulated PM, and the PM limits in the NSPS and NESHAP were identical. At proposal, where the proposed new source PM limits in the NSPS and NESHAP were different, we proposed to add 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 source 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.

This proposed language is still applicable even though in this final rule we are setting identical new source PM standards in the NSPS and NESHAP rule. For example, a cement kiln that is an existing source under NESHAP subject to the 0.04 lb/ton clinker emissions limit could potentially become modified under NSPS and also be subject to the 0.01 lb/ton clinker emissions limit. In addition, there is always a possibility that other situation may occur where a source is subject to differing emission limits under NSPS and NESHAP as a result of rule changes.

4. What are the final testing requirements under subpart F?

There are no PM, NO_X or SO_2 compliance testing requirements; compliance is based on the use of a continuous emissions monitor (*see* below).

5. What are the final monitoring requirements under subpart F?

To demonstrate compliance with the PM emission limits, we are amending the monitoring requirements to require the installation and operation of a PM CEMS. The reason for this decision was previously discussed. Because this requirement is also part of the Portland Cement NESHAP, it will also apply to existing kilns currently subject to the NSPS. Consequently, affected facilities under this rule are not subject to an opacity standard to monitor compliance with the final PM standard. The PM CEMS must be installed and operated in accordance with the requirements of § 60.63(g).

We are also adding monitoring requirements for all emission sources that are subject to the 10 percent opacity standard—that is, emission sources other than the kiln and clinker cooler. We are requiring that they meet the monitoring requirements for these same emission points contained in the Portland Cement NESHAP, 40 CFR part 63, subpart LLL in order to make the two rules consistent.

Under the final amendments, compliance with the emission limits for NO_X and SO_2 are also determined using continuous emissions monitoring systems (CEMS). The requirements for the installation, operation, and calibration of each CEM, including minimum data requirements, are specified in the requirements in § 60.63(k) and (l). Under the final amendments, the owner or operator of kilns that elect to comply with the alternative SO_2 emission limit of 90 percent reduction are required to continuously monitor SO_2 emissions at the scrubber inlet as well as the outlet. These are the same requirements proposed. We received no comments on the NO_X monitoring provisions. Commenters objected to the SO_2 monitoring requirement for facilities that do not require SO_2 controls, suggesting stack tests every five years instead. However, in these cases, it is possible that a source might change a raw material and significantly increase SO_2 emissions beyond the standard. If monitoring is not in place, these excess emissions could be unchecked for five years before they were discovered. We believe the cost of the SO_2 monitor ($56,000) is reasonable to prevent these excess emissions. These monitors are well established technology that are already installed on over 30 cement kilns, including those without SO_2 controls.

C. What is EPA's sector-based approach?

Sector-based approaches are based on integrated assessments that consider multiple pollutants in a comprehensive and coordinated manner to manage emissions and CAA requirements. One of the many ways we can address sector-based approaches is by reviewing multiple regulatory programs together whenever possible. This approach essentially expands the technical analyses on costs and benefits of particular technologies, to consider the interactions of rules that regulate sources. The benefit of multi-pollutant and sector-based analyses and approaches include the ability to identify optimum strategies, considering feasibility, costs, and benefits across the different pollutant types while streamlining administrative and compliance complexities and reducing conflicting and redundant requirements, resulting in added certainty and easier implementation of control strategies for the sector under consideration.

In order to benefit from a sector-based approach for the cement industry, EPA analyzed how the NESHAP under reconsideration relates to other regulatory requirements currently under review for Portland cement facilities. In this analysis we looked at how the different control requirements that result from these requirement interact, including the different regulatory deadlines and control equipment requirement that result, the different reporting and recordkeeping requirements, and opportunities for States to account for reductions resulting for this rulemaking in their State implementation plans. The requirements analyzed affect HAP and/or criteria pollutant emissions from cement kilns and cover the NESHAP reconsideration, area source NESHAP, and the NSPS revision and their collateral impacts on other programs such as New Source Review (NSR), Regional Haze and the National Ambient Air Quality Standards (NAAQS).

As a result of the sector-based approach, this rulemaking will reduce conflicting and redundant requirements by setting the same PM emission limit requirement for both the Cement NESHAP and the Cement NSPS. Also the sector-based approach facilitated the streamlining of monitoring, record keeping and reporting requirements on both rules reducing administrative and compliance complexities associated with complying with both regulations. In addition, the sector-based approach promotes a comprehensive control strategy that maximizes the co-control of multiple regulated pollutants (*i.e.,* mercury and HCl) while obtaining SO_2 and $PM_{2.5}$ emission reductions as co-benefits. These collateral SO_2 and $PM_{2.5}$ emission reductions may be considered for "netting" and "offsets" purposes under the major NSR program or as credits that could help areas around the country with attainment of the SO_2 or $PM_{2.5}$ NAAQS.

For more information on our sector's analyses, its benefits and interaction with NSR, NAAQS and Regional Haze please refer to the preamble of the proposal of this rule (74 FR 21159–61).

V. Responses to Major Comments

This section presents a summary of responses to major comments. A summary of the comments received and our responses to those comments may be found in Docket ID No. EPA–HQ–OAR–2007–0877 for subpart F and Docket ID No. EPA–HQ–OAR–2002–0051 for subpart LLL.

A. What are the significant comments and responses on 40 CFR part 63, subpart LLL?

Comment: Many industry commenters (2830, 2832, 2836, 2841, 2844, 2845, 2858, 2859, 2863, 2864, 2874, 2890, 2908, 2910, 2914, 2915, 2916, and 2917) stated that setting MACT floors on a pollutant-by-pollutant basis violates the law and results in MACT floors that bear no relation to emission limits that are being achieved at the best performing existing sources. According to industry commenters, this method violates the plain language and intent of section 112(d) of the Clean Air Act (CAA) and its effect is a MACT floor that reflects a standard that no one plant in existence currently achieves. Industry commenters 2832, 2841, 2844, 2845, 2846, 2910, 2914, 2915, and 2916 stated that section 112(d)'s use of the terms *best-performing* and *existing* clearly means that sources in a category or subcategory that are to be used to set the MACT floor are to be real, not theoretical or hypothetical, sources (42 U.S.C. 7412(d), 2006 and *Northeast Maryland Waste Disposal Authority,* 358 F.3d at 954). They further contend that the phrase *achieved in practice* can only mean that Congress intended actual sources, performing under real-life conditions, to be the benchmark for determining the MACT floors. Furthermore, the language of the statute does not speak in terms of the best-performing source or sources for each listed pollutant or group of pollutants (42 U.S.C. 7412(d)). Rather, the focus is on the best existing source or sources for all pollutants, and what these sources truly can achieve on an overall basis. Industry commenters argue that EPA's pollutant-by-pollutant methodology is also at odds with the legislative history underlying section 112(d) (S. Rep. No. 228, 101st Cong., 1st Sess. 169, 1989).

According to the industry commenters, the focus on overall performance is not surprising because in the 1990 CAA Amendments Congress abandoned section 112's previous focus on individual pollutant standards, and adopted the technology-based multi-pollutant approach to regulating toxics in use under the Clean Water Act (CWA). *See* S. Rep. No. 228, 101st Cong., 1st Sess. 133–34 (1989). Thus, if one source can achieve a firm degree of control for one pollutant but not for another, there may be no justification for including it in the set of sources from which the floor is calculated (*Tanners' Council of America* v. *Train,* 540 F.2d 1188, 1193 (4th Cir. 1976) deeming CWA effluent limitations guidelines not achievable where plants in EPA's database were capable of meeting the limitations for some, but not all, of the pollutant parameters).

Some industry commenters (2845, 2910) stated that EPA's previous use of a pollutant-by-pollutant analysis was based on authorities not applicable to the CAA. EPA attempted to defend its practice of establishing pollutant-by-pollutant MACT standards by citing *Chemical Mfr. Ass'n.* v *EPA,* 870 F.2d 177, 239 (1989), clarified 885 F.2d 253, 264 (5th Cir. 1989), cert. denied, 495 U.S. 910, (1990), a case where the Court held that, under the CWA, *best available technology* (BAT) referred to the single best-performing plant on a pollutant-by-pollutant basis.

According to industry commenters 2845 and 2910, EPA's reliance on *Chemical Mfr. Ass'n* is misplaced as the CAA's procedure regarding the selection of MACT technologies differs on a textual basis from the CWA's procedure for identifying best available technology. Under the CWA, BAT standards are to be set based on the best practicable control technology currently available. 33 U.S.C. 1311(b)(1)(A)(i)(2006). This has led to pollutant-by-pollutant determinations. The CAA more narrowly limits the basis for MACT designation to what has been achieved at existing sources, not what could be hypothetically achievable on a per-pollutant basis.

One industry commenter (2890) stated that EPA appears to be forgetting that the floor is only the first step in the process. Once EPA has established a floor based on physical sources, it is directed to go back and look at options beyond the floor. Those *beyond the floor* options would include the best control for each pollutant on every source. By correcting the floor approach, EPA would also correct the issue identified by Judge Williams in his concurring opinion to the Brick vacatur, where a floor that is designed to represent what has been achieved is more stringent than what would be deemed achievable under a MACT.

Response: We disagree with the commenters who object to setting MACT floors on a pollutant-by pollutant basis. Contrary to the commenters' suggestion, section 112(d)(3) does not mandate a total facility approach. A reasonable interpretation of section 112(d)(3) is that MACT floors may be established on a HAP-by-HAP basis, so that there can be different pools of best performers for each HAP. Indeed, as illustrated below, the total facility approach not only is not compelled by the statutory language but can lead to results so arbitrary that the approach may simply not be legally permissible.

Section 112(d)(3) is ambiguous as to whether the MACT floor is to be based on the performance of an entire source or on the performance achieved in controlling particular HAP. Congress specified in section 112(d)(3) the minimum level of emission reduction that could satisfy the requirement to adopt MACT. For new sources, this floor level is to be "the emission control that is achieved in practice by the best controlled similar source." For existing sources, the floor level is to be "the average emission limitation achieved by the best performing 12 percent of the existing sources" for categories and subcategories with 30 or more sources, or "the average emission limitation achieved by the best performing 5 sources" for categories and subcategories with fewer than 30 sources. This language does not address whether floor levels can be established HAP-by-HAP or by any other means. The existing source MACT floor achieved by the average of the best performing 12 percent can reasonably be read as referring to the source as a whole or to performance as to a particular HAP. The reference in the new source MACT floor provision to "emission control achieved by the best controlled similar source" can mean emission control as to a particular HAP or emission control achieved by a source as a whole.

Industry commenters also stressed that section 112(d) requires that floors be based on actual performance from real facilities, pointing to such language as "existing source", "best performing", and "achieved in practice". EPA agrees that this language refers to sources' actual operation, but we repeat that the language says nothing about whether it is referring to performance as to individual HAP or to single facility's performance for all HAP. Industry commenters also said that Congress could have mandated a HAP-by-HAP result by using the phrase "for each HAP" at appropriate points in section 112(d). Doing so would have removed ambiguity from section 112(d), but does not compel any inference that Congress was *sub-silentio* mandating a different result when it left the provision ambiguous on this issue. The argument that MACT floors set HAP-by-HAP are based on the performance of a hypothetical facility, so that the limitations are not based on those achieved in practice, just re-begs the question of whether section 112(d)(3) refers to whole facilities or individual HAP. All of the limitations in the floors in this rule of course reflect sources' actual performance and were achieved in practice.

The reason EPA has long adopted the interpretation that the existing and new source MACT floors are to be applied on a HAP-by-HAP basis are that a whole plant approach likely yields least common denominator floors—that is floors reflecting mediocre or no control, rather than performance which is the average of what best performers have achieved. *See* 61 FR at 173687 (April 19, 1996); 62 FR at 48363–64 (September 15, 1997) (same approach adopted under the very similar language of section 129(a)(2)). For example, if the best performing 12 percent of facilities for HAP metals did not control organics as well as a different 12 percent of facilities, the floor for organics and metals would end up not reflecting best performance. For new sources, not only would the floor reflect unoptimized control, but EPA would have to make some type of value judgment between control of organics and metals just to decide which source was best controlled.[40]

Commenters provided no description of how their total facility approach would work in practice. Would a source that is a best performer for PM and worst for other HAP be in the pool? Would there be some overall summing of where the kiln fell for each pollutant? Would there have to be value judgments made among pollutants (is being a best performer for mercury worth more than for PM in a ranking process)? EPA evaluated an approach whereby every kiln was ranked for performance for each HAP and the results were summed with the lowest overall score being the best performer, and next lowest the second best, *etc.* (among other things yielding a tie for best performer with no non-arbitrary way to break the tie). Using this approach, and with the three lowest ranked kilns as the average of the best performers, standards (after applying the UPL equation) would be approximately 65 lb/MM tons of clinker for mercury, 90 ppm for THC (nearly four fold increase), and 0.12 for PM (over an order of magnitude increase). All but one kiln in the data base already meets the THC standard, 21 of 89 kilns would meet the mercury limit, and 27 of 46 kilns have stack test measurements less than the 30-day value for PM. *See* memorandum, "Total Facility Approach for Setting MACT Floors", August 6, 2010.[41] These inflated values, and especially the drastically inflated THC and PM values, simply do not reflect best performance.

These types of results are at odds with Congress' purpose in adopting MACT floors. The central purpose of the amended air toxics provisions was to apply strict technology-based emission controls on HAPs. *See, e.g.,* H. Rep. No. 952, 101st Cong. 2d sess. 338. The floor's specific purpose was to assure that consideration of economic and other impacts not be used to "gut the standards. While costs are by no means irrelevant, they should by no means be the determining factors. There needs to be a minimum degree of control in relation to the control technologies that have already been attained by the best existing sources." A Legislative History of the Clean Air Act *Vol. II* at 2897 (statement of Rep. Collins). An interpretation that the floor level of control must be limited by the performance of devices that only control some of these pollutants effectively "guts the standards" by including worse performers in the averaging process, whereas EPA's interpretation promotes the evident Congressional objective of having the floor reflect the average performance of best performing sources. Since Congress has not spoken to the precise question at issue, and the Agency's interpretation effectuates statutory goals and policies in a reasonable manner, its interpretation must be upheld. *See Chevron* v. *NRDC,* 467 U.S. 837 (1984).[42]

It is true that legislative history can sometimes be so clear as to give clear meaning to what is otherwise ambiguous statutory text. As just explained, EPA's HAP-by-HAP approach fulfills the evident statutory purpose and is supported by the most pertinent legislative history. A few

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[40] Another industry commenter (2859) stated that it had three sources which were best performers for mercury and three other sources which were best performers for PM but that each would need to make upgrades for the pollutant not currently fully controlled. EPA views this as another least common denominator example whereby each of the floors would be diluted due to the coincidence that facilities are not optimizing control of all their emitted pollutants. See also Petitioners Brief in *Medical Waste Institute et al.* v. *EPA,* No. 09–1297 (DC Cir.) pointing out, in this context, that "the best performers for some pollutants are the worst performers for others" (p. 34) and "[s]ome of the best performers for certain pollutants are among the worst performers for others."

[41] This example could have been more extreme. One of the ultra-high mercury emitting sources is nearly a best performer for HCl (it is just outside the pool of three best performers). Inclusion as a best performer, under some methodologies, would have added these mercury emissions to the pool of "best performers", even though, for mercury, performance is the worst.

[42] Since industry commenters argued that the statute can only be read to allow floors to be determined on a single source basis, commenters offered no view of why their reading could be viewed as reasonable in light of the statute's goals and objectives. It is not evident how any statutory goal is promoted by an interpretation that allows floors to be determined in a manner likely to result in floors reflecting emissions from worst or mediocre performers.

industry commenters nonetheless indicated that a HAP-by-HAP approach is inconsistent with legislative history to section 112(d), citing to page 169 of the Senate Report. Since this Report was to a version of the bill which did not include a floor provision at all (much less the language at issue here), it is of no relevance. *National Lime II,* 233 F. 3d at 638.

Other industry commenters pointed out correctly that the section 112(d) air toxic provisions were modeled on the technology-based control scheme for water toxics in the Clean Water Act. S. Rep. No. 228, 101st Cong. 2d sess. 133–34. However, a HAP-by-HAP approach to standard setting has actually been adopted and upheld under the Clean Water Act. Section 301(b)(2)(A) of the Clean Water Act requires plants to control discharges of toxic pollutants to a degree reflecting performance of "best available technology economically achievable." In *Chemical Manufacturers Ass'n* v. *EPA,* 870 F. 2d 177, 238 (5th Cir. 1989) the Court held that this requirement could permissibly be applied on a pollutant-by-pollutant basis:

> The legislative history of the CWA indicates that the "best available technology" refers to the single best performing plant in an industrial field. The EPA urges that because the Act and the legislative history do not provide more particular guidance, it was free to determine the "best" plant on a pollutant-by-pollutant basis. The Supreme Court has stated that "it is by now commonplace that 'when faced with a problem of statutory construction, this Court shows great deference to the interpretation given the statute by the officers or agency charged with its administration.'" This Court defers to the EPA's interpretation of the Act. The EPA's interpretation of the Act is rational and is not precluded by the legislative history" (internal citations omitted).

The Court reaffirmed its holding on this issue at 885 F. 253, 264 (5th Cir. 1989).

Industry commenters stated that the Clean Water Act requirement of Best Available Technology Economically Achievable and Best Practicable Technology is not the same as the Clean Air Act's requirement of maximum achievable control technology. These distinctions do not seem pertinent to the issue at hand. Both statutes require technology-based performance to control all toxics discharged or emitted, and both require standards to be achievable. The legislative history to section 112(d) makes clear that the CAA provisions are modeled after those in the Water Act (as industry commenters correctly noted). EPA does not see any more certainty in the CWA than in the Clean Air Act on this point and believes its interpretation that a pollutant-by-pollutant approach is justified is as reasonable under section 112(d)(3) of the CAA as it is under section 301(b)(2) of the Clean Water Act.[43]

Industry commenters also noted that EPA retains the duty to investigate and, if justifiable, to adopt beyond the floor standards, so that potential least common denominator floors resulting from the whole facility approach would not have to "gut the standards." That EPA may adopt more stringent standards based on what is "achievable" after considering costs and other factors is irrelevant to how EPA is required to set MACT floors. MACT floors must be based on the emission limitation achieved by the best performing 12 percent of existing sources, and, for new sources, on the level achieved by the best controlled similar source, and EPA must make this determination without consideration of cost. At best, standards reflecting a beyond-the-floor level of performance will have to be cost-justified; at worst, standards will remain at levels reflecting mediocre performance. Under either scenario, Congress' purpose in requiring floors is compromised.

EPA notes, however, that if optimized performance for different HAPs is not technologically possible due to mutually inconsistent control technologies (for example, metals performance decreases if organics reduction is optimized), then this would have to be taken into account by EPA in establishing a floor (or floors). The Senate Report indicates that if certain types of otherwise needed controls are mutually exclusive, EPA is to optimize the part of the standard providing the most environmental protection. S. Rep. No. 228, 101st Cong. 1st sess. 168 (although, as noted, the bill accompanying this Report contained no floor provisions). It should be emphasized, however, that "the fact that no plant has been shown to be able to meet all of the limitations does not demonstrate that all the limitations are not achievable." *Chemical Manufacturers Association* v. *EPA,* 885 F. 2d at 264 (upholding technology-based standards based on best performance for each pollutant by different plants, where at least one plant met each of the limitations but no single plant met all of them).

All available data for cement kilns indicate that there is no technical problem achieving the floor levels for each HAP simultaneously, using the MACT floor technology. For most kilns, compliance with the mercury limits will be accomplished using activated carbon injection followed by a second PM control consisting of a fabric filter. There is no technical impediment to using this same system for control of THC (or organic HAP). Note that the ACI system would have to be installed downstream of the existing PM control, therefore there would be no effect on the cement kiln dust collected in the existing PM control. One industry commenter claimed that carbon is not effective on mercury and THC at the same time. However, we see no basis for that statement as long as the correct type of carbon is used. Another industry commenter claimed ACI increases dioxin emissions. Considering the fact that ACI can actually be used to remove dioxins from kiln exhaust gas, we see no basis for that statement either.

After the ACI system, a wet scrubber can be used for HCl control. We would expect the wet scrubber to be the downstream control because it creates a moisture laden exhaust that would require reheating to then apply ACI. Again, there is no technical impediment to adding a wet scrubber after the ACI system, and the two control devices should not interfere with each other's performance. If the facility required an RTO to meet the THC limit, the RTO would be installed downstream of the wet scrubber in order to protect the RTO from any acid gases in the kiln exhaust. The wet scrubber/RTO combination has been demonstrated in cement kiln applications.

In order to meet the PM standard a facility could choose to modify their

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[43] One industry commenter cited *Tanners' Council of America* v. *Train,* 540 F. 2d 1188, 1193 (4th Cir. 1976) for the proposition that technology-based effluent limitation guidelines under the Clean Water Act are not considered achievable "where plants in EPA's database were 'capable of meeting the limitation for some, but not all, of the pollutant parameters'". *Tanners' Council* involved a situation where EPA established standards for one source category based on a transfer of performance information from a different, unrelated source category. 540 F. 2d at 1192–93. Since the wastewater from the category from which the limits were transferred was easier to treat than tannery wastewater, the court was skeptical of EPA's undocumented assertions that the transfer of performance data (with certain upward adjustments) was permissible. *Id.* None of these circumstances apply here. EPA is not transferring performance from another category, but basing limits on documented performance of cement kilns. In addition, as noted in earlier preamble text, all of the kilns in the pool of best performers for each HAP is meeting the limit for that HAP, a strong showing of technical feasibility and technical achievability. Cf. *CPC International* v. *Train,* 540 F. 2d 1329, 1333 (8th Cir. 1976); *American Meat Inst.* v. *EPA,* 526 F. 2d 442, 458, 459 (7th Cir. 1975). Further, as discussed in the final part of this comment response, EPA has closely examined and is unaware of any situation whereby optimized performance for one HAP interferes with or otherwise precludes or impedes optimized performance for another.

existing PM control to meet the new limit, or design the baghouse downstream of the ACI injection point to meet the PM limit.

Though we have described some fairly complicated control scenarios, there are simpler applications of control technology that would likely be utilized successfully. One example would be simultaneous injection of alkaline materials (lime or sodium compounds) and activated carbon downstream of the existing PM control device followed by collection with a fabric filter. This type of injection scheme would potentially control acid gases (HCl and SO_2), THC (or organic HAP) mercury, and PM.

Industry commenters made much of the fact that no single facility is presently achieving all of the HAP limits proposed. But this only shows that plants will need to reduce their emissions of certain HAP to meet standards reflecting average of best industry performers for that HAP.

Impacts of Pollutant-by-Pollutant Approach

Comment: Industry commenters 2831, 2844, 2845, and 2874 stated that in evaluating the economic cost of achieving emission reductions, looking at one plant's emission control of only one pollutant to the exclusion of all other emission controls produces a disjointed view of cost implications and compliance feasibility. While an individual MACT floor for one pollutant might not appear cost-prohibitive, when combined with all of the other MACT floors for other pollutants, the total cost implications could become especially onerous. While the CAA was authored with the intent of reducing air pollution, Congress did not intend to disrupt the *productive capacity* of the United States through the promulgation of economically unachievable standards. 42 U.S.C. 7401(b)(1)(2006). By setting MACT floors individually and ignoring the collective cost implications of the entire NESHAP, EPA would effectively disregard the CAA's requirement that air pollution control be advanced while promoting the nation's *productive capacity. Id.*

Response: EPA is forbidden by law from considering costs in determining MACT floors. *NRDC* v. *EPA,* 489 F. 3d 1364, 1376 (DC Cir. 2007); *National Lime,* 233 F. 3d at 640. Although one of the overall goals of the Act is to protect and enhance the quality of the Nation's air and resources so as to promote the public health and welfare and the productive capacity of the population," CAA section 101 (b) (1), this overall goal does not somehow authorize EPA to adopt floors that either consider costs (overall or otherwise) or to base floors on other than what best performers achieve.

2.3.3 Lowest Emitters as Best Performers

Comment: One industry commenter (2834) stated that the Brick MACT ruling of the DC Circuit Court reinforces earlier holdings in *National Lime Association* vs. *EPA.* The Court again held that floors are to be based on the emission level actually achieved by the best performers (those with lowest emission levels), not the emission level achievable by all sources.

Response: In this rule, EPA is choosing as best performers those sources with lowest emissions of each HAP, on a normalized basis, with sources' variability taken into account in assessing which had the lowest emissions.

Comment: Many industry commenters (2841, 2844, 2845, 2846, 2858, and 2914) stated that EPA established its proposed floors equating best performing sources with those that have the lowest emissions for particular HAPs even though there are other ways to measure performance and, in some cases, other methodologies may comply with the statute where the "lowest emitter" approach does not. Industry commenter 2845 noted that equating best performer with lowest emitter contravenes a Congressional directive that, in developing MACT standards, EPA cannot require substitution of raw materials in mineral processing industries, such as cement manufacturing, quoting the Joint Explanatory Statement of the Committee of Conference for the 1990 CAA Amendments stated: For categories and subcategories of sources of [HAPs] engaged in mining, extraction, beneficiation, and processing of nonferrous ores, concentrates, minerals, metals, and related in-process materials, the Administrator shall not consider the substitution of, or other changes in, metal- or mineral-bearing raw materials that are used as feedstocks or material inputs * * * in setting emission standards, work practice standards, operating standards or other prohibitions or requirements or limitations under this section for such categories and subcategories. H.R. Rep. No. 101–952, at 339 (1990). According to the industry commenters, enormous amounts of limestone are fed into a kiln to manufacture clinker, and it is cost-prohibitive to import limestone from further away. If the plant's quarry contains limestone with high concentrations of mercury or high concentrations of organics, the kilns will emit more mercury or THC and potentially more organic HAPs. Because limestone with high mercury or organic emissions will result in higher HAP emissions, and it is not cost-effective to import limestone from far away, equating the lowest emitters with the best performing sources makes no sense in the context of cement facilities. It also would be squarely in opposition to the Joint Explanatory Statement.

Response: The industry commenter is citing to the "Joint Explanatory Statement" that accompanied the Conference Committee Report to the 1990 Clean Air Act Amendments. This legislative history is of limited utility here. As explained at 353 F. 3d 388: "The Joint Explanatory Statement describes how the differences between the Senate and House were resolved in the Conference Committee * * *. The Joint Explanatory Statement may be helpful in determining Congress's intent, but does not carry the same weight as the Conference Committee Report itself." *See* id. at 236–37. If there were some ambiguity in the statute, the Joint Conference Committee Report could shed some light on Congress' intent, but there is no exception to section 112(d)(2)(A)'s requirement that EPA consider "substitution of materials" for each source category. Thus, the statement cannot be read to negate the express statutory command that MACT is to be based on, among other things, measures, processes, or systems which reduce the volume of pollutant emissions through substitution of materials or other process modifications. Indeed, EPA's attempts to identify best performers by ignoring the contribution of raw material inputs have been soundly rejected. *Brick MACT,* 489 F. 3d at 882–883. In fact, brick and ceramic production, like Portland cement production, involves extraction of mined material from a quarry located proximate to the production facility because transport of raw material over long distances is "infeasible". 489 F. 3d at 879. The language from the Joint Explanatory Statement no more allows EPA to ignore raw material contribution to Portland cement plants' HAP emissions than it did raw material HAP contributions to brick and ceramic plants' HAP emissions.

Comment: Industry commenter 2844 stated that EPA could interpret section 112(d)(3) as *Brick MACT* appears to do, as one unitary concept meaning sources with the lowest emission levels, or EPA can interpret it as a more complex concept that EPA may determine the emission control (using any of the various definitions in the CAA) that sources have achieved in practice (as estimated by reasonably predictive variability factors) and rank them according to their relative emissions levels (*i.e.,* a quantitative measure of achievement). Having done so, the Agency can then evaluate each of the lowest emitters in terms of whether they meet the Agency's criteria for best controlled similar source. With regard to best controlled, EPA may evaluate this from a purely quantitative angle (lowest emissions) or from more qualitative aspects, reduction efficiency, environmental and health (or cross-media) impacts, cost-effectiveness of reductions achieved, impacts on other HAP or pollutant emissions, and so on.

Industry commenter 2845 provided several examples of judicial MACT decisions endorsing a technology approach to setting the standards, in which EPA selected the best performing sources based on the relative performance of air pollution control technology.

Industry commenter 2844 stated that EPA also has the discretion to define best performers as sources other than those with the lowest achieved emission levels. In the current proposal, the many difficulties associated with evaluating the impact of HAP content in the raw material inputs to mercury emission control and other factors could support a decision by the agency to establish a standard based on efficiency (*i.e.,* a percent reduction standard) if not for the source category as a whole, then such a standard might be established for a particular subcategory as relevant, or as an alternative compliance strategy. EPA's discretion is sufficiently broad to encompass many reasonable decisions identifying and estimating the emission control of best performing sources on bases other than lowest emissions data, assuming the floor for the standard is based on a reasonable methodology estimating the percent reduction achieved in practice by the best performing sources under the reasonably foreseeable worst operating conditions.

Industry commenter 2844 stated that before EPA can determine a floor, EPA must define the following terms in regard to the selection of a best performer for new sources: Emission control; Achieved in practice; Best controlled; and Similar source.

To set the floor for existing sources, the industry commenter stated that EPA should define the following terms: Average emission limitation; Achieved; and Best performing.

Response: EPA must make determinations in each standard as to each of these terms and has done so here. In this rule, EPA is determining that the best controlled similar source is the source with the lowest emissions of the HAP in question on a normalized basis (for mercury and PM), and on a concentration basis (for THC and HCl) considering variability in determining both which source is best controlled and in estimating its achieved performance. EPA is adopting the same approach for existing sources in determining which are the 12 percent of best performing sources and the performance they achieve. This approach accounts for all HAP inputs and outputs (*i.e.,* accounts for HAP in all raw material and feed inputs as well as all emission controls), and is consistent with the case law.

With regard to the comment stating that the standard could be expressed as a per cent reduction, the industry commenter did not explain how this can be done without negating the contribution of HAPs in feed and fuel input into plant performance. Most particularly, for HAP which are uncontrolled, mercury being the chief example in this rule, there is no removal efficiency to evaluate. Moreover, even for HAP which are controlled, plants with higher removal efficiencies may also be the highest emitters if the levels of the inputs to the control device is high. For these reasons, EPA is not evaluating best performers based on removal efficiencies in this rule.

Comment: Industry commenters 2832, 2846, and 2890 stated that rather than selecting sources with the lowest emissions for particular HAP as best performing sources, EPA could use the relative performance of air pollution control technology to select the best performing sources, applying the best reasonable method for determining best-performers, which does not necessarily have to equate to lowest emissions.

Response: EPA discussed this issue at some length at proposal. *See* 74 FR at 21149. The problem with equating best performance with performance of pollution control alone is that it ignores the contribution of raw materials and fuels to HAP emissions. Basing standards exclusively on performance of control technology is legally permissible when the control technology is the sole factor influencing performance, which is not the case here. *National Lime,* 233 F. 3d at 633–34. EPA thus is not adopting these industry commenters' approach. *See* previous response as well.

Comment: Several industry commenters (2845, 2846, 2874, and 2915) stated that EPA is proposing to calculate MACT floors by averaging the top 12 percent of sources for which CEMS data are available (even if that amounts to less than 30 sources), rather than by considering the top 12 percent of sources for which EPA has emissions information. As a result, EPA is proposing to establish the MACT floor based on data from only 2 sources. The industry commenters stated that CAA section 112(d) obligates EPA to set the MACT floor looking at no fewer than 5 sources, recognizing the value of relying on the maximum amount of data available.

Industry commenter 2841 stated that the use of a minimum of five facilities should be adopted in the establishment of THC standards as well as the other standards in this proposed regulation. The establishment of requirements based on a small amount of data would run counter to the intent of the CAA in utilizing data that is truly representative of the best-performing facilities throughout an entire industry.

Industry commenter 2841 stated that in previous MACT rulemakings, EPA used the five best performing facilities if the number of facilities was less than 30. Consistent with these prior rulemakings, the industry commenter stated that this approach should be used for this proposed Portland Cement NESHAP rule and that EPA needs additional data points in order to appropriately set limits for the industry as a whole.

Response: EPA believes that it has discretion to use the data which most accurately measure sources' performance, which for THC case are data obtained from CEM-equipped sources. EPA also believes that it has a reasoned technical basis for not combining CEMS data with non-CEM data, since this would be a classic apples-to-oranges comparison due to the difference in measuring times and methods. EPA does not agree that section 112 (d)(3) mandates a minimum of 5 sources in all instances, notwithstanding the incongruity of having less data to establish floors for larger source categories than is mandated for smaller ones. The literal language of the provision appears to compel this result.

Comment: One environmental advocacy group commenter (2898) supported EPA's decision to not rank best performers based on their relative mercury removal efficiency. Relying on mercury removal efficiency in setting the MACT floor for the Portland cement manufacturing industry would downplay the role of HAP inputs on emissions. EPA characterizes *Brick MACT's* statement that best performers are those emitting the least HAP as appearing arguably in dicta. However, the Brick MACT Court itself characterizes the statement as the holding of the *Cement Kiln* case. *Brick MACT,* 479 F.3d at 880 (relying on Cement Kiln's holding that § 7412(d)(3) requires floors based on the emission level actually achieved by the best performers or those with the lowest emission levels). The proposed alternative of setting the MACT floor on the basis of percentage of emission reduction achieved by sources would minimize, if not eliminate, the consideration of cleaner inputs in setting MACT floors, as EPA acknowledges, and is therefore contrary to statutory dictates and case law.

Response: EPA agrees that the chief legal issue with a percent reduction approach for expressing floors is that it undervalues the role of HAP inputs. EPA is not adopting that approach in this rulemaking.

Comment: Several industry trade association commenters (2831 and 2901) stated that EPA retains considerable discretion on how to set MACT floors. The commenters supported the Agency's authority to set floor standards based on control efficiency, or any method as long as their method reasonably estimates the performance of the relevant best performing plants. There is nothing in the Court's decisions that requires EPA to use the straight-emissions approach favored in this rule. The commenter stated that the Court has expressly decided that a straight emissions or arithmetical methodology is not required. EPA's technology based approach that estimated performance rather than deriving the standards through an arithmetic-straight emissions approach is supported by the Courts, as long as it results in a reasonable estimate of the performance of the best controlled units. According to the commenter (2901), *Brick MACT* does not endorse a straight emissions approach; nor could it. To do so would mean that the *Brick MACT* Court was overturning the Chevron step one holding in *Sierra Club* and *National Lime II,* something that it cannot do.

Response: EPA is adopting the straight emissions (so-called) approach in this rulemaking and believes that the approach is permissible under the statue and case law. Commenters also did not convincingly address the issue of how the alternative approaches they mention account for HAP inputs. Moreover, *Sierra Club* and *National Lime II* make clear that a straight emissions approach may not be mandated under the language of the statute, but also make clear that there must be a reasoned basis for estimating which performers are best. *National Lime II,* and later *Brick MACT* further make clear that contribution of HAP inputs in raw materials and fuels must be accounted for in making best performer determinations. *See* 233 F. 3d at 634, 639; 479 F. 3d at 882–83. Each panel viewed these holdings as consistent with the *Chevron* analysis in *Sierra Club.* 233 F. 3d at 631–32, 633–34; 479 F. 3d at 878.

Comment: One industry commenter (2844) stated that the CAA requires that lawfully promulgated NESHAP standards must be achievable. Section 112(d)(2) of the Act requires EPA to establish emission standards for HAPs that require the maximum degree of reduction in emissions taking into consideration the cost of the emission reduction and non-air quality health and environmental impacts and energy requirements, that the EPA Administrator determines is achievable for new or existing sources. Further, House Rep. 101–490, Part 1 (328) stated that "The Committee expects MACT to be meaningful, so that MACT will require substantial reductions in emissions from uncontrolled levels. However, MACT is not intended to require unsafe control measures, or to drive sources to the brink of shutdown." The commenter noted that the proposed Portland cement proposed NESHAP standards do not comply with § 112's achievability requirements.

Response: The industry commenter refers to legislative history to versions of the 1990 amendments which did not include floor requirements, so it is not directly applicable in interpreting the enacted provisions. Moreover, as held repeatedly by the DC Circuit, the "achievability" requirement in section 112 (d)(2) does not alter the minimum level of stringency requirements mandated by section 112 (d)(3)'s requirements. *See, e.g., Cement Kiln Recycling Coalition,* 255 F. 3d at 861–62.

Comment: Industry commenter 2844 stated that EPA's conclusion that section 112(d)(3) and/or *Brick MACT* requires or even permits the Agency to ignore the achievability requirements of section 112(d)(2) is an unreasonable reading of the statute and of *Brick MACT.* The Agency retains more than sufficient discretion to devise NESHAP standards that successfully bridge the tension between achieved and achievable in section 112's standard-setting provisions by appropriately using both subcategorization and variability methodologies.

Response: EPA believes that variability needs to be assessed in order to accurately measure both which performers are best and what their performance is. However, authority to subcategorize is discretionary and need not be exercised where there are rational grounds not to do so, such as not authorizing emissions of large amounts of a dangerous neurotoxin. *See also* previous response.

Comment: Industry commenter 2844 stated that EPA's floor setting methodology does not comply with three of *Brick MACT's* requirements: Floors must be based on emissions achieved in practice by best-performing sources; EPA's use of variability factors and methodologies to adjust reported emissions data must be based on demonstrated relationships, so that the floor setting methodology serves to reasonably estimate or predict the performance of the best performing sources; and EPA must consider the impact of nontechnology factors, such as raw material and fuel inputs, on a source's emission control levels.

Industry commenter 2844 stated that in the Portland cement proposal, EPA set MACT floor levels that reflect the specific conditions at the time the data were generated and do not include any of the operational variability. The commenter suggests that EPA must look beyond its snap shots of performance to make a reasoned evaluation and estimation of all operating conditions and factors that might impact the level of actual emissions from those kilns in practice, and adjust their reported short term test data appropriately. EPA can and should adjust raw emissions results to estimate sources' achieved emissions levels when setting MACT floors and standards. Since Brick MACT, EPA's methodology now must be able to reasonably estimate the impacts of variability associated with both technological and nontechnological factors over the full range of circumstances.

Response: EPA disagrees that it has based the floors for any of the HAP on snapshot levels of performance and has not accounted for potential variability in sources' performance. Each of the floors reflects a reasonable estimate of what the best performing sources (or source) will achieve over time. Also, each of the floors considers the impact of non-technology factors, notably HAP inputs in raw materials and fuels, on the source's emissions.

Specifically, for mercury the standard reflects 30 days of data for all mercury inputs, reasonable estimates of control device performance (for the few controlled sources), plus a reasonable statistical methodology to account for variability (including variability of mercury content of kiln inputs). EPA also used a pooled variability factor (pooling variability for all kilns in the

MACT pool), which increased variability estimates. Where commenters provided data showing that kilns' performance was underestimated because different inputs were used outside the sampling period, EPA adjusted those emissions estimates. EPA also used data on variability of kilns quarrying limestone from the same geologic formation as two of the best performing kilns to estimate intra-quarry variability of those two best performing kilns, and further applied this variability as part of the pooled variability. *See* IV.A.1.c of this preamble and 74 FR at 21142–44.

The standard for THC reflects hundreds of observations gathered continuously over time using a CEMS yielding a data set from which variability can be calculated directly. *See* IV.A.1.d of this preamble.

The floors for HCl are set at the minimum reliable quantification level, which is a factor of three above the actual measured levels, and are averaged over 30 days as well. EPA believes this fully accounts for performance variability.

Floors for PM are based on multiple stack measurements which have been adjusted by reasonable statistical methodologies to account for variability. *See* IV.A.1.f of this preamble, responding to the argument that measurement by means of a CEM makes the standard more stringent. Moreover, the PM standard reflects performance of fabric filters with membrane bags, which are known to perform independent of inputs and to have relatively small operating variability. 72 FR at 54879 (Sept. 27, 2007); 70 FR at 59449 (Oct. 12, 2005).

Consequently, for each HAP, EPA is assessing sources' performance over time in a reasonable manner and is not ignoring their operating variability.

Comment: Industry commenter 2844 also stated that EPA adopted a floor setting methodology that is based on using lowest reported emission results with minimal variability adjustments to estimate emission control achieved in practice by best performing sources. EPA considered test-to-test variability, but did not consider the inherent variability due to raw materials, product mix, fuels, operating conditions and plant types. The industry commenter stated that EPA has not evaluated or validated whether its methodology accurately estimates emissions control achieved in real world circumstances at sources.

Response: This industry comment is inaccurate on a number of counts. First, the statistical methodology used to estimate variability depends on the distribution of data to which the formula is applied. Any variation in that data—be it due to differences in raw material concentration, fuel composition, or device operation—is thereby accounted for. Indeed, the data base for mercury consists virtually entirely of raw material and fuel mercury levels from which emissions are projected on a worst case, mass balance basis (since virtually no kiln controls its mercury emissions). Consequently, EPA's methodology does evaluate variability of inputs as well as product mix, fuels, operating conditions, and does not just evaluate control device operating variability as the commenter maintains. Second, for mercury and THC, EPA gathered data over time, as explained in the preamble and in the previous response. Third, for mercury, industry had ample opportunity to provide longer term sampling data and (with a few exceptions, which EPA evaluated and accepted) did not do so. Fourth, use of a pooled variability factor (which for mercury includes the reasonably estimated long-term intra-quarry variability of the two best performers extrapolated to all other sources in the MACT pool) further accounts for long term variability.

Comment: Industry commenter 2844 stated that EPA cannot evaluate floors using methodologies that focus exclusively on technology if the resulting standards do not reflect actual average limitation[s] achieved (*Brick MACT,* 479 F.3d at 882). The industry commenter concludes that *Brick MACT* requires EPA to address the role of non-technological factors that impact emissions in setting floors and EPA must develop a methodology that accurately estimates the actual emissions achieved in practice by the best performing sources under a variety of operating conditions, taking into consideration testing and technological and non-technological variability. As proof that EPA failed to properly account for sources' variability in setting the standards, the industry commenter (and industry commenter 2845) included a chart purporting to demonstrate that the kilns comprising the pool of best performers for each HAP could not themselves meet the proposed standard.

Response: EPA believes that its methodology reasonably estimates the variability of the best performing sources, taking into account both technological (emission control device) and non-technological (varying inputs) variability. EPA disagrees that the record shows that the kilns comprising the MACT pool for each floor cannot themselves meet the promulgated standards (*see* previous response). In fact, for each pollutant, the record indicates that every kiln in the MACT pool (not just the kilns below the average of the best performers) would be in compliance. *See* section IV.A.1.b above.

Comment: One industry commenter (2845) stated that case law and policy dictate that EPA must consider variability in establishing MACT standards, and the approach used by EPA in Prevention of Significant Deterioration (PSD) permitting should also apply in establishing MACT standards. To evaluate the emission limits achieved by existing sources, EPA is required to develop methodologies for estimating the variability associated with all factors that impact a source's emissions, including process, operational and non-technological variables (*see Nat'l Lime Ass'n* v. *EPA,* 627 F.2d 416, 443, DC Cir. 1980). While Courts have affirmed EPA's authority to choose a methodology designed to estimate emissions in setting the MACT floor, the Courts have also made clear that EPA's method must allow a reasonable inference as to the performance of the top 12 percent of units (*Cement Kiln Recycling Coalition* v. *EPA,* 255 F.3d 855, 862 (DC Cir. 2001)) (citing *Sierra Club* v. *EPA,* 167 F.3d 658, 663, DC Cir. 1999). Accordingly, the Court of Appeals for the DC Circuit has stated that EPA must show not only that it believes its methodology provides an accurate picture of the relevant sources' actual performance, but also why its methodology yields the required estimate (*Cement Kiln Recycling Coalition,* 255 F.3d at 862).

Response: EPA agrees that sources' variability should be accounted for both in determining which sources are best performers and what their achieved performance is. EPA also believes that it has reasonably accounted for sources' variability here, including both variability in inputs and operating variability.

Comment: Industry commenters 2844, 2845, and 2916 objected to EPA's interpretation of CAA Sections 112(d)(2) and 112(d)(3) and the *Brick MACT* opinion (Industry commenter 2845 provided a white paper as an appendix to their comments for the HWIMI MACT proposal, dated December 01, 2008.). The paper, titled "Implications of the Brick MACT Decision on EPA's Discretion in Setting MACT Floors," discusses variability at some length. The paper's main points were:

- The Agency has chosen to focus on setting MACT floors based on lowest emitting sources derived from limited test results that are not appropriately adjusted to account for stack test variability.

- The *Brick MACT* decision holds that EPA must base MACT floors on achieved emissions control rather than control technology, but it does not require EPA to ignore operational variability in determining those floors. Variability methodologies must reasonably estimate or predict emissions or variability through a demonstrated relationship between the data used and the performance intended to be estimated. Non-technological factors (*i.e.,* raw materials and fuel) must be considered in determining emission control achieved by best performers. It is within EPA's discretion to define the best performing sources.
- EPA should estimate variability in determining achieved emissions. The Agency can and must seek appropriate data from regulated entities and other stakeholders, and to develop appropriate fact-based estimating methodologies on the data available.

Response: EPA largely agrees with these general points and believes that it has adhered to these concepts in the final rule. EPA has also implored, and in many instances, compelled (through section 114 letters) industry to provide additional data to better gauge sources' performance.

Comment: A number of commenters including 2844 and 2845 argued that EPA should use an Upper Tolerance limit (UTL) rather than Upper Predictive Limit (UPL) statistical methodology to assess variability.

Response: EPA disagrees. An Upper Tolerance Limit is ordinarily utilized for large data sets and is intended to assure that predicted values are lower than a single highest observation. R. (Gibbons, Statistical Tolerance Limits for Ground-Water Monitoring,Vol. 29, No. 4, Ground Water, July–August, 1991) This methodology is intended to produce values that do not underestimate variability but for this reason tends to produce inflated predictions when applied to data sets containing multiple observations, which is the case for the MACT pools for each HAP in this rulemaking. This methodology would therefore overestimate performers' variability as applied in this rulemaking and EPA is therefore not utilizing it. EPA understands that they no longer regard use of UTL statistical methodology as necessitated here.

Comment: Several industry commenters (2832 and 2859) opposed the approach taken by EPA in its beyond-the-floor MACT analysis. Among other things, EPA failed to consider the creation of incremental greenhouse gas emissions associated with the construction, installation and operation of new emissions control equipment, and the minimal incremental environmental benefit associated with those controls. Also, EPA failed to consider the cost of carbon credit purchases by the industry.

Response: In all cases we declined to adopt beyond-the-floor standards based on consideration of costs, technical feasibility, and consideration of nonair environmental impacts. Evaluating other disbenefits for an option already rejected would have no purpose.

Comment: Many industry commenters (2830, 2845, 2846, 2855, 2858, 2859, 2879, 2887, and 2890) stated that CEMS are not a proven technology and should not be required to determine compliance.

Industry commenters 2588, 2844, 2845, 2846, 2858, and 2890 stated that EPA has no data showing that mercury CEMS are feasible on cement kilns and that emissions from cement kilns will likely be outside of the range of the current CEMS technology. The industry commenters stated that EPA must evaluate mercury CEMS through long-term field trials at cement plants in accordance with the proposed performance specifications and quality assurance procedures before imposing this regulatory requirement. The industry commenters proposed a mass-balance approach for monitoring, which is accurate and was used by EPA in setting the mercury standard.

Industry commenter 2855 stated that mercury sorbent trap monitoring systems have not been evaluated through long term field trials at cement plants in the United States (U.S.) in accordance with the proposed performance specifications and quality assurance procedures, so the reliability and performance of these measurement systems and the adequacy of the technical specifications cannot be determined.

Industry commenters 2855 and 2900 disagreed with EPA's interpretation of the operating experience with mercury CEMS in Germany. The industry commenters stated that mercury CEMS are inaccurate and difficult to maintain. Further, mercury CEMS operating in Germany are subject to monitoring regulations that are different than the U.S. regulations and are used in a different regulatory context than that proposed by EPA. The monitors used in Germany, or those available from other European or Asian manufacturers were not able to demonstrate acceptable performance in the Electric Power Research Institute (EPRI) Trimble County Mercury CEMS study.

Industry commenter 2855 stated that there is no legitimate technical basis on which to establish detailed performance specifications or quality assurance (QA) requirements for these CEMS. There is no legitimate technical basis to conclude that these CEMS could meet such requirements over any extended period when installed and operated at a cement plant. The industry commenter recommended that EPA evaluate the performance of mercury CEMS at cement kiln systems and acquire the information necessary to serve as the basis for technical specifications and requirements. After such information is available and analyzed, EPA should re-propose appropriate and demonstrated performance specifications and quality assurance procedures for mercury CEMS to monitor kiln and kiln/in-line raw mill mercury emissions.

Industry commenter 2855 disagreed with EPA's interpretation that mercury CEMS can be applied to the cement industry based on successful use on utility boilers. The commenter evaluated the following issues:

Number of Installations in the Utility Industry—There are 35–40 continuous mercury monitors (CMMs) installed and certified to date (not yet with a National Institute of Standards and Technology (NIST) traceable calibration source).

NIST Certification—In mercury CEMS certification requirements outlined in Performance Specification (PS)–12A, it states that all calibration and span gases must be NIST certified. The draft protocols were just released by NIST in July 2009. The major vendors of mercury CEMS are just now advertising NIST-certified calibration sources. Therefore, none of the mercury CEMS that have been previously installed are certified. NIST does not currently directly certify oxidized mercury calibrations. The Interim EPA Traceability Protocols now in place provide for certification of evaporative generators by certification of the individual components of the calibrator. Therefore, the language used in Section 7.0 that refers to a NIST trace oxidized mercury calibrator needs to be clarified or changed.

Difficulties Encountered in the Utility Industry—The industry commenter gave examples of power plants' difficulties with mercury CEMS.

Installation on Wet Stacks—Installing a mercury CEMS on a *wet* stack can result in problems: Plugging, corrosion, and buildup of solids. Although wet scrubbers are not currently common in the cement industry, under the proposed rule, they may be required to a greater extent, and many of these same problems with mercury CEMS potentially could occur for the cement industry as well.

Data Output Requirements—There is no need for dry basis measurements under the proposed rule and the language in either Subpart LLL should be included to provide an exemption from this requirement for cement plants or PS–12A should be revised. This language needs to be clarified by EPA.

Cost—The industry commenter provided information about CEMS costs, estimating that if mercury CEMS were installed on all non-waste-burning U.S. cement facilities, the total capital costs would be approximately $45 million, with annual operating costs being about $25 million.

Industry commenter 2901 stated that CEMS should not be used as a compliance method for cement plants for the following reasons:

EPA reported in 1997 on an experiment where CEMS were installed on a cement kiln burning hazardous waste. The Agency found substantial problems regarding mercury CEMS measurement accuracy and precision, deciding not to require Mercury CEMS at cement plants. The industry commenter stated that the primary issue is whether there is a NIST traceable standard that can be used to calibrate the unit. Because compliance is based on the production rate and on using a 30-day average, it is difficult to know what range to calibrate these units.

The reliability of CEMS on cement kiln stacks has not been demonstrated in the U.S., where standards and requirements are different. Demonstrations in the U.S. at coal-fired power plants have different conditions than those at cement kilns.

There is no legal imperative for EPA to require CEMS. Under the CAA, EPA's monitoring requirements must provide a reasonable assurance of compliance with emission standards *Sierra Club* v. *EPA,* 353 F.3d 976, 990–991 (DC Cir 2004) (*Copper Smelters*) *citing Natural Res. Def. Council, Inc.* v. *EPA,* 194 F.3d 130, (DC Cir 1999).

Response: Several commenters questioned the applicability of current continuous instrumental gaseous mercury CEMS technologies to cement kilns. Several commenters also raised technical issues about specific performance criteria in Performance Specification 12A (PS 12A) for gaseous Hg CEMS and expressed concern as to the availability of National institute of Standards and Technology (NIST) traceable Hg gas standards. NIST has recently completed certification of a "NIST Prime" elemental mercury gas generator at concentrations of 41, 68, 85, 105, 140, 185, 230, 287, and 353 μg/m^3 and mercury gas generator vendors may now submit elemental mercury gas generators for certification to serve as "Vendor Primes". Therefore NIST traceable mercury gas standards can now be made available in concentrations that exceed the equivalent mass standards for both existing and new kilns by between one and two orders of magnitude, thus providing the capability to accurately report excursions well beyond either standard. We have provided responses to the comments on specific performance criteria regarding PS 12A in the response to comments document, and in several instances PS 12A has been revised in response to those comments. The Agency believes that the now revised PS 12A is fully capable of properly measuring the performance of gaseous Hg CEMS in many applications, including cement kilns.

Regarding the applicability of the current commercially available gaseous Hg CEMS to cement kilns, and to wet or high moisture stacks in particular, we have considered the potential physical and chemical characteristics of such kiln stacks and does not consider them to be substantively different from those of other source categories, particularly utility boilers, where technical solutions have been deployed to enable the successful application, certification, and operation of gaseous Hg CEMS. One of several U.S. Hg CEMS manufacturers advises they have now installed approximately 400 Hg CEMS units on coal-fired power plants to meet regulatory requirements, including some with flue gas desulfurization systems with the higher stack gas moisture levels typical of these systems. These installations have included performance guarantees for system certification and the manufacturer also indicated a willingness to guarantee the performance of their units on cement kiln stacks.

We recognize that each source will experience their own particular learning curve as with any new instrument, but if the source should experience an apparently insurmountable problem with a particular installation, they still have the option to either petition the Administrator for consideration of an alternative testing approach under § 63.7(f) or to monitor Hg using a sorbent trap monitoring system by Performance Specification 12B (PS 12B). We disagree with the comment that PS 12 B requires further demonstration. The same technology (Method 30B, 40 CFR Part 60, Appendix A) was successfully used on several cement kilns in the process of collecting data to establish the emission limits in this rule with good precision and accuracy, and has also been widely deployed in the data collection program for the current MACT rule development program for utility boilers. EPA also believes that the growing body of evidence of the successful use of Hg CEMS in the utility industry in the U.S. is further evidence that Hg CEMS can be used in the cement kiln industry. In addition to the knowledge regarding the use of Hg CEMS on cement kilns in Europe, EPA is aware of two instances where Hg CEMS have been installed on cement kilns in the U.S., with specific evidence of successful execution of seven day calibration drift checks, linearity (measurement error tests, as well as relative accuracy testing.

Comment: Industry commenter 2845 stated that EPA should require that compliance with HCl limits should be measured by periodic stack tests. Because the HCl floors were developed from HCl stack test data, the standard for HCl should be based on periodic stack testing. EPA must evaluate valid data from Method 321/ASTM D6348 stack tests instead of the data contained in Table 5 of the proposal. Using CEMS to measure compliance effectively makes the standard more stringent than what has been achieved by the best-performing sources. If CEMS compliance demonstration is retained, then the limit for CEMS compliance must be raised to reflect the added variability that will be measured by the CEMS. While continuous measurement will capture variability of emissions 24 hours per day, 7 days per week over the full range of process and control system operating conditions over the life of the plant and its associated quarry, the stack test is merely a snapshot in time. By definition, a stack test contains no parameter related to variability other than that obtained during the three hours of testing. In addition to the inherent variability of HCl emissions, a CEMS standard must also consider the inaccuracy of the CEMS as determined (and allowed) relative to the required stack test methods, the uncertainty of calibration standards/materials, and other factors affecting the sampling, transport, and analysis of HCl which is a highly reactive compound.

Response: HCl CEMS will be measuring HCl with the same technology that was used in the period stack tests (M321) used to set the standard. An allowance for variability has been built in through the process of setting the standard, including setting the standard based on the 99th percentile UPL and increasing the standard to the practical quantitation limit of the analytic method.

Comment: Two industry commenters (2845 and 2859) said that EPA has not promulgated any regulations requiring PM CEMS at any source category due to its inability to address fundamental technical and policy issues and must resolve these issues through rulemaking before requiring PM CEMS at any cement plants. Furthermore EPA has not performed a legitimate technical analysis of emissions variability and compliance determination uncertainty to allow the use of PM CEMS for determining continuous compliance with a PM limit at cement plants.

The use of PM CEMS in Europe and other countries does not constitute a valid basis for application of PM CEMS at cement plants in the United States. Light scattering, light transmission, and extractive beta attenuation instruments are all inferential measurement devices and a correlation must be established to relate the device output to the actual PM concentration, then the accuracy and bias of the reference test and the uncertainty of the statistical correlation, as well as the stability of the correlation must be considered. Under the German TUV and the European monitoring standard (EN 14181) these uncertainties are considered; emissions are not considered to exceed the allowable limit until the lower bound of the confidence interval and/or tolerance interval exceeds the emission limit; emission standards may contain different averaging periods requiring different levels of conformance; and when a problem is encountered, the emphasis is on resolving the emission problem rather than direct enforcement and collection of financial penalties. All of these considerations place the European monitoring program in an entirely different regulatory context than the proposed PM monitoring requirements.

Response: We reject the industry commenters' assertions that PM CEMS have not been required via rulemaking because of unresolved fundamental technical or policy issues. Concerns about PM CEMS were identified and addressed prior to the January 2004 publication of Performance Specification 11 and Quality Assurance Procedure 2 for PM CEMS (69 FR 1786, January 12, 2004). As mentioned in that rule's preamble, "* * * we believe that the PM CEMS field demonstrations completed to date encompass a range of operating conditions and emission characteristics * * *" including those exhibited by sources such as cement kilns.

Moreover, we disagree with the assertion that our analysis of PM emissions variability is not legitimate, yielding an overly-stringent PM emissions limit. The PM limit is based on our analysis of PM emissions from test data, adjusted from an hourly to a 30-day averaging period and further adjusted for variability. As mentioned in the preamble to the Credible Evidence Rule (62 FR 8314, February 24, 1997), we have addressed and continue to address concerns about perceived "* * * limited number and distribution of test runs and the inherent variability in levels of emissions * * *" by a number of approaches, including changing emissions averaging periods.

Certainly a statistically-based adjustment to account for emissions variability, and which, in this case, increases the numerical value of the standard (and its longer averaging period) by fifty percent, does not make the standard more stringent.

Finally, the continuous collection of data used to assess compliance with this twice-adjusted standard does not create a limit more stringent that otherwise allowed. As discussed in the preamble to the Credible Evidence Rule, "* * * continuous monitoring of the standards (has) no effect on the stringency of the standard * * *" (62 FR at 8326, February 24, 1997).

Rather, consistent with the rulemaking description process given in Section 4.1.1 of the Credible Evidence Rule Response to Comment Document, we used our "* * * judgment, based on available information, to establish emissions standards at (appropriate) levels where the standards can be met on a continuous basis by a well operated and maintained source that employs best demonstrated technology * * *"[44]

Comment: Two industry commenters (2845 and 2859) had the following comments concerning technical issues associated with application of PM CEMS. EPA has not addressed nor resolved the primary technical issues limiting the effective application of PM CEMS at cement plants including:

- Inability to generate a sufficiently wide range of PM concentrations to establish an acceptable correlation (*i.e.,* calibration),
- Accuracy and precision limitations of reference method at PM levels necessary to generate valid correlation, and
- Subsequent changes in effluent matrix and/or PM (*i.e.,* particle size distribution, refractive index, particle density, *etc.*) that influence the stability of the correlation and hence, the relationship between the output of the inferential measurement device relative to actual PM concentration.

Valid PM CEMS correlations cannot be established for PM CEMS at cement plants due to limitations of process operation and control equipment in conjunction with the proposed emission limitation. The requirements in Appendix A, PS–11 for the PM CEMS correlation and in Appendix F, Procedure 2 do not provide a sufficiently reliable means to determine compliance with emission limitations.

Response: We have not identified problems cited by the commenters at existing installations. In fact, PS–11 and Procedure 2 are working well. We note that PS–11 has several features to address correlation issues. For example, PS–11 provides for the addition of a zero point, which enhances the ability to provide a calibration. We note that PS–11 has several features to address correlation issues due to any limitations of process operation and control equipment. PS–11 provides for the addition of a zero point. For example, if control equipment operations cannot be varied adequately to achieve higher PM concentrations, resulting in a cluster of data points at a very low level and making it difficult to achieve PS–11 criteria, then an artificial data point may be selected at zero that allows the correlation curve to be developed that meets the correlation criteria. It also strongly suggests the use of paired trains to insure that accuracy and precision is obtained. Changes in the effluent matrix could potentially be a problem with light scattering technologies but this has not been shown to be a problem with existing installations. This would not be a problem with beta attenuation monitors. Factors that influence the stability of the correlation are addressed in Procedure 2 (40 CFR, Appendix F). Procedure 2 describes the required audits to insure that subsequent measurements are stable and within acceptable limits, thereby ensuring reliable and stable compliance measurement data.

Comment: Two industry commenters (2845 and 2859) had the following comments concerning PS–11 and Procedure 2. The requirements at § 63.1349 for PM CEMS are incomplete and ambiguous and EPA has failed to specify important QA frequencies and other information relevant to the implementation of PM CEMS in accordance with PS–11 and Procedure 2. The proposed Subpart LLL revisions fail to address critical elements including the following sections of PS–11 and Procedure 2:

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[44] See Section 4.1.2.1 of the Credible Evidence Rule Response to Comment Document, available at *http://www.epa.gov/ttncaaa1/t1/fr_notices/certcfin.pdf.*

- PS–11 3.20, species reference method as method defined in applicable regulations (Method 5 with 250 °F filtration temperature) but this is inadequate for low concentrations where Method 5I should be used, and is inapplicable to sources with PM that condenses between the stack temperature (mill on and mill off, if applicable) and 250 °F where Method 17 should be used or ASTM D 6831.
- PS–11, 6.2 You must ensure that the averaging time, the number of measurements in an average, the minimum data availability, and the averaging period for your CEMS conform to those specified in the applicable regulation—but none are specified.
- When using PS–11, 6.5 Your CEMS must sample the stack effluent such that the averaging time, the number of measurements in an average, the minimum sampling time, and the averaging procedure for reporting and determining compliance conform to those specified in the applicable regulation—but none are specified.
- Procedure 2, 10.3 You must conduct a response correlation audit (RCA) and a relative response audit (RRA) at the frequency specified in the applicable regulation * * * but none are specified.
- Procedure 2, 10.3, You must perform an RRA at the frequency specified in the applicable regulation * * * but none is specified.
- When using Procedure 2, 10.3(7) You must perform an RCA at the frequency specified in the applicable regulation * * * but none is specified.
- When using Procedure 2, 10.9 You must report the accuracy results for your PM CEMS at the frequency specified in the applicable regulation * * * but none is specified.

Response: We recognize that PS–11 does not specify a reference method; we have revised the final rule to specify Method 5 or Method 5I (40 CFR part 60, appendix A) as the reference method. Facilities with issues in application of these reference methods, may petition the Administrator for alternatives or modifications under § 60.8(b) or § 63.7(f). The averaging times and data reduction specifications have been added to §§ 60.63(c) and 63.1350(b) of the rule. There are no specific data availability requirements, §§ 60.63(g) and 63.1348(b) require that monitoring be conducted at all times the affected source is operating except for periods of monitoring system malfunctions, repairs, or quality assurance/quality control activities. The language of the final rule has been revised to specify the frequency of the Relative Response Audits (annually) and the Response Correlation Audits (every three years), for specifics, *see* §§ 60.63(c)(2) and 63.1350(b)(2). Absolute Correlation Audits are required by Procedure 2 on a quarterly basis.

Comment: One environmental advocacy group commenter (2786) stated that EPA should not eliminate opacity standards in the proposed rule. The commenter stated that there are benefits to having an opacity standard in conjunction with a particulate matter standard. Opacity measurements can be made by anyone who is trained to measure opacity, which can include members of the public and not just inspectors, and opacity measurements are a cheaper method of getting more frequent measurements.

Response: We disagree. Given the sensitivity of the BLD and PM CEMs, we find the opacity requirements to be redundant.

Comment: One environmental advocacy group commenter (2898) stated that EPA should require PM CEMS and retain the opacity monitoring requirements. EPA is proposing installation and operation of a BLD system, along with stack testing using EPA Method 5 conducted at a frequency of five years for demonstrating compliance with the proposed PM emissions limit. As an alternative, a PM CEMS that meets the requirements of PS–11 may be used, and EPA is proposing to eliminate the current requirement of using an opacity monitor. The proposed rule solicits comment on making the use of a PM CEMS a requirement. The commenter stated that EPA should both require CEMS and retain the use of opacity monitors.

EPA should abandon the BLD system requirement outlined in the proposed rule and mandate the use of PM CEMS instead. The agency previously concluded that PM CEMS is a superior monitoring technology that can be implemented at a reasonable price. EPA has found that BLD systems, standing alone, are inadequate to verify compliance and has also found that continuous opacity monitors (COMS) operate as a useful check on PM emissions and proper operation of PM CEMS.

Providing a superior level of compliance assurance is not the only benefit of PM CEMS. EPA has acknowledged that the assumptions to assure compliance are fewer and less conservative (direct measure of the standard is the top of the monitoring hierarchy), CEMS mean facilities need to monitor only one emissions parameter to assure compliance rather than multiple operating limits, often relevant to more than one standard, and that the cost of installing PM CEMS technology is reasonable.

Response: We would support the use of multi-metal CEMS, should they become available. We have not yet seen evidence that COMS are well-suited for continuous compliance as are BLD or PM CEMS, so that requiring their use as a backup system would add monitoring costs to no special environmental benefit.

Comment: Several industry commenters (2832 and 2859) opposed the proposed requirement to install CEMS in order to satisfy compliance assurance monitoring (CAM) for selected pollutants. Instead, the commenter proposed that CAM requirements be satisfied using periodic stack testing to the extent that stack testing is requested or required by State air permits. According to EPA’s proposal, the MACT floor for new and existing sources in this industry will be determined by stack testing results of sources within the MACT pool. If EPA were to finalize a numeric emissions limitation based on this approach to setting the new and existing MACT floors, that limitation will be based on the same stack testing data. CEMs will have played no role in this process. It stands to reason that compliance assurance should be based on stack testing results, and not a CEMS data that has played no part in this process.

One industry trade association commenter (2916) stated that EPA can achieve a reasonable assurance of compliance without the use of CEMS. The requirement to use CEMS is unreasonably costly and unnecessary, given that other reliable means of showing compliance are available for all relevant pollutants. Raw material sampling and kiln parametric monitoring, in conjunction with periodic testing, would work well for THC and HCl. The sorbent trap method for mercury is a good alternative to mercury CEMS and should be retained in the final rule. EPA should refrain from requiring PM CEMS in the final rule. Bag leak detection systems and parametric monitoring of ESPs are proven methods for assuring ongoing compliance with PM limits.

Response: We disagree. In the case of THC, emissions may change significantly due to a process change without any advance indication. In addition, the THC emission limits were established using data from CEMS, and the standard itself is a 30-day average, requiring 30 monthly measurements (only practically obtainable with a CEM). Therefore, CEMS are the obvious compliance assurance choice. In the case of mercury emissions, short term test data do not necessarily reflect the long term emissions. In addition, the performance of the available mercury controls may be significantly affected by operational factors. To devise a test plan to clearly establish the performance of mercury control under all conditions would be difficult, and for that reason it would be difficult to establish the proper control device operating parameters and operating limits. Therefore, mercury CEMS are essential in demonstrating continuous compliance with the mercury emissions limits. If the facility does not have a wet scrubber, changes in raw materials, or fuels could significantly increase emissions without any indications unless a CEMS is used.

B. What are the significant comments and responses on 40 CFR part 60, subpart F?

Comment: Several State and environment advocacy group commenters (62, 65, and 69) objected to EPA not proposing standards for greenhouse gas (GHG) emissions under the proposed NSPS. One State commenter (62) criticizes EPA's decision to not propose any NSPS for GHG emissions from Portland cement plants. The commenter states that even though the Courts have confirmed that GHGs are air pollutants subject to regulation under the CAA, EPA has not issued any such standards, instead issuing an Advance Notice of Proposed Rulemaking (ANPR) that seeks public comment on whether to regulate GHG emissions under the CAA at all. State commenter 62 protests this course of action, and requests that EPA revise the proposed rule to include NSPS for GHG emissions.

According to State commenter 62, EPA's failure to propose NSPS for GHGs in the proposed rule violates section 111 of the CAA (42 U.S.C. 7411), which requires EPA to determine whether GHG emissions emitted by cement plants may endanger public health or welfare, and to promulgate NSPS for each air pollutant emitted by cement plants that contributes significantly to global warming pollution. The State commenter states that as the second largest industrial source of carbon dioxide emissions in the United States (emitting 45.7 million metric tons of carbon dioxide in 2006), the cement industry contributes significantly to GHG emissions and there can be no serious dispute that GHG emissions endanger public health and/or welfare. The ANPR that EPA issued instead is no substitute for action and does not commit to regulating GHG emissions from any source. State and environmental advocacy group commenters 65 and 69 submitted several exhibits in support of their comments. A summary of the comments is presented here. To review the entire comment, please refer to the comment at *www.regulations.gov.* The State and environmental advocacy group commenters state that:

- EPA is required by section 111 to promulgate NSPS for all pollutants emitted by a regulated source category including CO_2 emission from cement plants and EPA's assertion that section 111 does not compel the agency to regulate CO_2 emissions is contrary to the Act's plain language.
- Congress has expressly directed that NSPS address the emissions of "any" air pollutant, a term that plainly encompasses CO_2.
- At a minimum, in directing that NSPS be established for sources that cause, or contribute significantly to air pollution which may reasonably be anticipated to endanger public health and welfare, Congress showed that it meant to require limits on emissions of any pollutants that cause or contribute to such endangerment. Because cement plants emit CO_2 in such amounts that those emissions significantly contribute to "air pollution which may reasonably be anticipated to endanger public health or welfare," EPA is legally required to issue standards of performance limiting those emissions. EPA cannot rationally assert that cement plant CO_2 emissions do not meet these criteria, and the Agency's refusal to promulgate standards of performance is therefore unlawful.
- EPA's contention that it can refuse to regulate CO_2 emissions on the basis of interactions with other CAA provisions is impossible to reconcile with section 111, because that section clearly contemplates that EPA will adopt standards of performance covering pollutants that have not previously been subject to regulation under the Act.
- Cement plants' emissions of CO_2 cause, or contribute significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare and significantly contribute to global climate change.
- There are existing technologies that can reduce emissions of CO_2 from cement plants. In addition to the suggested technologies, other measures that would also have CO_2 reduction benefits include shifting from high carbon content fuels, such as coal, to lower carbon content fossil fuels, such as natural gas.
- Section 111(d) of the Act provides that EPA shall require States to implement and enforce standards of performance for existing sources when the pollutant at issue is not regulated as a criteria pollutant or hazardous air pollutant.
- EPA must also consult with the U.S. Fish and Wildlife Service and National Marine Fisheries Service to insure that the final rule is not likely to jeopardize recently-listed endangered species.

Response: Due to issues related to the regulation of GHGs under the CAA, no standards of performance for GHGs were included in the proposal and none are being included in the final amendments. Promulgating a standard without first proposing it does not follow the accepted process of proposal and public comment that is required of EPA rulemakings. Also, we have not gathered the information we need on GHG emissions and control strategies for the Portland cement industry. EPA's decisions and plans for regulating GHG from this industry are discussed earlier in this document (*see* section IV.B.1.g).

Comment: Several private, State and environmental advocacy group commenters (59, 60, 63, 68, 70, 71, 72) approve of the proposed limits for NO_X or believe more stringent limits are appropriate. One private commenter (59) states that the proposed standard is unjustifiably high, and will allow for greater NO_X emissions than can be achieved with the installation of off-the-shelf pollution control technology. The commenter recommends a standard of no greater than 0.5 lb NO_X/ton clinker and states that SCR is an effective and proven technology to reduce NO_X emissions from cement kilns and can reduce NO_X emissions from cement kilns by greater than 90 percent, consistent with what has been observed with SCR in other industries. According to the private commenter, SCR can achieve this performance with cost-effectiveness of approximately $1,500–$3,800/ton NO_X, easily within regulatory cost thresholds for many NO_X control programs. Regarding concerns over dust and plugging, the commenter cites three recent installations of SCR on cement kilns that show that SCR vendors can properly design and install units which manage the dust and successfully operate for many years. The commenter stated that numerous SCR companies believe that they can design and supply SCR systems for NO_X control at cement plants where they will have to guarantee performance levels in legal contracts, and thus they would be at significant financial risk to advertise and sell an SCR system that was actually going to fail. The effectiveness of the technology to reduce NO_X and other pollutant emissions from cement kilns, as demonstrated by the SCR installations on cement kilns in Europe and the numerous SCR installations on other heavy industries like coal-fired power plants and waste incinerators, is supported by the marketing, technical assessments, and reports prepared by numerous experts on this subject, including: Three (3) cement companies, five (5) SCR manufacturers, an independent blue ribbon panel, the U.S. EPA (twice), and the European IPPC. State commenter 68 believes that EPA's proposed NO_X limit of 1.5 lb/ton clinker underestimates the reductions that are achievable with SCR technology and recommends that SCR be identified as BDT for this sector and is "the regulated future" for cement kilns. The commenter states that the agency has noted that hybrid combinations of SNCR and SCR could be used in new cement kilns to achieve greater reductions than would be possible with SNCR alone. SCR is also named by EPA as available technology for cement kilns in the Regulatory Impact Analysis for the Final Clean Air Visibility Rule or the Guidelines for Best Available Retrofit Technology (BART) Determinations Under the Regional Haze Regulations. As far back as 1999, EPA included SCR in a list of control technologies available for both dry and wet cement manufacturing processes, as did a Pechan & Associates Report prepared for EPA's Office of Air Quality Planning and Standards in September 2005. Therefore, SCR technology for the cement manufacturing sector has been considered feasible technology by EPA for some time.

One State commenter (60) states that the NO_X emission limit should be lowered to 1.0 lb/ton of clinker on a 24 hour rolling average for new PH/PC kilns and a limit added of 2.0 lb/ton of clinker on a 24-hour rolling average if reconstruction or modification of the kiln commences after June 16, 2008, and the final configuration is a long wet kiln or a long dry kiln. The State commenter states that the recommendations regarding PH and PH/C kilns should apply equally to projects at greenfield sites and brownfield sites stating that many of the advances in NO_X control in the U.S. and Europe have been made at brownfield sites whether they have involved new kilns or reconstruction or modification of existing kilns.

To support the State commenters recommended limits for NO_X, the commenter provided the following information and included several supporting documents as attachments to the comments:

- A long-term value of 1.46 pounds per ton (lb/ton) of NO_X clinker was achieved with no add-on control equipment when not accounting for slag use and 1.38 lb/ton when accounting for slag use at TXI Kiln 5 (a PH/C kiln) in Midlothian, Texas.
- A long-term value of 1.98 lb/ton was achieved with no add-on control equipment at Cemex Sta. Cruz (a PC/H kiln) in Davenport, California. The project involved an improvement to an existing calciner (commissioned in 1997) on an existing kiln to comply with an existing NO_X limitation.
- Titan America (a PH/C kiln) in Medley Florida and Giant Cement in South Carolina where average values of 1.62 and 1.88 lb NO_X/ton were documented for new kilns with no add-on control equipment at brownfield sites.
- The results from the existing SCANCEM (an affiliate of Lehigh) Skövde PH kiln where emissions were reduced from 4.4 lb NO_X/ton (1995) by installation of a SNCR system and which achieved 0.72 lb/ton in 2005.
- The results from the existing SCANCEM Slite PH/C kilns where emissions were reduced from 4.0 lb NO_X/ton (1995) by installation of an SNCR system and which achieved 1.01 lb/ton in 2005.
- The results from the existing Radici Cementeria di Monselice PH kiln where emission reductions to values as low as 0.20 lb NO_X/ton were demonstrated by installation of a SCR system. The supplier guaranteed reduction of 90 percent and realized reductions as high as 97 percent.

State commenter 60 states that based on the foregoing, reductions on the order of 75 percent are achieved by well-designed SNCR systems and 90 percent by SCR. Given that a new kiln can be designed such that emissions can be controlled to values between 1.5 and 2 lb/ton before add-on control, 1 lb/ton is achievable by SNCR. Given a kiln with less sophisticated design or particularly difficult raw materials achieving 3 to 5 lb/ton, SNCR or SCR or a combination of the two can reduce emissions to values much less than 1 lb/ton. The commenter states that the proposed averaging time of 30 days is a tremendous concession to the industry. The availability of reagent injection makes it easier to achieve the proposed standard on a 24-hour basis. The lowest permit limit for a project under construction in the United States applies to the Drake Cement in Arizona. The value is equivalent to 1.14 lb/ton on a 24-hour basis. A contract was awarded to F.L. Smidth who developed the calciner that achieves 2 lb/ton or less at TXI, Titan and Cemex as discussed above. The limit will be achievable using an SNCR system.

State commenter (60) states that because long wet and long dry kilns use much more energy to make a ton of clinker, a higher NO_X limit may be acceptable for these kilns. State commenter 60 agrees with EPA's assumption that new projects triggering the NSPS will actually result in a PH/C kiln. A project that might trigger a prevention of significant deterioration (PSD) review at a long kiln will probably incorporate emissions control measures to avoid PSD and a BACT determination for NO_X and SO_2. The measures to avoid PSD will also likely avoid the short-term emissions increases that would otherwise trigger the NSPS.

Finally, with respect to the reconstruction provisions, it is not likely that a company will actually invest 50 percent of the value of an existing long kiln without taking the opportunity to make it much more energy efficient through conversion to a PH/C kiln. The State commenter states that a separate standard for long kilns will avoid the unnecessary relaxation of the limits applicable to PH and PH/C kilns. The State commenter listed the following NO_X reduction technologies that have been demonstrated for long kilns and submitted supporting documentation as attachments to the comment:

- Conversion from direct to indirect firing in conjunction with the installation of a multi-channel (Low NO_X) burner;
- Mid-kiln fuel injection (including tires);
- Near mid-kiln pressurized air injection;
- SNCR at long kilns; and
- Combination of SNCR with air injection.

One State commenter (63) described the advances in technology for controlling NO_X emissions, especially SNCR and SCR, from Portland cement plants, and requests EPA consider the technological improvements and their applications when establishing NO_X emission limits. The State commenter states that EPA continues to play a crucial role in encouraging innovation and in mobilizing supply chains to deliver technologies that improve our air quality and environment including the continued tightening of emission limits. This encourages the industries such as the cement industry to work closely with equipment and component suppliers to ensure significant reductions in emissions in a timely and economical manner. The commenter states that with the improved processes that lower uncontrolled NO_X emissions and with the addition of SCR, NO_X limits of 0.25–0.5 lb NO_X/ton clinker are achievable.

One State commenter (70) supports the proposed level for new, modified and reconstructed kilns of 1.50 lb/ton of clinker for NO_X. Facilities can meet the 1.50 lb/ton of clinker for NO_X, with SNCR alone or with SCR (either as a supplement or as an alternative to SNCR).

One State commenter (71) states that if new or modified systems would likely use the preheater/precalciner configuration, then what is achievable must be looked at and then apply the effect of the controls. If this approach is followed, the appropriate NO_X emission limit should be in the range of 1.14 lb/ton of clinker. According to State commenter 71, the traditional long dry cement kilns can attain a NO_X emission level of 2.73 lb/ton of clinker without utilizing SNCR control technology. Based on an SNCR control efficiency of 50 percent, a NO_X emission level of 1.3 lb/ton of clinker is achievable. As a result, cement kilns with SNCR control technology can achieve a NO_X emission level between 1.14 and 1.3 lb/ton of clinker. However, this State commenter believes that the NO_X emission level from cement kilns can be further reduced by utilizing SCR control technology. State commenter 71 states that EPA dismisses the SCR technology used in Europe and concedes that some mechanical problems were experienced in the early stages with plugging but these problems were resolved and the system remained in service for four years at the Solnhofen facility in Germany. According to the commenter, waste disposal should not be an issue because the spent catalyst could be added to the process as a source of alumina. State commenter 71 previously conducted a Best Available Retrofit Control Technology (BARCT) assessment for a cement plant in our area and recommended SCR as the BARCT for this facility.

One environmental advocacy group commenter (72) states that the NSPS emission rate for NO_X from cement plants should be lowered to 0.5 lb/ton of clinker on a 24 hour rolling average because of the ability of current plant designs to achieve very low rates of NO_X emissions without the addition of add-on pollution controls. Currently available add-on controls can reduce NO_X emission levels below the proposed 1.5 lbs of NO_X per ton of clinker. There is a considerable operational experience with SNCR that shows it's capable of reducing NO_X emissions to 1 lb or less/ton of clinker when combined with a modern-designed kiln. SCR has been demonstrated in the utility industry and Europe and can further reduce emissions.

Response: The starting point for the NO_X limit was the emission level that could be achieved with no add-on control device for NO_X. To achieve the lowest NO_X levels without add-on controls involves the use of state-of-the-art combustion technologies in conjunction with PH/PC kilns. In developing the proposed limits for NO_X, we used emissions data showing that three recently permitted kilns had achieved average NO_X levels of 1.62, 1.88, and 1.97 lb/ton of clinker through the use of combustion technologies such as low-NO_X burners and staged combustion in the calciner (SCC). We assumed that through advanced combustion technology, an emission level of 2.5 lb/ton of clinker was generally achievable. Following proposal, commenters supporting the limit, commenters recommending lower limits, and commenters recommending higher limits submitted additional data on NO_X emissions from U.S. kilns as well as kilns operating in other countries. The data are summarized below.

TABLE 9—CEMENT KILN NO_X EMISSIONS DATA

Kiln	Kiln type	Process controls	Add-on controls	NO_X emissions before add-on control (lb/ton clinker)
TXI, Midlothian, TX, Kiln 5 (2003)	PH/PC	LNB, slag	None	1.38
		LNB	None	1.46
Cemex, Santa Cruz, CA (2006–2007)	PH/PC	SCC	None	1.98
Titan America, Medley, FL (2007, 2008)	PH/PC	SCC	None	1.62
Giant Cement, Harleyville, SC (2006, 2007)	PH/PC	SCC	None	1.88
TXI Riverside, CA	Long Dry	Combustion, Process	None	1.5
	Long Dry	Combustion, Process	None	1.5
Lafarge Sugar Creek, MO (2004–2005)	PH/PC	LNB, SCC	None	3.58
Lafarge Calera, AL (2006–2007)	PH/PC	LNB, SCC	None	2.06
Lafarge, Alexandria, Egypt (2007)	PH/PC	LNB, SCC	None	2.03
Lafarge, Richmond, Canada (2007)	PH/PC	LNB, SCC	None	2.64
Lafarge, Port La Nouvelle, France (2007)	PH/PC	LNB, SCC	None	2.65
Lafarge, Ewekoro, Nigeria (2007)	PH/PC	LNB, SCC	None	3.38
Lafarge, Kujawy, Poland (2007)	PH/PC	LNB, SCC	None	3.4
Lafarge, Harleyville, U.S. (2007)	PH/PC	LNB, SCC	None	3.48
Lafarge, Tetouan, Morocco (2007)	PH/PC	LNB, SCC	None	4.07
			AVG	2.41

The average uncontrolled NO_X emissions for the listed kilns are 2.4 lb/ton of clinker. If the result for the long dry kiln is removed, the average is 2.5 lb/ton. This result is consistent with the baseline NO_X level used by EPA in the development of the proposed NO_X limits. To allow for variations in process, fuel or feed, EPA selected a baseline level of 3.0 lb/ton of clinker.

To arrive at the emissions limit for NO_X, we evaluated two add-on control technologies for BDT: SNCR and SCR. EPA agrees that SCR is a promising technology for the control of NO_X emissions from Portland cement plants. The Agency also agrees that SCR is an attractive control alternative in that it has the advantage of reducing emissions of other pollutants in addition to reducing NO_X by 80 to 90 percent. However, although SCR has been demonstrated at a few cement plants in Europe and has been demonstrated on coal-fired power plants in the U.S., the Agency is not satisfied that it has been sufficiently demonstrated as an off-the-shelf control technology that is readily applicable to cement kilns. The experience with SCR use on coal-fired power plants in the U.S. is not directly transferrable to Portland cement plants with the main difference being the lower dust loadings at power plants than would occur at cement plants. (Note this is not an issue for CEMS because they can be located downstream of the PM controls.) The experience at European kilns showed long periods of trial and error before the technology was operating properly. In particular, problems with the high-dust installations and the resulting fouling of the catalyst were problematic. This and other problems were eventually overcome, although at one of the early facilities to add SCR, the use of the SCR was discontinued in favor of a selective noncatalytic reduction (SNCR) system while the facility owners and operators gathered additional data to assess the advantages and disadvantages of the SCR system in comparison to the SNCR system.

State commenters also noted that it would be possible to combine SNCR and SCR technology on the same kiln, thereby significantly reducing the amount of catalyst required. This could reduce the problem with catalyst fouling. We see no technical impediment to combining SNCR and SCR technology. But at the same time we have no data on this combined system to assess its effectiveness or potential for catalyst fouling.

At this time we therefore do not agree with the commenters that SCR can be considered best demonstrated technology and as a result have not established a NO_X emission limit based on that technology.

We determined SNCR to be BDT and applied a control efficiency for the SNCR to the baseline uncontrolled level to determine the appropriate NO_X level consistent with application of BDT. As discussed in the preamble to the proposed rule, SNCR performance varies depending on various factors, but especially the normalized molar ratio (NMR), or the molar ratio of ammonia injected to NO_X- higher removal efficiencies are associated with a higher NMR. SNCR performance has been shown to range from 20 to 80 percent NO_X removal. At proposal we used an efficiency of 50 percent as representative of SNCR performance on average. Since then, additional information on SNCR performance has become available including data supplied by State commenters as well as a 2008 report by the Portland Cement Association. These data are summarized below. Reported removal efficiencies range from 25 to over 90 percent. According to a 2008 PCA report, ammonia slip occurs at molar ratios generally above 1.0. The graph below illustrates the relationship between the ammonia molar ratio, or NMR, and the performance of SNCR. EPA also examined the data to determine if uncontrolled NO_X emissions affected SNCR performance since SNCR performance has been shown to improve with higher uncontrolled NO_X levels, but the data here did not show any effect between initial NO_X concentration and SNCR performance. Using the data below, the average removal efficiency of SNCR is 60 percent. Thus, EPA believes the 50 percent removal efficiency used to establish the NO_X emission limit is a reasonable estimate of the SNCR performance that allows for an operating margin considering reasonable worst-case conditions that can be expected within the industry or source category as a whole. This operating margin should be sufficient to allow facilities where a greater than 50 percent reduction may be necessary to meet the 1.5 lb/ton clinker limit to increase ammonia injection to achieve greater than 50 percent reduction without causing ammonia slip.

TABLE 10—SNCR NO_X REMOVAL EFFICIENCY

Kiln	NO_X emissions before SNCR (lb/ton clinker)	NO_X emissions with SNCR (lb/ton clinker)	Removal efficiency (%)	Ammonia molar ratio
SCANCEM Skovde, Sweden (1995,2005)	4.4	0.7	84	1–1.2
SCANCEM Slite, Sweden(1995,2005)	4.0	1.0	75	1.2–1.4
Ash Grove, Durkee OR (1994 test)	4.75	1.0	> 80 for most	
Suwannee American (2008)	Not reported	1.4		
Florida Rock	3.1	1.7	47	0.1–0.65
	3.8	2.2	42	0–1
1	7.0	3.2	55	0.7
2	4.3	3.0	30	0.7
3	4.6	2.3	50	0.7
4	4.0	2.0	50	0.6–0.7
5	3.8	2.9	25	
6	4.0	2.4	40	0.25
6	4.0	2.0	50	0.5
7	3.4	1.7	50	0.5
7	3.6	0.9	75	0.8
7	3.2	0.6	81	1
8	5.0	0.4	92	1.0–1.2
8	5.0	1.1	78	1.0–1.2
9		0.9	80–85	1.2–1.4
AVG.	4.2	1.7	60	

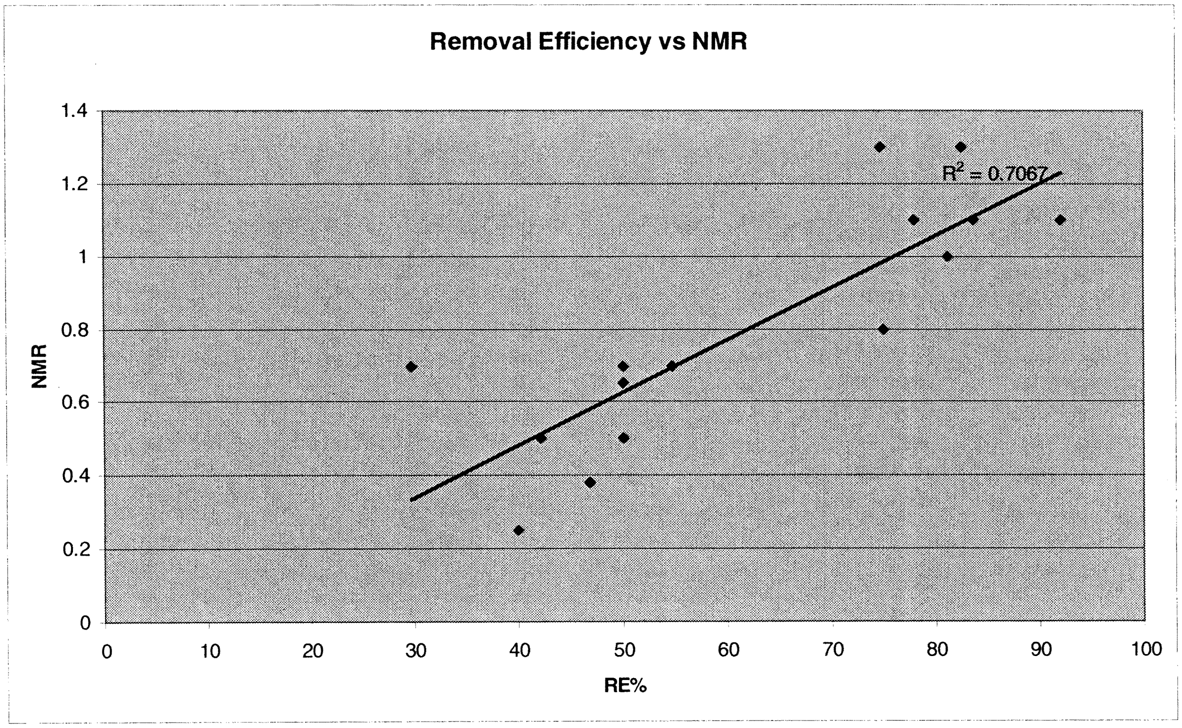

Figure 2, NOx Removal Efficiency vs. NMR

Comment: Several industry commenters (64, 73, 74, 75, 76, 77, 78) commented on the difficulty of consistently achieving the NOx limit of 1.5 lb/ton clinker limit over time and at all new kiln locations and favored a higher limit or no limit. They state that it is important to note that consistent, long term compliance with this proposed limit may be difficult to achieve and there will be instances where compliance may not be possible at all. According to the industry commenters, different factors can influence NO_X emissions such as:

(1) *Fuel type/quality*—Lower volatility solid fuels such as petcoke produce higher NO_X emissions. Also, any problems with fuel quality as delivered to the plant can have a negative impact on NO_X emissions;

(2) *Raw mix burnability*—Harder burnability will give higher NO_X emissions. Burnability is dependent on raw mix chemistry, fineness, and chemical deviation (impacted by homogeneity and operation of the quarry, which can vary over extended periods of time);

(3) *Kiln bypass system*—The size of the bypass for a given plant (if needed), and consequently the bypass emissions, depends on the chemistry of the raw mix and fuel(s) and the product standards that must be maintained to comply with regulations;

(4) *Size/type of the preheater*—New in-line calciners will normally give the lowest NO_X emissions; however, in cases where the type of fuel(s) used dictates the need for a separate calciner (such as may be applied to utilize waste materials), NO_X emissions will be higher. In addition, sometimes a new project will consist of upgrading an existing pyro system. In many of these cases the layout of the existing equipment is such that it cannot be modified to perform as well as a brand new calciner system, and will therefore have higher NO_X emissions;

(5) *Sub-standard operation and maintenance of the kiln system*—This is the responsibility of the cement producer, but it is also expected that NO_X emissions will increase slightly over a typical campaign between annual maintenance stoppages due to normal "wear and tear" of the system; and

(6) *SNCR efficiency and slippage*—The ability of an SNCR system to reduce NO_X emissions is not the same for all systems, especially for an existing pyro system that has been upgraded (due to potential lack of an optimum injection point) or a very large pyro system (due to lack of optimum mixing of ammonia and preheater gas).

One industry commenter (75) states that although the removal efficiency of SNCR can theoretically be improved by increasing the quantity of ammonia injection, there is a practical limit to this approach. As ammonia injection rates increase, the potential formation of a secondary plume due to "ammonia slip" increases. In addition, sulfur in the raw materials results in SO_2 and SO_3 in the exhaust, which decreases the efficiency of ammonia injection and leads to operational issues such as solids accumulation and plugging downstream of the SNCR. As the industry commenter noted in the permit application for its proposed kiln, facilities with lower BACT emission limits are also those facilities with lower sulfur raw materials, notably plants located in Florida, thereby improving the efficiency of SNCR. Given the baseline NO_X emissions expected at a new plant, industry commenter 75 would need a control level of at least 70 percent to meet the proposed limit of 1.5 lb/ton. Industry commenter (75) is not confident that this can be done with SNCR. Therefore, the industry commenter recommends that the NO_X standard be established at 1.95 lb/ton, which reflects a level of control achievable with the use of SNCR by all facilities without introducing the negative effects associated with pushing for high control levels.

One industry commenter (76) states that assuming a facility is already operating with best combustion practices (*i.e.,* indirect fired fuel supply systems, low primary air burners, *etc.*) then the burnability of the raw mix has the greatest single impact on NO_X emissions. Statistically speaking, most preheater precalciner cement kiln plants worldwide emit an uncontrolled NO_X emission of 3.8 to 4.2 lb NO_X/ton of clinker. With a 50 percent NO_X reduction rate from the application of SNCR technology, a controlled emission rate of 1.9 to 2.1 lb NO_X/ton of clinker could be expected for most kilns. As such, a 1.95 lb NO_X/t clinker limit for all new kiln applications seems achievable. The issues arise when people arbitrarily apply the 50 percent reduction potential of SNCR to lower baseline emission numbers. (*i.e.,* at a 3.2 lb NO_X/ton of clinker uncontrolled emission, SNCR could reduce it to 1.6 lb NO_X/ton of clinker). While this might be true on an isolated case basis, it would be unwise to approach such a low level for a new NSPS limit for all new kilns because of the issue of burnability. In some cases it might be possible to reduce the baseline NO_X levels with integrated control systems, such as Multi-Stage Combustion (MSC) installed on low NO_X calciner system; but here again, the practicality of sustaining stable, continuous operation while simultaneously reducing the baseline NO_X by 10 to 30 percent is very site specific. Industry commenter 76 believes that a controlled emission rate of 1.95 lb NO_X/ton of clinker can be achieved by all new kiln applications providing SNCR is used as the principle measure to control NO_X emissions, but excluding that portion of gases that may be extracted through a bypass system.

One industry commenter (77) believes that under the worst-cast combinations of raw materials, fuels and cement specifications and with the application of SNCR technology, a controlled emission rate of 2.0 lbs of NO_X per ton of cement clinker can be achieved by all new kiln applications. However, if the kiln must incorporate a bypass for alkalis, chlorides or sulfur, the NSPS limits must allow for increased NO_X emissions on a plant by plant basis due to the fact that bypass amounts can be anywhere from 5 percent to 100 percent in size.

One industry commenter (78) states that very few kilns with alkali bypasses would have a chance of meeting the proposed limit long-term. One industry commenter (83) requested that EPA clarify whether the NO_X limit applies only to a kiln's main stack or both the main and bypass stacks.

One industry commenter (73) believes that EPA failed to appropriately consider variables that affect uncontrolled NO_X emissions from preheater/precalciner kilns employing SCC and LNB on an industry-wide basis. As a consequence, EPA relied upon a limited database that did not reflect these variables and then made assumptions reflecting an incomplete understanding of variability in uncontrolled NO_X that result from them. Industry commenter (73) recommends that EPA revise its proposed baseline NO_X emission standard from 1.5 to 2.0 lb/ton of clinker, and allow for adjustments of the standard upward from this value when bypasses are used, unusually hard burning raw mixes are used, or specific clinker types (such as oil well clinker) that require non-typical burning methods is being produced. When bypasses, hard burning mixes and/or clinker specifications require non-typical operational parameters, an adjustment factor should be allowed and evaluated on a case-by-case basis. The fact that individual kilns may be able to achieve a NO_X emission rate as proposed (or even lower rates) is not determinative of what is an appropriate standard for the NSPS.

Industry commenter (73) states that fuel volatility plays a major role in NO_X emission control. The uncontrolled NO_X generated in the precalciner alone can vary by as much as 1.4 g/kg of clinker (2.8 lb/ton clinker) based on fuel volatility. Industry commenter (73) states that modern preheater/precalciner kilns fire approximately 55–65 percent of their fuel in the precalciner. The nitrogen content in the fuel is the main factor affecting fuel NO_X formation. The fuel NO_X produced in the precalciner is not directly proportional to the nitrogen content of the fuel. It also depends on the chemical form of the nitrogen in the fuel and the volatility of the fuel. Typically, fuel nitrogen in coals used by PH/PC kilns varies between 1.0 and 2.0 percent. This difference can impact the uncontrolled NO_X by as much as 1.5 lb/ton of clinker.

Industry commenter 73 states that a PH/PC kiln system uses hot gases from the kiln to both dry and heat the raw materials prior to calcination. The effectiveness of this system is related to the moisture content of the raw materials and their ability to absorb heat from the gases. If additional heat is required to dry or heat the raw materials, gases from a separate fuel-fired furnace or the clinker cooler are ducted to the raw mill. As a result, the moisture content of the raw materials directly influences the NO_X emission rates. High moisture materials require additional energy to dry the materials in the raw mill and/or preheater. This increased need for energy contributes to the amount of NO_X emitted if the excess energy comes from burning additional fuel. Some plants may have up to 20–25 percent moisture content in their raw mix—which results in a 15 to 20 percent increase in the kiln's specific heat consumption, as compared to a "standard" raw mix that contains approximately 5 percent moisture. This additional energy need results in the combustion of more fuel which ultimately results in more uncontrolled NO_X.

On NO_X emissions from alkali bypasses, commenter 73 states that because the gases within the bypass are not allowed to remain in the optimal SNCR temperature range, SNCR is not a feasible control option for these gases. The commenter shows (in graph form in their comments) that for a certain size kiln, bypassing 25 percent of its kiln gases will have an incremental increase of approximately 0.42 lb/ton of clinker in the controlled NO_X emission rate.

Industry commenter 73 states that the three major kiln suppliers require a cement company to provide detailed information on raw materials (including moisture content), fuels, and clinker quality specifications prior to preparing a quotation and specifying emission guarantees. Uncontrolled 30-day average NO_X emissions can vary from less than 1.6 to greater than 4.6 lb/ton of clinker. SNCR has been demonstrated to reduce NO_X emissions from cement kilns; however, SNCR has not been used on cement kilns for an extended period of time. High removal efficiencies such as those stated in the preamble (*i.e.,* 63 percent at an ammonia-to-NO_X ratio of 1.0) may result in adverse product quality or environmental impacts that are undesirable. In addition, the use of SNCR on larger kilns (>2,000,000 ton/yr capacity) may not be as effective due to the larger calciner duct diameter and the inability of the ammonia-reagent to mix thoroughly with the combustion gases. Based on limited data, removal efficiencies of 25–50 percent appear to be achievable without these adverse impacts. Therefore, industry Commenter 73 believes that since NSPS is applicable to all new or reconstructed kilns, a reasonable baseline NSPS limit taking into account typical operating conditions and limitations stated above is 2.0 lb/ton of clinker. However, when non-typical conditions exist (bypass, hard burning mixes, and specific clinkers that require non-typical burning methods), an adjustment upward from the baseline value is appropriate and should be made on a case-by-case basis.

Industry Commenters (64, 73) stated that the proposed NO_X limitations are substantially more stringent than the most stringent NO_X limit that applies to cement plants in Europe, which converts to approximately 2.5 lb/ton of clinker produced although EPA asserts that this should be considered the "baseline level of control that would occur with no additional regulatory action." The industry commenter states that there are several problems with that analysis: (1) It does not appear that this conclusion is based on a "statistically sound" analysis, as the statute requires; and (2) If the NSPS were set at 2.5 lbs of NO_X per ton of clinker, then all affected facilities would have to meet the limitation continuously, rather than the "average" performance of all affected facilities being at or below 2.5 lb/ton. Therefore, it would appear from EPA's rationale that setting an emission standard of 2.5 lb/ton would require some facilities, even if they have SCC and low-NO_X burners, to implement additional NO_X controls in order to comply continuously with that standard throughout the life of the facility.

The industry commenter states that there may be substantial differences between the NO_X emissions that can be achieved by new, greenfield kilns and what can be achieved by "reconstructed," brownfield kilns. NO_X emissions are a function of fuel type and of raw material type, as described above. Reconstructed cement plants usually will have little or no control over their raw materials and may have limited control over the fuel they can use.

The industry commenter states that EPA also needs to address the achievability of NO_X limitations at cement plants that have bypass stacks to control alkalinity because EPA has not presented any basis for concluding that SNCR is a demonstrated technology for meeting the proposed limits for facilities with bypass systems.

Likewise, while EPA acknowledges that burnability may have a significant influence on NO_X emissions, EPA has not explained how these differences are reflected in its analysis of the BDT and the proposed new NO_X limits. Cement plants with hard-to-burn raw materials face much greater challenges in meeting a NO_X limit and applying SNCR.

Industry commenter (64) agrees with EPA that SCR has not been demonstrated on preheater/precalciner kilns and that there are substantial unresolved issues about the potential for use of SCR at such cement plants. Industry commenter (64) also notes that, in addition to the cost which EPA identified as a disadvantage of a low dust SCR system, there would be substantial adverse energy usage and GHG consequences of re-heating the flue gas for a low-dust SCR system.

Industry commenter (64) also believes that EPA has not given adequate consideration to ammonia slip from the use of SCNR. EPA seems to acknowledge that it does not have data on how ammonia slip will contribute to condensable PM emissions, and what if anything could be done to mitigate that contribution. EPA has not conducted a sufficient technical analysis to support new NO_X emission limits that would effectively require use of SNCR without addressing the ammonia slip issues. Ammonia slip may be a particular problem when SNCR is applied to particular designs, such as pyro systems that have been modified or that are particularly large. The inability of these systems to promote the reaction of ammonia with NO_X also reduces potential control efficiency of SNCR on these systems.

Industry commenter (64) believes that the best approach is for EPA not to amend the NSPS to include NO_X limits. If EPA nevertheless insists on including NO_X in the revised subpart F NSPS, then industry commenter (64) recommends that for preheater/precalciner kilns (whether constructed at Greenfield or brownfield sites), a NO_X emission floor of 1.95 lb/ton of clinker be established as the NSPS limit. This limit would then be modified on a case-by-case basis to account for site-specific factors such as the presence of a bypass stack/duct or difficult to burn limestone or fuels, likely resulting in an emission limit in excess of the recommended floor.

Response: The previous response addresses the industry commenters' concerns regarding the appropriateness of the NO_X emissions limit. Based on the data received prior to proposal as well as data submitted after proposal, we feel confident that a well designed preheater/precalciner kiln using low NO_X process technology such as LNB and SCC will be able to achieve a NO_X emission level of 3 lb/ton of clinker or less and using a well designed and operated SNCR system will achieve NO_X removal efficiencies of at least 50 percent without excess ammonia slip. But should a case occur where NO_X emissions prior to application of SNCR are above 3.0 lb/ton clinker, we have set the limit sufficiently high that a facility could increase the NMR for SNCR to achieve removal efficiencies above 50 percent without causing excessive ammonia slip. Referring to Figure 2 above on NMR verses removal efficiency, we note that a NMR of 1 results in a removal efficiency above 75 percent, where a NRR of 1 equates to a point where excessive ammonia slip can occur.

The industry commenters point to numerous factors that can influence NO_X emissions, fuel volatility and type of fuel nitrogen being two factors mentioned. However, we note that facilities have a choice of fuels. If their current fuel creates a high NO_X situation, then they may need to modify their fuel choice. They again raise the issue of burnability but in the context of certain product types. Again we note that there are numerous facilities that achieve NO_X levels well below 3.0 lb/ton clinker located at various locations, some of which have "hard to burn" raw materials. The industry commenters provided no data to substantiate that the burnability issues associated with product types are any more severe that burnability issues associated with different raw materials. Given these different locations, we would surmise that they also use different coals and possible other fuels. Given the breadth of the data, we find it unlikely that we have not sufficiently covered all the variables that affect NO_X emissions. And also given the operating margin we have applied for SNCR (50 percent reduction on average versus a potential reduction of 75 percent), we continue to believe that the 1.5 lb/ton clinker emission limit is achievable under any reasonable foreseeable conditions without resulting in excessive ammonia slip (and the attendant potential to produce $PM_{2.5}$). Industry commenters note that a larger kiln may have problems with ammonia distribution and an attendant reduction in SNCR efficiency. However, they provided no data to substantiate that claim, and we note that some of the kilns achieving levels well below 3.0 lb/ton clinker are above 1 million tpy in size. For larger kilns, it should be possible to use a split exhaust dust if necessary to achieve the required ammonia distribution.

Some industry comments expressed concern that sources will have to actually be able to reduce emissions to below the NO_X limit in order to not exceed the limit. In proposing the NO_X limits, EPA took this into consideration when it set the NO_X limit as a 30-day average as opposed for example to a 24-hr limit. Doing so accommodates occasional daily excursions and accounts for operational variability.

EPA agrees with the industry commenters that kilns equipped with alkali bypasses cannot be expected to meet the NO_X limit for the portion of the exhaust that goes to bypass. Bypass gases are quickly cooled and do not remain at a temperature long enough to be treated using an SNCR systems. EPA has revised the rule to clarify that for kilns with alkali bypasses, only the main kiln exhaust gases are subject to the NO_X limit. Because all kilns do not require an alkali bypass and the bypass gas stream is a small fraction of the total kiln exhaust gas flow, the emission of NO_X from the bypass will be minimal.

Comment: Several State and environmental advocacy group commenters (60, 68, 70, 71, 72) stated that the proposed limits for SO_2 were not sufficiently stringent. State commenter (60) recommends deleting the 90 percent reduction option, revising the limit for SO_2 to 0.5 lb/ton clinker on a 24-hr rolling average if the kiln is a PH or PH/PC kiln and adding a limit of 1.0 lb/ton clinker on a 24-hr rolling average if the kiln is a long wet or long dry kiln. State commenter (72) concurs on reducing the limit to 0.5 lb/ton for PH/PC kilns. State commenter (60) states that for PH and PH/C kilns the limit should apply equally to projects at greenfield sites and to projects at brownfield sites. Industry commenter (60) cites kiln performance at brownfield sites that have involved new kilns and reconstructed or modified of existing kilns.

Cement plants in Florida emit on the order of 0.10 lb SO_2/ton clinker. Although these kilns use low-sulfur feed materials, all use coal and rely on the fuel SO_2 control that is inherent in the PH and PH/C designs. The steps include reaction with alkali and incorporation into the clinker in the burning zone, dry scrubbing with finely divided lime in the calcination zone and moist limestone scrubbing in the raw mill. State commenters (60) and (72) cite the performance of the kilns used by EPA to establish the proposed limit. The key kiln (kiln 5 at TXI Midlothian, TX) upon which EPA based the proposed SO_2 standard of 1.33 lb/ton has actually operated at 0.37 to 0.57 lb/ton.

State commenters (60) and (72) state that raw materials in the Midlothian area are known to be high-sulfur and the TXI kiln has a wet scrubber to reduce (non-fuel) SO_2 emissions. The limit for kiln 5 is now approximately 0.95 lb/ton following a production increase authorized by the Texas Commission on Environmental Quality (TCEQ). TXI Midlothian Kiln 5 and two other PH/C kilns (Kilns 1 and 2) operated by Holcim in the same city are controlled by wet scrubbers. All three have wet scrubbers yet there is a vast difference in performance between the TXI Kiln 5 and the Holcim Kilns 1 and 2. The commenter presented data on the SO_2 performance of the 3 scrubber controlled kilns. According to the commenter, the TXI Kiln 5 can consistently achieve SO_2 emissions less than 0.5 lb/ton if required by a permit limit. The higher SO_2 values for the Holcim kilns (>4 lb/ton) represent the first year of joint operation. Thereafter, Holcim Kilns 1 and 2 were operated at levels between 2 and 3 lb/ton. The commenter states that they can choose to run one to four pumps providing reductions in SO_2 emissions ranging from 51 percent with a single pump in operation to 91 percent with four pumps in operation.

State commenters (60) and (72) state that the Ash Grove Chanute PH/C kiln in Kansas achieves less than 0.30 lb SO_2/ton despite high sulfur in the raw materials without even using a wet scrubber. State commenter (60) states that this performance is attained using important innovations (The F.L. Smidth DeSOx system and Envirocare Micromist Lime system) not yet assessed by EPA. Attachments provided as part of the comment describe these technologies. State commenter (60) states that without controls, the proposed Chanute kiln would emit SO_2 at the high rate of 12 lb/ton from raw material sources alone (*i.e.,* exclusive of fuel SO_2). According to state commenter (60), using the described technology, actual emissions from the Ash Grove Chanute kiln are less than 0.25 lb SO_2/ton.

According to State commenter (60), the Holcim Siggenthal PH kiln in Switzerland achieves approximately 0.05 lb SO_2/ton using the POLVITEC coke filter installed in the 1990's. The POLVITEC system is used with various concurrent operational practices to control NH3 (from an SNCR system), SO_2, PM and metals. Among several functions, the coke filter captures the non-fuel SO_2 generated in the PH. The coke is subsequently crushed and then burned with fuel in the main kiln burner. The SO_2 from the PH then behaves like fuel SO_2 and is incorporated into the clinker. Further details are available in an attachment submitted with the comment. The State commenter also states that SO_2 emissions would be significantly less than 0.10 lb/ton of clinker. According to the State commenter, the Siggenthal plant emits much less SO_2 than the average of Holcim cement plants in Switzerland and clearly less than 0.10 lb SO_2/ton.

State commenters (60) and (72) state that the Holcim Untervaz plant in Switzerland achieves between 0.04 and 0.21 lb SO_2/ton using a wet scrubber despite, according to State commenter (72), the presence in the limestone of iron sulfide. Holcim initially installed a dry scrubber at the Untervaz plant in the late 1980's. Recent data provided by the State commenter indicate significant reductions in SO_2 emissions since 2002 largely due to the replacement of the older dry scrubber with a more efficient and economic wet scrubber.

According to State commenter (60), the areas where medium sulfur raw materials are present can implement programs similar to the Ash Grove installation without installing large wet scrubbers, dry scrubbers or coke filters. Finally selective mining of the available raw materials with respect to sulfur content is an important SO_2 control strategy for any new project. In summary, State commenter (60) recommends an NSPS SO_2 limit of 0.50 lb/ton of clinker on a 24-hour basis for PH and PH/C kilns. State commenter (60) states that because long wet and long dry kilns use more energy to make a ton of clinker, a higher SO_2 limit may be acceptable. State commenter (60) agrees with EPA's assumption that new projects triggering the NSPS will result in a PH/C kiln. According to the State commenter, projects that might trigger a PSD review at a long wet or long dry kiln will probably incorporate emissions control measures to avoid PSD and a BACT determination. The measures to avoid PSD will also likely avoid the short-term emissions increases that would otherwise trigger the NSPS. With respect to the reconstruction provisions, the commenter states that it is not likely that a company will actually invest 50 percent of the (undepreciated) value of an existing long kiln without taking the opportunity to make it much more energy efficient through conversion to a PH/C kiln. Nevertheless, the State commenter states that it is advisable to separate out the (unlikely) long kiln projects that trigger the NSPS without resulting in PH or PH/C kilns in order to avoid the unnecessary relaxation of the limits applicable to the much more likely PH and PH/C kilns. According to the State commenter, scrubbers are available for long kilns just as they are available for PH and PH/C kilns. Other suggested strategies cited by the commenter include (1) Near mid-kiln pressurized air injection; and (2) Chains near the entrance of the kiln that can improve contact between the incoming wet limestone and the SO_2-laden exhaust gases containing both raw material and fuel sulfur.

State commenter (60) states that good SO_2 control will make it possible to employ more aggressive NO_X control and that the control of NO_X and SO_2 will also minimize the formation of ozone and fine PM in the environment.

State commenters (68, 70, 71) stated that State and local experts, who have had long experience with this industry, believe that the proposed NSPS limit for SO_2 does not reflect what most plants are capable of achieving. Even taking into account regional variability in the pyritic sulfur content of the raw materials, these State commenters find that most cement kilns already achieve lower SO_2 emissions than the 1.33 lb/ton of clinker proposed.

State commenter (70) stated that after addressing raw materials in their most recent BACT review, SO_2 limitations were 0.9 lb/ton of clinker (30-day average) and 1.6 lb/ton of clinker (24-hr average); considerably lower than the 1.33 lb/ton of clinker (30 day average) proposed.

Response: Most kilns have low SO_2 emissions because of the widespread availability of raw materials with low to moderate sulfur levels and the inherent scrubbing effects of modern PH/PC kilns with in-line raw mills. In fact, these two reasons have been cited as BACT in several NSR reviews. Sulfur in the fuel is typically not a problem because the sulfur content is relatively low and the sulfur has ample opportunity to react with clinker and dust both in the kiln and raw mill before the exhaust gases are discharged to the atmosphere. The sulfur that usually results in higher SO_2 emissions is due to pyritic sulfur contained in the raw materials, especially the limestone. Where kilns have high levels of pyritic sulfur in their raw feed, wet scrubbers may be necessary to meet the limit for SO_2.

We note that in our analysis of the NESHAP, all new kilns will have to apply wet scrubbers to meet the HCl emissions limit. If this indeed occurs then costs of wet scrubbing to meet the SO_2 will be negligible. Even in the absence of the NESHAP requirements, the application of a wet scrubber to a kiln that has high uncontrolled SO_2 emissions is a cost effective approach to reducing SO_2 emissions. At higher uncontrolled emission levels, wet scrubbers achieve emission reductions of 90 to 95 percent. However, at lower uncontrolled SO_2 levels, removal efficiency declines resulting in an increase in cost-effectiveness. But at this point other cost-effective control techniques, such as lime injection, are available. Based on these facts, we have lowered the SO_2 emission limit in this final rule to 0.4 lb/ton clinker or a 90 percent reduction in SO_2 emissions, which addresses the comments that the proposed SO_2 limit was too high.

Comment: Several industry commenters (64, 74, 75) expressed concerns that the proposed limits for SO_2 are too stringent. One industry commenter (64) recommends that EPA not include SO_2 limitations because EPA recognizes that there are only "a few locations" where the raw materials contain high levels of sulfur, and in those few situations State regulations already impose SO_2 emission limitations that require the type of technology EPA proposes as the basis for the proposed SO_2 limitations. The industry commenter states that EPA assumes that one out of five new kilns will be sited where the raw materials are high in sulfur, requiring an SO_2 scrubber or a lime injection system when in fact at existing plants there have only been a handful of situations where high-sulfur materials have been determined to justify wet scrubbers. According to the industry commenter, of 28 BACT determinations for SO_2 for cement kilns since 1998 reported in the RACT/BACT/LAER Clearinghouse (RBLC), only 5 were based on wet scrubbers, and 1 specified a dry scrubber or hydrated lime injection while the majority required no add-on controls because of low-sulfur raw materials or reliance on the inherent process absorption of SO_2. The industry commenter states that the preamble information that the fact that only 5 kilns out of 178 kilns currently use a wet scrubber indicates that uncontrolled SO_2 emissions are rarely high enough to justify add-on controls.

The industry commenter states that EPA acknowledges in the preamble that EPA is not obligated to promulgate NSPS for every pollutant emitted by sources in the source category. According to the industry commenter, the fact that very few cement kilns have been required to employ add-on controls for SO_2 is evidence that there are few instances where cement kilns are contributing to SO_2 NAAQS nonattainment, so there is no need for an SO_2 NSPS to address ambient air quality problems.

Industry commenter (64) states that allowing State and site-specific requirements to address SO_2 at plants with high-sulfur raw materials would address weaknesses in EPA's proposed SO_2 standards. For example, although EPA assumes that the proposed SO_2 standards will require add-on controls only at facilities with high-sulfur raw materials, EPA has proposed a limit of 1.33 lb of SO_2 per ton of clinker, whereas the average emission rate from just 18 data points from tests at facilities with moderate levels of sulfur in raw materials was 1.3 lb/ton. EPA's assumption that facilities with low and moderate levels of sulfur in raw materials would not have to install controls to meet the proposed SO_2 standards is not justified by those data. Requiring facilities with moderate uncontrolled SO_2 emission levels to use add-on controls for SO_2 would result in excessively high costs per ton of SO_2 removed, as EPA has recognized. Also, the energy penalty associated with wet scrubbers could more appropriately be evaluated on a case-by-case basis, where it can be weighed against factors such as the level of uncontrolled SO_2 emissions at the particular plant and the need for further SO_2 reductions at that location for attainment and maintenance of SO_2 ambient air quality standards.

Industry commenter (64) states that because there is so little experience with add-on SO_2 controls, EPA has relatively little data about the performance of those controls, and is proposing NSPS for SO_2 based solely on a recent BACT determination. The few kilns that will be subject to the proposed subpart F NSPS can be addressed through requirements for SO_2 control derived through the RACT process or through NSR.

Industry commenter (64) states that if EPA persists in setting SO_2 standards, there are a number of problems with the standards as proposed. For example, the percentage reduction alternative does not indicate that it is to be calculated on a 30-day basis or how the percentage reduction is to be calculated. The industry commenter infers from the monitoring provisions that EPA intends for a source to compare the SO_2 concentration at the inlet to the scrubber to the SO_2 concentration at the outlet from the scrubber, but this does not reflect the substantial reduction in SO_2 emissions that occurs from contact with alkaline materials in the process. The industry commenter states that cement plants with moderate uncontrolled SO_2 emissions may have to install controls and the 90 percent reduction standard likely would be unachievable when applied to the relatively low inlet concentrations to the control device. The industry commenter states that it is even less clear how EPA would apply the percentage reduction standard to cement plants that choose to use lime injection.

Industry commenter (64) states that the proposed regulations lack any discussion of whether the SO_2 limitations apply during periods of startup, shutdown, and malfunction. Since substantial reduction of SO_2 occurs naturally in the cement-making process because of the alkaline nature of the raw feed, industry commenter (64) states it would be reasonable to provide an exemption so that a wet scrubber or a lime injection system need not be operating, or operating at maximum efficiency, during periods of startup, shutdown, or malfunction. The industry commenter states that several recent BACT determinations involving scrubbers include special provisions for startup, shutdown, or malfunction.

Industry commenter (64) states that the proposed limits for SO_2 appear inconsistent with their stated technology basis, when compared to actual experience and to BACT determinations. According to the commenter, the majority of BACT determinations in the past 10 years that rely only on inherent SO_2 reduction established limits higher than 1.33 lb/ton of clinker, except for plants in Florida, where the BACT determinations often recognized that raw materials are low in sulfur. According to the industry commenter, NSPS should be based on demonstrated technology that can be applied to the sector as a whole, rather than based on raw materials that are available only in a limited area of the country. These BACT determinations also undermine EPA's stated assumption that 1.3 lb/ton represents a "moderate uncontrolled SO_2 emission rate" and 13 lb/ton would be "a high uncontrolled SO_2 emission level," since almost all BACT determinations for plants other than those in Florida imposed SO_2 emission limits based on no add-on controls higher than 1.3 lb/ton, and a number were higher than 13 lb/ton.

Industry commenter (64) states that if EPA insists on promulgating NSPS for SO_2, it is essential that the standards retain the proposed option of meeting either a pounds per ton of clinker or a percentage reduction limit; but both limits should be higher than proposed. According to the commenter, the three wet scrubbers operated by Holcim were not designed to achieve 90 percent reduction, and the one BACT determination that contains an estimated percentage reduction in the RBLC uses 85 percent reduction. Importantly, cement plants in arid venues may not have the option to use a wet scrubber because of water restrictions. Especially if EPA persists in applying the revised NSPS to existing, modified or reconstructed facilities, wet scrubbers cannot be considered demonstrated available technology for all facilities in the source category. EPA does not, and industry commenter (64) believes EPA cannot, support a 90 percent reduction requirement using dry scrubbers or lime injection. According to the industry commenter, to qualify as a limit based on demonstrated technology, the limit should be achievable at all types of plants, raw materials, and locations, and should be based on actual performance data rather than what is "reportedly" achievable or anticipated.

Industry commenter (64) states that 1.33 lb/ton does not represent even the technology basis—alkaline wet scrubber on high-sulfur raw materials—that EPA has identified. The industry commenter states that EPA describes one kiln where uncontrolled SO_2 emissions are "about 13 lb/ton of clinker." Achieving 90 percent reduction of that uncontrolled emission rate would just meet the proposed mass limit, with no margin of compliance. And in any event, at least four of the BACT determinations for cement kilns in the past 10 years reported in the RBLC reflect uncontrolled SO_2 emission rates over 20.0 lb/ton. The proposed limit of 1.33 lb/ton thus does not reflect a limit that has been demonstrated as achievable applying wet scrubber technology to the range of sulfur contents present in cement plant raw materials.

One industry commenter (74) states that the proposed SO_2 limit may be achievable in most cases but different plants will require different solutions to achieve that limit. Due to the large variations in the elemental and pyritic sulfur from plant to plant, industry commenter (74) does not believe that it is fair to have a set SO_2 limit for all plants. Each plant's limit should be considered on a case-by-case basis considering the elemental or pyritic sulfur level in the raw materials and a reasonable target for the cost per short ton of removal to determine the controls that are used. In some cases this will give a limit lower than 1.33 lb/ton clinker and in other cases it will give a higher limit.

One industry commenter (75) states that: (1) Given the range of pyritic sulfur in our raw material, we would need to have a wet scrubber to meet this limit; (2) Lime injection is an effective control with less secondary impacts on water supply and energy use; and (3) A limit of 4 lb/ton of clinker should be adopted. This would allow greater use of lime injection, providing significant SO_2 reductions while avoiding secondary adverse environmental impacts and energy use of wet scrubbing. The industry commenter does not believe that the proposed limit adequately reflects the inherent variability of kiln emission rates, which are dictated by the characteristics of the raw feed to a kiln. Industry commenter (75)'s kiln feed is locally mined raw materials used for over 100 years, with plans to continue the present mining operation for many years in the future. The standard, as proposed, would impose economic and environmental impacts beyond those considered by EPA.

Response: EPA disagrees with the industry commenter that the Agency is under no obligation to set standards for SO_2 as evidenced by the lack of any SO_2 limits previously or the infrequent need for scrubbers (5 out of 20 new kilns expected to need scrubbers). The absence of SO_2 limits in the NSPS previously was due to the lack of a demonstrated add-on control technology applied to cement kilns during EPA's last review of the NSPS in 1988. Since then, wet scrubbers have been installed on no less than five kilns and operate continuously. Other scrubbers, dry and wet, are installed on other kilns and operate as needed. In reference to the industry commenters' observations regarding permitted kilns in the RBLC database, EPA notes that three kilns for which scrubbers are reported as an add-on control device have permit limits far in excess of the NSPS SO_2 limits indicating a clear need for national standards for SO_2 emissions from cement kilns. Furthermore, controlling SO_2 emissions will control emissions of condensable fine particulate matter, leading to very significant environmental benefits. *See* Table 13 in Section VI. Control is consequently in keeping with the ultimate goals of the Act in general and section 111 in particular: protecting and enhancing the Nation's air quality. *See Asarco* v. *EPA,* 578 F. 2d at 327.

In response to the industry commenters' argument that kilns utilizing raw materials with moderate sulfur levels may have to install controls to comply with the SO_2 limit, EPA agrees that in a few instances those kilns may need to reduce their SO_2 emissions. However, these kilns only need moderate reductions in SO_2 and have options other than adding wet scrubbers (assuming no wet scrubbers are needed to meet the NESHAP HCl standard). In addition to the inherent scrubbing that occurs with the raw mill, cement plants can and do also practice careful selection of their raw materials to avoid high sulfur materials. There are cement plants that already limit the sulfur in their raw materials through their mining practices and through screening the raw materials they purchase. Owners and operators also reduce SO_2 emissions by not burning sulfur-containing coal and by burning natural gas during kiln preheating, shutdown and during other maintenance periods when the kiln and/or raw mill are down. In those instances when some additional reduction is necessary, a less expensive alternative to wet scrubbing is lime injection. Lime injection can achieve up to 70 percent reduction and may only be necessary during periods of higher SO_2 emissions, for example when the raw mill is off.

In response to the industry commenter's questions of how the 90 percent reduction is to be determined, they are correct that the reduction is to be measured across the scrubber (in other words, measurements must be made to measure the SO_2 entering the scrubber and the SO_2 exiting the scrubber). Like the SO_2 standard, the rule states explicitly that the 90 percent reduction is to be based on a 30-day average. In the case of lime injection, EPA believes this add-on control will only be used in situations requiring a modest reduction in SO_2 emissions and these kilns will be able to meet the SO_2 emissions limit.

EPA disagrees with the industry commenter's suggestion that EPA provide some allowance for periods of startup, shutdown or malfunction as SO_2 emissions are affected by whether the raw mill is operating or not. The industry commenter requested that EPA allow that during these periods, scrubbers or lime injection systems need not operate or at least need not operate at maximum efficiency. The industry commenter provided no data to indicate that, given the long averaging periods, a facility's raw mill up time versus down time is significantly affected by periods of startup and shutdown. In fact, the reason for the 30 day averaging period was specifically to allow a long enough averaging period that the higher emissions that occur for SO_2 when the raw mill is down could be averages with long periods when the raw mill is operating.

EPA disagrees with the industry commenter's statement that the proposed limits for SO_2 appear inconsistent with their stated technology bases, when compared to actual experience and to BACT determinations. The standard was based on the performance of a scrubber-equipped kiln that processed high sulfur limestone. The alternative to the SO_2 emission limit is to demonstrate a 90 percent removal efficiency across the scrubber. EPA could not ignore the performance of this control technology, *i.e.,* wet scrubbers, which are currently used full time at 5 cement plants. In reviewing the RBLC database, it is obvious that, in some cases, permit limits are not as stringent as they could be. One entry in the RBLC database even stated that the permit limit did not account for the reduction that would be achieved by the scrubber installed to control SO_2.

We note that industry commenters have stated that some new facilities may be located in areas where there is not sufficient water to operate a wet scrubber. However, we are not mandating the use of wet scrubber technology in these regulations, and we believe that sufficient alternative controls exist for SO_2 controls that this issue would not preclude a facility from meeting these emissions limits. As previously noted, these alternative technologies include dry lime injection, injection of sodium compounds, selective mining, injection of a finely divided lime slurry, use of lower sulfur fuels, and careful screening of purchased raw materials. Regarding the industry commenter's statements that the emission limit and alternative percent reduction should be less stringent, EPA notes that the kiln upon which the emission limit was based actually operates at levels under 0.6 lb/ton clinker based on information supplied by another commenter (60). The same industry commenter states that the limit for the kiln was reduced in 2007 from 1.33 to 0.95 lb/ton following a production increase authorized by the Texas Commission on Environmental Quality. To support its statement that a 90 percent removal efficiency is too high, the industry commenter noted that three Holnam (now Holcim) plants use scrubbers that are designed to operate at less than 90 percent efficiency. Our data for the scrubbers at the Texas plant shows that the removal efficiency depends on the number of pumps in operation, with 91 percent efficiency when all four pumps are operating. The scrubbers at the Holnam facility in Michigan have not operated continuously due to various issues encountered. We also note that SO_2 scrubbers in the utility industry have consistently achieved 90 percent SO_2 since the 1970s. We see no technical reason that the same removal levels are not achievable in the cement industry. Therefore, where add-on controls are necessary to comply, scrubbers designed to achieve at least a 90 percent efficiency or greater are expected to be able to meet the 90 percent efficiency alternative; cement plants may be able to meet the emission limit by utilizing scrubbers with less than 90 percent efficiency or with lime injection if the uncontrolled SO_2 levels are at moderate levels (assuming that wet scrubbers are not needed to comply with other requirements, such as the HCl standard in the NESHAP).

EPA does not agree with the industry commenter that the limit of 1.33 lb/ton based on uncontrolled SO_2 emissions of 13 lb/ton of clinker and a 90 percent reduction leaves no margin for compliance. First, there are scrubbers with efficiencies higher than 90 percent removal efficiency, which, even if they can't meet the 1.33 (or the 0.4) lb/ton clinker emission limit, will be able to consistently meet 90 percent removal. Secondly, based on an industry commenter, the SO_2 emissions from a PH/PC kiln are not likely to be as high as 13 lb/ton of clinker due to the scrubbing effects of the raw mill, but more in the range of 4–5 lb/ton of clinker (75). This is supported by data from a 2001 survey of cement plants showing that average SO_2 emissions from PH kilns was 1.39 lb/ton of clinker (maximum of 6.54) and from PC kilns was 1.92 lb/ton of clinker (maximum of 8.83). Based on these data, use of a wet scrubber should be able to meet the proposed SO_2 limit of 1.33 and the final limit of 0.4 lb/ton clinker. In some cases, a less expensive control such as lime injection may be adequate. Regarding the industry commenters reference to determinations reported in the RBLC that reflect uncontrolled SO_2 emission rates over 20.0 lb/ton, these rates (if they are accurate) are associated with old wet kilns that do not have inline raw mills. In the case of one the two Michigan kilns, the quarries raw materials are known to have extremely high sulfur contents that are not seen at other locations. However, even if this location decided to build a new kiln, or to modify or reconstruct an existing kiln, they would still have the option to meet the 90 percent removal option.

In response to the industry commenter that states it is not fair to have a set SO_2 limit for all plants and that each plant's limit should be considered on a case-by-case basis, EPA points out that the standards gives plants an alternative to the SO_2 limit recognizing, just as the industry commenter states, that some plants may not be able to meet the SO_2 limit due to the presence of pyritic sulfur in its limestone. Where plants cannot meet the SO_2 limit, they have the option of complying with the alternative limit of showing a 90 percent reduction in SO_2 emissions.

EPA disagrees with one industry commenter's suggestion of setting the SO_2 limit at 4 lb/ton clinker in order to allow greater use of lime injection systems. Given that there are cost-effective controls to achieve much lower levels, a limit of 4 lb/ton clinker simply cannot be considered BDT. We also note that EPA does not specify the type of control that must be used to meet the limit, or, for that matter, that any specific control has to be used. Plant owners may use any add-on control, such as lime injection if a control is necessary, or process control, such as selective mining, or a combination of add-on and process controls to meet the limit. The industry commenter states that it mined its materials locally for over 100 years and plans to continue to do so. However, almost all cement plants in the country could make a similar statement, and it has no relevance and does not change the facts that cost-effective SO_2 controls are available to achieve SO_2 emission levels of 0.4 lb/ton clinker.

Comment: One industry commenter (64) supports EPA's decision not to set separate limits for condensable PM, $PM_{2.5}$, or PM_{10} stating that these fractions of PM will be adequately controlled by facilities utilizing control equipment sufficient to meet the proposed limits for PM. The industry commenter also concurs that EPA does not have adequate data on the emissions or the demonstrated capability of various control technologies to meet any specified level of these fractions of PM. The industry commenter states that they are not aware of any demonstrated or emerging technology that would provide better control of $PM_{2.5}$, PM_{10}, or condensable PM emissions specifically.

Response: The PM limits address filterable PM, including $PM_{2.5}$ and PM_{10}, but not condensable PM. EPA does not currently have sufficient information on emissions of condensable PM from cement kilns to set emission limits and the limited information we do have is highly uncertain. We also believe that these emissions will be controlled via controls on HCl in the NESHAP and SO_2 in the NSPS. EPA has recently promulgated a new test method for condensable PM (Method 202) which will allow for more reliable assessments of condensable PM. We anticipate that better data will be available at the time of the next review of the NSPS.

Comment: Several industry commenters (64, 73, 74, 83) expressed concerns over the proposed NSPS for PM of 0.086 lb/ton of clinker. Industry commenter (64) states that the proposed limit of 0.086 lb/ton of clinker is not supported by the data available from new plants with the identified technology: It does not allow for deterioration of performance over time, and it does not allow for an adequate margin of compliance. Industry commenters believe that EPA used insufficient data to develop the standard and failed to consider situations where gases from kilns, clinker coolers, and coal mills are combined for energy recovery purposes. Industry commenter (73) has spoken to major suppliers of cement kiln systems and believes that baghouse technology with membrane bags is capable of achieving a continuous outlet grain loading rate of 0.010 gr/dscf. Applying EPA's factors for standardized volumetric flow and feed-to-clinker ratio (54,000 dscf/ton of feed and 1.65 tons feed/ton clinker), an appropriate NSPS PM standard would be 0.127 lb/ton of clinker for cement kilns and clinker coolers. Industry commenter (73) and (74) also believe that when clinker cooler and kiln gases are combined, the standard for these systems should be additive.

The industry commenters stated that the standards must be set at a level that recognizes that there will be some deterioration in performance over time. According to the industry commenters, in most cases, emission rates achieved immediately after installation of pollution control equipment will not be representative of the performance over the life of the source, as the bags and the baghouse itself age and experience normal wear, even with proper operation and maintenance. Industry commenter (73) agrees with EPA that “fabric filters control generally to the same concentration irrespective of the PM loading to the filter inlet, though some variability in PM emissions from fabric filters does occur due to seepage and leakage.” It is the seepage and leakage that becomes an issue as baghouses age. Industry commenter (64) states that the PM stack testing data used by EPA in their analyses were obtained from kiln-baghouse systems that had operated for less than 5 years and, therefore, EPA has not demonstrated that they have proposed a limit that new sources can sustain long term. EPA has recognized this in numerous other rulemakings, including in setting emission standards for hazardous air pollutants at new cement kilns burning hazardous waste where they amended the PM limits for new sources in that NESHAP based on data demonstrating that the original PM standard was “overly stringent in that it does not fully reflect the variability of the best performing source over time.”

Response: As noted in the previous comments on the NESHAP PM limit, we have reevaluated the performance of PM controls for this source category and have determined that the appropriate NESHAP new source standard is 0.1 lb/ton clinker based on a 30 day rolling average. Because all new sources will be required to meet this limit, we see no reason to set a different limit for the NSPS. We note the industry commenter's performance concerns. However, in setting the NESHAP limit we reviewed test data from a number of facilities. Some facilities had average emissions as low as 0.007 lb/ton clinker based on short term testing, and the average of the best performing five facilities was 0.019 lb/ton (based on multiple short term testing). Based on this information, we believe that if the PM control is properly designed and maintained, PM levels well below the level we proposed, or the levels suggested by the commenter are possible. In addition, the data discussed were short term tests. Compliance will be based on a 30-day rolling average, which allows facilities to average out potential short term transients.

VI. Summary of Cost, Environmental, Energy, and Economic Impacts

A. What are the impacts of the final amendments to subpart LLL and subpart F?

We are presenting a combined discussion of the estimates of the impacts for these final amendments to 40 CFR part 60, subpart F and 40 CFR part 63, subpart F. The cost, environmental, and economic impacts presented in this section are expressed as incremental differences between the impacts of a Portland cement plant complying with the amendments to 40 CFR 63 subpart LLL 40 CFR part 60 subpart F and the baseline, *i.e.,* the standards before these amendments. The impacts are presented for the year 2013, which will be the year that all existing kilns will have to be in compliance, and also the year that will represent approximately 5 years of new kiln construction subject to the amended NSPS emissions limits. The analyses and the documents referenced below can be found in Docket ID Nos. EPA–HQ–OAR–2007–0877 and EPA–HQ–OAR–2002–0051.

1. What are the affected sources?

We expect that by 2013, the year when all existing sources will be required to come into compliance, there will be 100 Portland cement manufacturing facilities located in the U.S. and Puerto Rico that we expect to be affected by these final amendments. Of these facilities, approximately 5 are complete new greenfield facilities. These facilities will operate 158 cement kilns and associated clinker coolers. We have no estimate of the number of raw material dryers that are separate from the kilns.

Based on capacity expansion data provided by the Portland Cement Association, we anticipate that by 2013 there will be 16 kilns and their associated clinker coolers subject to NESHAP new source emission limits for mercury, HCl, and THC, and seven kilns and clinker coolers subject to the amended NSPS for NO_X and SO_2. Some of these new kilns will be built at existing facilities and some at new greenfield facilities. The location of the kiln (greenfield or currently existing facility) has no bearing on our estimated cost and environmental impacts (since there are no longer separate standards for so-called greenfield new sources).

As previously noted there are two kilns with unusually high mercury emissions that we believe cannot meet the mercury emissions limit without using more than one control technique. In developing the cost impacts, we assume that they would require multiple mercury controls. The only mercury controls available for which we have detailed cost data are ACI and wet scrubbers, so we costed both controls to develop what we consider to be a reasonable cost estimate for these facilities. This does not imply that we believe these facilities will specifically use a combination of a wet scrubber and ACI to meet the mercury limit, but we do believe the combination of these control results in a reasonable estimate of cost.

2. How are the impacts for this proposal evaluated?

For these final Portland Cement NESHAP amendments, EPA utilized three models to evaluate the impacts of the regulation on the industry and the economy. Typically in a regulatory analysis, EPA determines the regulatory options suitable to meet statutory obligations under the CAA. Based on the stringency of those options, EPA then determines the control technologies and monitoring requirements that sources might rationally select to comply with the regulation. This analysis is documented in an Engineering Analysis. The selected control technologies and monitoring requirements are then evaluated in a cost model to determine the total annualized control costs. The annualized control costs serve as inputs to an Economic Impact Analysis model that evaluates the impacts of those costs on the industry and society as a whole.

The Economic Impact Analysis model uses a single-period static partial-equilibrium model to compare a pre-policy cement market baseline with expected post-policy outcomes in cement markets. This model was used in previous EPA analyses of the Portland cement industry (EPA, 1998; EPA, 1999b). The benchmark time horizon for the analysis is assumed to be short and producers have some constraints on their flexibility to adjust factors of production. This time horizon allows us to capture important transitory impacts of the program on existing producers. The model uses traditional engineering costs analysis as "exogenous" inputs (*i.e.,* determined outside of the economic model) and computes the associated economic impacts of the final regulation.

For the Portland Cement NESHAP, EPA also utilized the Industrial Sector Integrated Solutions (ISIS) model which conducts both the engineering cost analysis and the economic analysis in a single modeling system. The ISIS model is a dynamic and integrated model that simulates potential decisions made in the cement industry to meet an environmental policy under a regulatory scenario. ISIS simultaneously estimates (1) optimal industry operation to meet the demand and emission reduction requirements, (2) the suite of control technologies needed to meet the emission limit, (3) the engineering cost of controls, and (4) economic impacts of demand response of the policy, in an iterative loop until the system achieves the optimal solution. The peer review of the ISIS model can be found in the docket.[45] This model was revised based on peer review comments and comments on the proposed rule and was used to develop cost and economic impacts of the final rule.

In a Technical Memo to the docket, we provide a comparison of these models to provide an evaluation of how the differences between the models may impact the resulting estimates of the impacts of the regulation. For example, the Engineering Analysis and Economic Impact Analysis evaluate a snapshot of implementation of the final rule in a given year (*i.e.,* 2013, based on 2005 dollars) while ISIS evaluates impacts of compliance dynamically over time (*i.e.,* 2005–2013). In general, given the optimization nature of ISIS, ISIS accounts for more flexibility when estimating the impacts of the regulation. For example, when optimizing to meet an emission limit, ISIS allows for the addition of new kilns, as well as kiln retirements, replacements, expansions and the installation of controls. In the Engineering Analysis the existing kiln population is assumed to be constant even though normal kiln retirements occur. Based on these differences, the total control costs from the Engineering Analysis are higher than the total control cost estimated in ISIS.

We have not yet developed ISIS modules to calculate non-air environmental impacts and energy impacts. Therefore, these sections only contain impacts calculated by the traditional engineering methods.

In addition, we have not yet developed ISIS modules to calculate non-air environmental impacts and energy impacts. Therefore, these sections only contain impacts calculated by the traditional engineering methods.

3. What are the air quality impacts?

For the Portland Cement NESHAP and NSPS, we estimated the emission reductions that will occur due to the implementation of the final emission limits. EPA estimated emission reductions based on both the control technologies selected by the engineering analysis and the ISIS model. These emission reductions are based on the estimated kiln population in 2013.

Under the final limit for mercury, we have estimated that the emissions reductions will be 14,700 lb/yr for kilns subject to the exiting source emissions limits. For kilns subject to new source emissions limits, the emissions reductions will be 1,900 lb/year in 2013.

Under the final limits for THC, we have estimated that the emissions reductions will be 9,800 tpy for kilns subject to existing source limits, which represents an organic HAP reduction of 3,400 tpy. For kilns subject to new source limits, THC emissions will be reduced by 720 tpy. This represents an organic HAP reduction of 250 tpy.

Under the final limit for HCl, we have estimated that emissions will be reduced by 4,700 tpy for kilns subject to exiting source limits and 1,100 tpy for kiln subject to new source limits.

The final emission limits for PM represent a lowering of the PM limit from 0.5 lb/ton of clinker to .04 lb/ton of clinker for existing kilns and for new kilns, a lowering to 0.01 lb/ton of clinker. These new limits are based on 30-day rolling averages measured with a CEM. We have estimated that PM emissions will be reduced by 9,500 tpy for kilns subject to the existing source limits and 2,000 tpy for kilns subject to the new source limit. These estimates include only direct PM reductions, and do not include secondary PM reductions that occur as a result of concurrent control of SO_2 discussed below. The PM emission reductions that occur as a result of the final NSPS limits are included in the totals shown above since the final NSPS PM limit is equal to the new source NESHAP limit.

The control strategies likely adopted to meet the final standards for mercury, THC and HCl will also result in concurrent control of SO_2 emissions. For kilns that use an RTO to comply with the THC emissions limit, it is necessary to install an alkaline scrubber upstream of the RTO to control acid gas and to provide additional control of PM

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[45] *See* Industrial Sector Integrated Solutions Model and Review of ISIS Documentation Packages dated August, 2010.

and to avoid plugging and fouling of the RTO. Scrubbers will also be used to control HCl and mercury emissions. Reductions in SO_2 emissions associated with controls for mercury, THC and HCl are estimated at 230 tpy, 11,200 tpy, and 98,400 tpy, respectively, so that total reduction in SO_2 emissions from existing kilns will be an estimated 95,500 tpy. The SO_2 emission reduction totals also include the reduction that will result from the final NSPS limit for SO_2. If we were to break out the NSPS SO_2 reduction separately, a new 1.2 million tpy kiln equipped with a scrubber will reduce SO_2 emissions by 190 tpy on average or about 14,300 tpy in 2013.

These controls will also reduce ambient concentrations of secondary $PM_{2.5}$ as well. This is PM that results from atmospheric transformation processes of precursor gases, including SO_2. Note that the PM emission reductions above do not reflect reductions in secondary PM formation. For these rules, the reduction in secondary PM formation represents a large fraction of the total reduction in ambient levels of PM, which is discussed in the benefits section of the preamble below. However, with the data available, we are unable to estimate the fraction of ambient PM reduction resulting specifically from the reduction in SO_2 emissions.

Under the final limit for NO_X, we estimated that the emission reduction for a 1.2 million tpy model kiln will be 600 tpy. The nationwide emissions reduction 5 years after promulgation of the final standards was estimated at 6,600 tpy.

In addition to this traditional estimation of emission reductions, EPA employed the ISIS model to estimate emission reductions from the NESHAP and NSPS. The estimation of emission reductions in the ISIS model accounts for the optimization of the industry and includes the addition of new kilns, kiln retirements, replacements, and expansions as well as installation of controls. Using the ISIS model, in 2013 we estimate reductions of 12,627 lbs of mercury, 10,809 tons of THC, 4,307 tons of HCl, 5,729 tons of PM (does not include reductions in secondary PM), and 80,245 tons of SO_2, and 14,159 tons of NO_X compared to emissions that would occur in 2013 in the absence of the NESHAP and NSPS. As noted, the ISIS model estimates lower SO_2 reductions because the model optimizes kiln retirements, replacements, and expansions as well as installation of controls. We did not determine ambient PM benefits based on the ISIS model's predicted emission reductions. However, even with this lower SO_2 reduction estimate, the secondary PM impacts would likely constitute a majority of the total ambient PM impacts. More information on the ISIS Model and results can be found in the ISIS TSD and in a Technical Memo to the docket.

Under the final standards, new monitoring requirements are being added. Particulate matter CEMS are being required on kilns and clinker coolers. For cement kilns, CEMS are required for measurement of THC, NO_X and SO_2. For kilns that do not have wet scrubbers, CEMS are required to monitor HCl emissions. Continuous emission measurement (CEMS or sorbent traps) are required for measurement of mercury emissions. There is insufficient data to quantify the emissions reduction that will result from these requirements. However, emissions reductions will occur as a result of the availability of continuous information on kiln and control device performance and a reduction in the length of time that operations are outside of acceptable conditions. Also, periods of excursions from acceptable conditions will be identified more quickly with continuous monitoring than with less frequent approaches, thus reducing the duration of such excursions.

4. What are the water quality impacts?

We estimated no water quality impacts for the proposed amendments. The requirements that might result in the use of alkaline scrubbers will produce a scrubber slurry liquid waste stream. However, 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. The four facilities (five kilns) that currently use wet scrubbers in this industry report no water releases at any time.[46] We requested comment in the Portland Cement NEHSAP proposal on the potential for water releases due to wet scrubber system purges and any regulations that might apply. Though commenters raised concerns of the possibility of water impacts, they did not provide a rationale of why it would be expected when it is not occurring at the four facilities that currently use wet scrubbers, due to their on-site reuse of water. If discharges did occur, there would be a potential for water quality issues. But given these facts, we believe our estimate of no water quality impacts resulting from production of waste water by wet scrubbers is reasonable.

The addition of scrubbers will increase water usage by about 4,200 million gallons per year. For a new 1.2 million tpy kiln, water usage will be 72 million gallons per year or 630 million gallons by 2013 for all kilns subject to new source limits for HCl and NSPS limits.

We did receive comments that in some areas there is not sufficient water available to support this increase in water use. We do not have sufficient data to perform an analysis of this situation, but we note that other less water intensive controls (dry injection of various sorbents, spray dryers) are available for control of HCl. This is further discussed in the cost impacts section.

5. What are the solid waste impacts?

The potential for solid waste impacts are associated with greater PM control for kilns, waste generated by ACI systems and solids resulting from solids in scrubber slurry water. As explained above, we have assumed little or no solid waste is expected from the generation of scrubber slurry because the solids from the slurry are used in the finish mill as a raw material. All of the facilities currently using wet scrubber use mix the gypsum created in the scrubber with clinker in the finish mill. A commenter noted that the synthetic gypsum can be difficult to dewater, but currently operating facilities seem to have solved this issue. Another commenter notes that facilities with low SO_2 levels may produce such small amounts of gypsum. Theoretically, this could result in a situation where it is impractical to dewater the gypsum, and it must be land filled. However, we anticipate that the total amounts of waste will not be significant and the cost impact (compared to the total scrubber costs) will be minimal.

The PM captured in the kiln fabric filter (cement kiln dust) is essentially recaptured raw material, intermediate materials, or product. Based on the available information, it appears that most captured PM is typically recycled back to the kilns to the maximum extent possible. Therefore we estimate that any additional PM captured will also be recycled to the kiln to the extent possible.

Where equipped with an alkali bypass, the bypass will have a separate PM control device and that PM is typically disposed of as solid waste. An alkali bypass is not utilized on all kilns. Where one is present, the amount of solid waste generated from the alkali bypass is minimal, usually about 1

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[46] Summary of Responses to Requests for Water Impacts Information. August 5, 2010.

percent of total CKD 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.

Waste collected in the polishing baghouse associated with ACI that might be added for mercury or THC control cannot be recycled to the kiln and will be disposed of as solid waste. An estimated 122,000 tpy of solid waste will be generated from the use of ACI systems on existing kilns. A typical new kiln subject to new source mercury standards equipped with an ACI system will be expected to generate 1,800 tons of solid waste per kiln or, assuming all 16 of the kilns subject to new source standards will add ACI systems, about 35,000 tpy in the year 2013.

In addition to the solid waste impacts described above, there is a potential for an increase in solid waste generation if a facility elects to control its mercury emissions by increasing the amount of CKD wasted rather than returned to process. This will be a site-specific decision, and we have no data to estimate the potential solid waste that may be generated by this practice. However, we expect the total amount to be small for two reasons. First, wasting cement kiln dust for mercury control represents a significant expense to a facility because it will be essentially wasting either raw materials or product. We anticipate this option will not be used if the amount of CKD wasted will be large. Second, we believe that cement manufacturers will add the additional CKD to the finish mill to the maximum extent possible rather than waste the material.

6. What are the secondary impacts?

Indirect or secondary air quality impacts include impacts that will result from the increased electricity usage associated with the operation of control devices as well as water quality and solid waste impacts (which were just discussed) that will occur as a result of these final revisions. We estimate these final revisions will increase emissions of criteria pollutants from utility boilers that supply electricity to the Portland cement facilities. We estimate increased energy demand associated with the installation of scrubbers, ACI systems, and RTO. The increases for kilns subject to existing source standards are estimated to be 1,700 tpy of NO_X, 900 tpy of CO, 3,000 tpy of SO_2 and about 90 tpy of PM. For kilns subject to new source standards, increases in secondary air pollutants are estimated to be 440 tpy of NO_X, 230 tpy of CO, 760 tpy of SO_2 and 20 tpy of PM. We also estimated increases of CO_2 to be 0.9 million tpy for kilns subject to existing source standards and 209,000 tpy for kilns subject to new source standards.

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

7. What are the energy impacts?

The addition of alkaline scrubbers, ACI systems, and RTO added to comply with the final amendments will result in increased energy use due to the electrical requirements for the scrubber and ACI systems and increased fan pressure drops, and natural gas to fuel the RTO. We estimate the additional national electrical demand to be 800 million kWhr per year and the natural gas use to be 1.2 million MMBtu per year for kilns subject to existing source standards. For kilns subject to new source standards, the electrical demand is estimated to be 199 million kWhr per year.

8. What are the cost impacts?

Under the final amendments, existing kilns are expected to add one or more control devices to comply with the final emission limits. In addition, kiln and clinker coolers will be required to install varying numbers of CEMS or continuous emissions monitors. We performed two separate cost analyses for this final rule. In the engineering cost analysis, we estimated the cost of the final amendments based on the type of control device that was assumed to be necessary to comply with the final emission standards. Based on baseline emissions of mercury, THC, HCl and PM for each kiln and the removal efficiency necessary to comply with the final emission limit for each HAP, an appropriate control device was identified. In assigning control devices to each kiln where more than one control device will be capable of reducing emissions of a particular HAP below the limit, we assumed that the least costly control will be installed. For example, if a kiln could use either a scrubber or ACI to comply with the final limit for mercury, it was assumed that ACI will be selected over a scrubber because an ACI system will be less costly. ACI also is expected to achieve a higher removal efficiency than a scrubber for mercury (90 percent versus 80 percent). In some instances, a more expensive technology was considered appropriate because the selected control reduced emissions of multiple pollutants. For example, even though ACI will be less costly than a scrubber for controlling mercury, if the kiln also had to reduce HCl (and, for new kilns subject to the NSPS amendments SO_2) emissions, we assumed that a scrubber will be applied to control HCl as well as mercury because ACI will not control HCl. However, for many kilns, our analysis assumes that multiple controls will have to be added because more than one control will be needed to control all HAP. For example, ACI may be considered necessary to meet the limits for THC/organic HAP and/or mercury. For the same kiln, a scrubber will also be required to reduce HCl emissions. In this case we allocate the cost of the control to controlling mercury emissions, not to the cost of controlling HCl emissions. In addition, once we assigned a particular control device, in most cases we assumed mercury, HCl and THC/organic HAP emissions reductions will equal the control device efficiency, and not the minimum reduction necessary to meet the emissions limit. We believe this assumption is warranted because it matches costs with actual emissions reductions. In the case of PM, we assumed the controlled facility will emit at the average level necessary to meet the standard (*i.e.,* we assumed for PM that the controlled facility will emit at 0.01 lb/ton clinker, the average emission level, not 0.04 lb/ton clinker, the actual emissions limit), because the final emissions levels are extremely low.

As previously discussed, in the case of the two facilities that require mercury emission reduction of 98 percent or more, we estimated the cost impacts by costing the two mercury control for which we have cost data, ACI and wet scrubbers. We believe this estimate is a conservative estimate of the costs these facilities will ultimately incur to meet the mercury emissions limit, based on the fact that they may be able to meet the limit using dust shuttling and/or treatment of cement kiln dust, which, based on the limited amount and size of equipment required, is expected to have lower costs than wet scrubbing.

In a separate analysis performed using the ISIS model, we input into ISIS the baseline and controlled emissions rates for each pollutant, along with the maximum percent reduction achievable for a particular control technology, and allowed ISIS to base the control required on optimizing total production costs. In addition, the ISIS model accounts for normal kiln retirements that will occur even in the absence of any regulatory action (*i.e.,* as new kilns come on-line, older, less efficient and more costly to operate kilns are retired). In the first cost analysis, total national annual costs assume that all kilns currently operating continue to operate while 20 new kilns come on-line. In the ISIS model, the two highest mercury emitting kilns requiring a 98+ percent mercury control are assumed to shut down in 2013 because no single mercury control applied to these kilns can meet a 98+ percent mercury reduction.

Table 11 presents the resulting add-on controls each approach estimated was necessary to meet the final emissions limits.

TABLE 11—CONTROL INSTALLATION COMPARISON

	LWS	ACI	LWS + ACI	MB	FF	WS + RTO	RTO	SNCR
Engineering Analysis	115	151	2	28	0	10	0	7
ISIS Model	30	42	29	6	2	6	15	7

In the engineering analysis, we estimated the total capital cost of installing alkaline scrubbers and ACI systems for mercury control, including monitoring systems, will be $339 million with an annualized cost of $113 million. Most of the ACI systems installed for mercury control will also control organic HAP and THC. Where ACI does not provide sufficient control of organic HAP and THC, RTO/wet scrubbers are used. The estimated capital cost of installing RTO/wet scrubbers to reduce THC emissions will be $253 million with annualized cost of $49 million. The capital cost of adding scrubbers for the control of HCl is estimated to be $1,882 million with an annualized cost of $261 million. The capital cost of adding membrane bags to existing fabric will be $57 million with annualized cost of $16 million. The total capital cost for the final amendments for kilns subject to existing source emissions limits will be an estimated $2.2 billion with an annualized cost of $377 million.

The estimated emission control capital cost per new 1.2 million tpy kiln is $3.2 million and the annualized costs are estimated at $1.2 million for mercury and THC/organic HAP control, and $3.6 million for HCl control. Because the new kiln will be equipped with a baghouse even in the absence of the rule and because the ACI system, which includes a polishing baghouse, will be installed for mercury and organic HAP control, there will be no additional cost for PM control. Under the NSPS, 7 new kilns will install SNCR to control NO_X and add NO_X CEMS at a capital cost of $19.6 million and an annualized cost of $10.9 million. The control of SO_2 under the NSPS will be accomplished by wet scrubbers installed for HCl control under the NESHAP so that no control costs are attributable to the NSPS. There will be SO_2 monitoring cost estimated at $1.1 million capital cost and $0.3 million annualized cost for the 7 new kilns subject to the NSPS. Flow monitoring devices are needed in conjunction with CEMS for NO_X and SO_2. Capital costs for flow monitoring devices will be $0.25 million capital and $0.1 million annualized costs. National annualized cost by the end of the fifth year for all new kilns will be an estimated $80.6 million.

In the ISIS results, we are not able to separate costs by pollutant because the model provides an overall optimization of the production and air pollution control costs. The total annual costs of the ISIS model for the NESHAP and NSPS are $350 million in 2013. This estimate is significantly lower than the total costs estimated by traditional methods.

It should be noted that for cases where more than a 50 percent reduction in HCl was required, we costed a wet scrubber. We note that some commenters have stated that some new and existing facilities may be located in areas where there is not sufficient water to operate a wet scrubber. However, in this rule we are not mandating wet scrubber control technology. Other control techniques are available (hydrated finely ground lime, spray dryers, fuel and additive switching) that we believe would allow a cement kiln to meet the HCl emission limits in areas where sufficient water for a wet scrubber is not available. However, we do not have data available on costs for these alternatives controls or techniques, some of which would be site specific. We would anticipate that costs of these techniques would be no more expensive that a wet scrubber. Therefore we believe that by costing wet scrubber technology in these situations we have not underestimated costs.

9. What are the economic impacts?

EPA employed both a partial-equilibrium economic model and the ISIS model to analyze the impact on the industry and the economy.

The Economic Impact Analysis model estimates the average national price for Portland cement could be 5.4 percent higher with the NESHAP and NSPS, or $4.50 per metric ton, while annual domestic production may fall by 11 percent, or 10 million tons per year. Because of higher domestic prices, imports are expected to rise by 3 million metric tons per year. Operating profits fall by $241 million.

Precise job effect estimates cannot be estimated with certainty. Ideally, whenever a regulatory change results in a reallocation of labor or other factors of production in an economy, a general equilibrium approach should be applied to estimate the attendant economic impacts. Unfortunately, time and resource constraints prevented the creation of a model with the spatial and sectoral resolution necessary to analyze the final rule. However, Morgenstern *et al.* (2002) provides a theoretical framework which allows us to approximate some of the relevant general equilibrium effects by identifying three economic mechanisms by which pollution abatement activities can indirectly influence: Higher production costs raise market prices, higher prices reduce consumption, and employment within an industry falls (“demand effect”); pollution abatement activities require additional labor services to produce the same level of output (“cost effect”); and post-regulation production technologies may be more or less labor intensive (*i.e.,* more/less labor is required per dollar of output) (“factor-shift effect”).

Several empirical studies, including Morgenstern *et al.* (2002), suggest the net employment decline is zero or economically small (*e.g.,* Cole and Elliot, 2007; Berman and Bui, 2001). However, others show the question has not been resolved in the literature (Henderson, 1996; Greenstone, 2002). Morgenstern *et al.* use a 6-year panel (U.S. Census data for plant-level prices, inputs [(including labor], outputs, and environmental expenditures) to econometrically estimate the production technologies and industry-level demand elasticities. Their identification strategy leverages repeat plant-level observations over time and uses plant-level and year fixed effects (*e.g.,* dummy variables for plant and years). After estimating their model, Morgenstern show and compute the change in employment associated with an additional $1 million ($1987) in environmental spending. Their estimates cover four manufacturing industries (pulp and paper, plastics, petroleum, and steel) and Morgenstern *et al.* present results separately for the cost, factor shift, and demand effects, as well as the net effect. They also estimate and report an industry-wide average parameter that combines the four industry-wide estimates and weight them by each industry's share of environmental expenditures.

Historically, EPA has most often estimated employment changes associated with plant closures due to environmental regulation or changes in output for the regulated industry (EPA, 1999a; EPA, 2000). This partial equilibrium approach focuses only on the "demand" portion of the projected change in employment and neglects other employment changes. EPA provides this estimate because it employs the most detailed modeling for the industry being regulated even if it does not capture all types of employment impacts. In addition to the employment effects identified by Morgenstern *et al.,* we also expect that the substitutes for cement (*e.g.,* asphalt) would expand production as consumers shift away from cement to other products. This would also lead to increased employment in those industries. Focusing only on the "demand effect", it can be seen that the estimate from the historical approach is within the range presented by the Morgenstern "demand effect" portion. This strengthens our comfort in the reasonableness of both estimates. In April of this year, EPA started including an estimate based on the Morgenstern approach because it is thought to be a broader measure of the employment impacts of this type of environmental regulation. Thus, this analysis goes beyond what EPA has typically done because the parameters estimated in the Morgenstern paper were used to estimate all three effects ("demand," "cost," and "factor shift"). This transfer of results from the Morgenstern study is uncertain but avoids ignoring the "cost effect" and the "factor-shift effect."

Using the historical approach, we calculated "demand effect" employment changes by assuming that the number of jobs declines proportionally with the economic model's simulated output changes. As shown in Table 3–10, using this limited approach, the employment falls by an 1,500 jobs, or approximately −10 percent.[47] By comparison, using the Morgenstern approach, we estimate that the net employment effects could range between 600 job losses to 1,300 job gains.

EPA has solely used this historical estimate in the past as a measure of the projected employment change associated with a regulation. However there are a number of serious shortcomings with this approach. First, and foremost, the historical approach only looks at the employment effects on the regulated industry from reduced output. Second, to arrive at that estimate, EPA needed to string together a number of strong assumptions. The employment impacts are independent of the performance of the overall economy. This rule takes effect in three years. If the economy is strong, the demand for cement strong, it is unlikely that any contraction in the industry will take place, even with the regulation. Second, we assume that all plants have the same limited ability to pass on the higher costs. In reality, plants should be modeled as oligopolists for each of their regional markets. Finally, EPA assumed that employment is directly proportional to output. This is unlikely, and biases the results towards higher employment losses. The Morgenstern methodology is a more complete consideration of probable impacts of a regulation on the economy.

TABLE 12—JOB LOSSES/GAINS ASSOCIATED WITH THE FINAL RULE

Method	1,000 Jobs
Partial equilibrium model (demand effect only)	−1.5
Literature-based estimate (net effect [A + B + C below])	0.3 (−0.6 to +1.3).
A. Literature-based estimate: Demand effect	−0.8 (−1.7 to +0.1).
B. Literature-based estimate: Cost effect	0.5 (+0.2 to +0.9).
C. Literature-based estimate: Factor shift effect	0.6 (+0 to +1.2).

We calculated a similar "demand effect" estimate that used the Morgenstern paper. EPA selected this paper because the parameter estimates (expressed in jobs per million [$1987] of environmental compliance expenditures) provide a transparent and tractable way to transfer estimates for an employment effects analysis. Similar estimates were not available from other studies. To do this, we multiplied the point estimate for the total demand effect (−3.56 jobs per million [$1987] of environmental compliance expenditure) by the total environmental compliance expenditures used in the partial equilibrium model. For example, the jobs effect estimate for is estimated to be 807 jobs (−3.56 × $378 million × 0.6).[48] Demand effect results are provided in Table 12. It is not appropriate to substitute the data from that approach in to the Morgenstern due to the incompatibilities of the underlying data. Since the result from the historical approach is within the confidence bounds for the Morgenstern results for the "demand effect", we are comfortable that the more general Morgenstern result is a good representation of the change in employment.

We also present the results of using the Morgenstern paper to estimate employment "cost" and "factor-shift" effects. Although using the Morgenstern parameters to estimate these "cost" and "factor-shift" employment changes is uncertain, it is helpful to compare the potential job gains from these effects to the job losses associated with the "demand" effect. Table 12 shows that using the "cost" and "factor shift" employment effects may offset employment loss estimates using either "demand" effect employment losses. The 95 percent confidence intervals are shown for all of the estimates based on

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[47] To place this reduction in context, it is similar to the decline experienced during the latest economic downturn; approximately 2,000 jobs (see Appendix A, Table A–3).

[48] Since Morgenstern's analysis reports environmental expenditures in 1987 dollars, we make an inflation adjustment to the engineering cost analysis using the consumer price index ((195.3/113.6) = 0.6).

the Morgenstern parameters. As shown, at the 95 percent confidence level, we cannot be certain if net employment changes are positive or negative.

Although the Morgenstern paper provides additional information about the potential job effects of environmental protection programs, there are several qualifications EPA considered as part of the analysis. First, EPA has used the weighted average parameter estimates for a narrow set of manufacturing industries (pulp and paper, plastics, petroleum, and steel). Absent other data and estimates, this approach seems reasonable and the estimates come from a respected peer-reviewed source. However, EPA acknowledges the final rule covers an industry not considered in the original empirical study. By transferring the estimates to the cement sector, we make the assumption that estimates are similar in size. In addition, EPA assumes also that Morgenstern *et al.'*s estimates derived from the 1979–1991 are still applicable for policy taking place in 2013, almost 20 years later. Second, the economic impact model only considers near-term employment effects in the cement industry where production technologies are fixed. As a result, the economic impact model places more emphasis on the short-term "demand effect," whereas the Morgenstern paper emphasizes other important long-term responses. For example, positive job gains associated with "factor shift effects" are more plausible when production choices become more flexible over time and industries can substitute labor for other production inputs. Third, the Morgenstern paper estimates rely on sector demand elasticities that are different (typically bigger) from the demand elasticity parameter used in the cement model. As a result, the demand effects are not directly comparable with the demand effects estimated by the cement model. Fourth, Morgenstern identifies the industry average as economically and statistically insignificant effect (*i.e.,* the point estimates are small, measured imprecisely, and not distinguishable from zero). EPA acknowledges this fact and has reported the 95 percent confidence intervals in Table 12. Fifth, Morgenstern's methodology assumes large plants bear most of the regulatory costs. By transferring the estimates, EPA assumes a similar distribution of regulatory costs by plant size and that the regulatory burden does not disproportionately fall on smaller plants.

EPA identified ten domestic plants with significant utilization changes that could temporarily idle until market demand conditions improve. It should be noted that some of these plant may be idled even in the absence of this action based on a review of recent history of this industry. The plants are small capacity plants with unit compliance costs close to $8 per ton and $241 million total change in operating profits. Since these plants account for approximately 8 percent of domestic capacity, a decision to permanently shut down these plants will reduce domestic supply and lead to additional projected market price increases. If any plants closed or idled there would also be a savings from not having to incur pollution control costs. A rough estimate of the change in social cost if all ten were to idle or close is a reduction in social cost of $24 million.[49]

The estimated domestic social cost of the final amendments is $926 to $950 million. There is an estimated $121 million surplus gain for other countries producing cement. The social cost estimates are significantly higher than the engineering analysis estimates, which estimated annualized costs of $466 million. This is a direct consequence of EPA's assumptions about existing domestic plants' pricing behavior. Under baseline conditions without regulation, the existing domestic cement plants are assumed to choose a production level that is less than the level produced under perfect competition. The imposition of additional regulatory costs tends to widen the gap between price and marginal cost in these markets and contributes to additional social costs. For more detail see the Regulatory Impact Analysis (RIA).

Using the ISIS model, we estimated 12 kilns (9 million tons of capacity) may be idled as a result of this final rulemaking. ISIS estimates a range of 1,105–1,134 jobs lost associated with the capacity idling. In ISIS, kilns are modeled producing at their capacity levels after taking into consideration normal downtime days. If the kilns owners decide to operate the kilns at a lower utilization rate a lower the number of kilns idling is expected to be lower.

As a result of this action, ISIS projects cement industry revenues are projected to decline by 4.5 percent, or $421 million. We estimate cement demand to drop 5.7 percent in 2013 or 7.0 million tons as a result of this action. The drop in demand will affect the domestic production and imports. Domestic production may fall by 9.6 percent or 9.0 million tons in 2013 compared to the baseline. Imports are likely to rise by 2.0 million tons. ISIS estimates that the average national price for Portland cement in 2013 could be 6.8 percent higher, or $5.79 per metric ton. More information on this model can be found in the ISIS TSD and in a Technical Memo to the docket.

10. What are the benefits?

We estimated the monetized benefits of this final regulatory action to be $7.4 billion to $18 billion (2005$, 3 percent discount rate) in the implementation year (2013). The monetized benefits of the final regulatory action at a 7 percent discount rate are $6.7 billion to $16 billion (2005$). Using alternate relationships between $PM_{2.5}$ and premature mortality supplied by experts, higher and lower benefits estimates are plausible, but most of the expert-based estimates fall between these two estimates.[50] A summary of the avoided health benefits and the associated monetized benefits estimates at discount rates of 3 percent and 7 percent are provided in Table 13 of this preamble.

TABLE 13—SUMMARY OF THE AVOIDED HEALTH INCIDENCES AND MONETIZED $PM_{2.5}$ BENEFITS ESTIMATES FOR THE FINAL PORTLAND CEMENT NESHAP AND NSPS

	Avoided health incidences	Monetized benefits (millions of 2005$, 3% discount rate)	Monetized benefits (millions of 2005$, 7% discount rate)
Avoided Premature Mortality	960 to 2,500	$7,600 to $19,000	$6,900 to $17,000.

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[49] In addition to the ten plants identified that could temporarily idle or permanently shut down, there are two plants with unusually high mercury emissions that cannot meet the mercury emission limit using any single control system. However, we are assuming that they will apply multiple controls to meet the limit and have accounted for multiple controls in our cost analysis.

[50] Roman *et al.,* 2008. Expert Judgment Assessment of the Mortality Impact of Changes in Ambient Fine Particulate Matter in the U.S. Environ. Sci. Technol., 42, 7, 2268–2274.

TABLE 13—SUMMARY OF THE AVOIDED HEALTH INCIDENCES AND MONETIZED $PM_{2.5}$ BENEFITS ESTIMATES FOR THE FINAL PORTLAND CEMENT NESHAP AND NSPS—Continued

	Avoided health incidences	Monetized benefits (millions of 2005$, 3% discount rate)	Monetized benefits (millions of 2005$, 7% discount rate)
Avoided Morbidity:			
Chronic Bronchitis	650	$19	$19.
Acute Myocardial Infarction	1,500	$11	$11.
Hospital Admissions, Respiratory	240	$0.2	$0.2.
Hospital Admissions, Cardiovascular	500	$0.9	$0.9.
Emergency Room Visits, Respiratory	1,000	$0.03	$0.03.
Acute Bronchitis	1,500	$0.01	$0.01.
Work Loss Days	130,000	$1.2	$1.2.
Asthma Exacerbation	17,000	$0.06	$0.06.
Minor Restricted Activity Days	750,000	$3.0	$3.0.
Lower Respiratory Symptoms	18,000	$0.02	$0.02.
Upper Respiratory Symptoms	14,000	$0.03	$0.03.

Note: All estimates are for the implementation year (2013), and are rounded to two significant figures so numbers may not sum across rows. All fine particles are assumed to have equivalent health effects. Benefits from reducing hazardous air pollutants (HAPs) are not included. These estimates do not include the energy disbenefits of $210 to $470 million.

These benefits estimates represent the human health benefits associated with reducing exposure to fine particulate matter ($PM_{2.5}$). The PM reductions are the result of emission limits on PM as well as emission limits on other pollutants, including hazardous air pollutants (HAPs) for the NESHAP and criteria pollutants for the NSPS. To estimate the human health benefits, we used the environmental Benefits Mapping and Analysis Program (BenMAP) model to quantify the changes in $PM_{2.5}$-related health impacts and monetized benefits based on changes in air quality. This approach is consistent with the recently proposed Transport Rule RIA.[51]

For this final rule, we have expanded and updated the analysis since the proposal in several important ways. Using the Comprehensive Air Quality Model with extensions (CAMx) model, we are able to provide cement sector-specific air quality impacts attributable to the emission reductions anticipated from this final rule. We believe that this modeling provides a superior representation of the geographic distribution of air quality impacts than the national average benefit-per-ton estimates used for the proposal analysis. Furthermore, CAMx modeling allows us to model the reduced mercury deposition that would occur as a result of the estimated reductions of mercury emissions.

Although we are unable to model mercury methylation and human consumption of mercury-contaminated fish, the mercury deposition maps provide an improved qualitative characterization of the mercury benefits associated with this final rulemaking. Lastly, we added qualitative descriptions of the benefits categories that we are unable to quantify and monetize, including the benefits of reducing hazardous air pollutants and ecosystem effects.

In addition, the $PM_{2.5}$ benefits for this final rulemaking reflect EPA's current interpretation of the economic literature on mortality valuation by using the value-of-a-statistical life (VSL) based on a meta-analysis of 26 studies.[52] The $PM_{2.5}$ benefits are generally consistent with the methodology used in the proposal after adjusting for the revised VSL, and these estimates reflect EPA's decision to remove the arbitrarily assumed threshold from the health impact function.

For these rules the SO_2 reductions represent a large fraction of the total monetized benefits from reducing $PM_{2.5}$, but it is not possible to isolate the portion if the total monetized benefits attributable to the emission reductions of SO_2 resulting from the application of HCl controls. The benefits models assume that all fine particles, regardless of their chemical composition, are equally potent in causing premature mortality because there is no clear scientific evidence that would support the development of differential effects estimates by particle type.

For context, it is important to note that the magnitude of the $PM_{2.5}$ benefits is largely driven by the concentration response function for premature mortality. Experts have advised EPA to consider a variety of assumptions, including estimates based both on empirical (epidemiological) studies and judgments elicited from scientific experts, to characterize the uncertainty in the relationship between $PM_{2.5}$ concentrations and premature mortality. For this final rulemaking we cite two key empirical studies, one based on the American Cancer Society cohort study[53] and the extended Six Cities cohort study.[54]

Alternate models identified by experts describing the relationship between $PM_{2.5}$ and premature mortality would yield higher and lower estimates depending upon the assumptions that they made, but most of the expert-based estimates fall between the two epidemiology-based estimates (Roman *et al.* 2008).

EPA strives to use the best available science to support our benefits analyses. We recognize that interpretation of the science regarding air pollution and health is dynamic and evolving. The question of whether or not to assume a threshold in calculating the benefits associated with reductions in $PM_{2.5}$ is an issue that affects the benefits calculations not only for this rule but for many other EPA rulemakings and analyses. Due to these implications, we solicited comment on appropriateness of both the no-threshold and threshold model for PM benefits analysis as part of the proposal of this rule.

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[51] U.S. Environmental Protection Agency, 2010. Proposed RIA for the Transport Rule. Prepared by Office of Air and Radiation. June. Available on the Internet at *http://www.epa.gov/ttn/ecas/ria.html.*

[52] In June 2009, EPA's Office of Air and Radiation revised the VSL used in air regulations to be consistent with the estimate used by the rest of the agency. Until updated guidance is available, EPA determined that a single peer-reviewed estimate applied consistently across the agency best reflects the advice it has received.

[53] Pope *et al.,* 2002. "Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Air Pollution." *Journal of the American Medical Association* 287:1132–1141.

[54] Laden *et al.,* 2006. "Reduction in Fine Particulate Air Pollution and Mortality." *American Journal of Respiratory and Critical Care Medicine.* 173: 667–672.

Three commenters did not support adopting a no-threshold model because it would obscure the greater uncertainty associated with calculated premature mortality at low PM concentrations and because it would be premature prior to the conclusion of the PM NAAQS review.

Shortly after the end of the comment period, EPA finalized the Integrated Science Assessment for Particulate Matter,[55] which was reviewed twice by EPA's Clean Air Scientific Advisory Committee, and concluded that the scientific literature consistently finds that a no-threshold log-linear model most adequately portrays the PM-mortality concentration-response relationship while recognizing potential uncertainty about the exact shape of the concentration-response function. In addition, the Human Health Subcommittee of EPA's Science Advisory Board recently concluded, "The HES fully supports EPA's decision to use a no-threshold model to estimate mortality reductions. This decision is supported by the data, which are quite consistent in showing effects down to the lowest measured levels. Analyses of cohorts using data from more recent years, during which time PM concentrations have fallen, continue to report strong associations with mortality. Therefore, there is no evidence to support a truncation of the CRF [concentration-response function]." [56]

After reviewing the public comments in conjunction with our review of the scientific literature and the Science Advisory Board's comments, we have determined that the no-threshold model is the most appropriate model for assessing the mortality benefits associated with reducing $PM_{2.5}$ exposure. Consistent with this recent scientific advice, we are replacing the previous threshold sensitivity analysis with a new "Lowest Measured Level" (LML) assessment. While an LML assessment provides some insight into the level of uncertainty in the estimated PM mortality benefits, EPA does not view the LML as a threshold and continues to quantify PM-related mortality impacts using a full range of modeled air quality concentrations.

Most of the estimated PM-related benefits in this rule accrue to populations exposed to higher levels of $PM_{2.5}$. Using the Pope *et al.* (2002) study, about 94 percent occur among populations with baseline exposure to annual mean $PM_{2.5}$ levels at or above 7.5 $\mu g/m^3$. Using the Laden *et al.* (2006) study, about 58 percent occur among populations with baseline exposure to annual mean $PM_{2.5}$ levels at or above 10 $\mu g/m^3$. It is important to emphasize that we have high confidence in $PM_{2.5}$-related effects down to the lowest LML of the major cohort studies. This fact is important, because as we estimate PM-related mortality among populations exposed to levels of $PM_{2.5}$ that are successively lower, our confidence in the results diminishes. However, our analysis shows that the great majority of the impacts occur at higher exposures.

It should be emphasized that the monetized benefits estimates provided above do not include benefits from several important benefit categories, including reducing other air pollutants, ecosystem effects, and visibility impairment. The benefits from reducing other pollutants have not been monetized in this analysis, including reducing 4,400 tons of NO_X, 5,800 tons of hydrochloric acid, 5,200 tons of organic HAPS, and over 16,000 pounds of mercury each year. In addition, we were unable to quantify the additional emission reductions that would occur if cement facilities temporarily idle or reduce capacity utilization as a result of this regulation, or the unquantifiable amount of reductions in condensable PM. Although we do not have sufficient information or modeling available to provide monetized estimates for this rulemaking, we include a qualitative assessment of the health effects of these air pollutants in the RIA for this rule, which is available in the docket.

In addition, the monetized benefits estimates provided in Table 13 do not reflect the disbenefits associated with increased electricity usage from operation of the control devices. We estimate that the increases in emissions of NO_X, SO_2, PM, and CO_2 would have disbenefits valued at $210 million to $470 million at a 3% discount rate. The total monetized benefits estimates of $7.4 billion to $18 billion (2005$, 3 percent discount rate) and $6.7 billion to $17 billion (2005$, 7% discount rate) reflect these energy disbenefits.

This analysis does not include the type of detailed uncertainty assessment found in the 2006 $PM_{2.5}$ NAAQS RIA or 2008 Ozone NAAQS RIA. However, the benefits analyses in these RIAs provide an indication of the sensitivity of our results to various assumptions, including the use of alternative concentration-response functions and the fraction of mortality impacts at low $PM_{2.5}$ levels.

The social costs of this rulemaking are estimated at $880 million (2005$) in the year of full implementation, and the benefits are estimated at $7.4 billion to $18 billion (2005$, 3 percent discount rate) for that same year. The benefits at a 7 percent discount rate are $6.7 billion to $16 billion (2005$). Thus, net benefits of this rulemaking are estimated at $6.5 billion to $17 billion (2005$, 3 percent discount rate). The net benefits at a 7 percent discount rate are $5.8 billion to $16 billion (2005$). Using alternate relationships between $PM_{2.5}$ and premature mortality supplied by experts, higher and lower benefits estimates are plausible, but most of the expert-based estimates fall between these two estimates. EPA believes that the benefits are likely to exceed the costs by a significant margin even when taking into account the uncertainties in the cost and benefit estimates.

A final issue on benefits concerns the air impacts of increases in imports. When a regulation leads to increases in imports and only the domestic emission changes are considered in a benefit analysis, the question of the impact of emissions from the increased production in other countries should be examined. The extra emissions may have an impact on the regulating country (the U.S.) and the other countries. The location of these extra emissions and the pollutants involved are both important. Our economic modeling does not involve estimates of the origin of the imports. We also do not have information about the level of control for facilities in other countries. Thus, estimating disbenefits associated with these increased emissions in other countries was beyond what we were able to do in this analysis.

However, another limitation of our analysis produces a bias in the opposite direction. The economic impact analysis estimated a 10 million ton decrease in domestic production. No emission reductions were estimated as a result of this change in production. The benefit analysis was based on emission reductions associated with control being applied to all facilities with no change in capacity utilization. The increase in imports was estimated to be 3 million tons. Thus we omitted an emission reduction associated with a 10 million ton decrease in production in this country while also omitting an increase in emissions for an increase in

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[55] U.S. Environmental Protection Agency (U.S. EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA–600–R–08–139F. National Center for Environmental Assessment—RTP Division. December. Available on the Internet at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546.*

[56] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA–SAB). 2010. Review of EPA's DRAFT Health Benefits of the Second Section 812 Prospective Study of the Clean Air Act. EPA–COUNCIL–10–001. June. Available on the Internet at *http://yosemite.epa.gov/sab/sabproduct.nsf/0/72D4EFA39E48CDB28525774500738776/$File/EPA-COUNCIL-10-001-unsigned.pdf.*

production in other countries of less than a third of the domestic decrease. Of course the net result of these two omissions depends on the relative emission rates of the countries involved. Analysis of benefits for either of these two types of emissions is beyond the current scope of the benefit analysis.

For more information, please refer to the RIA for this final rule that is available in the docket.

VII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under section 3(f)(1) of Executive Order 12866 (58 FR 51735, October 4, 1993), this action is an "economically significant regulatory action" because it is likely to have an annual effect on the economy of $100 million or more. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under E.O. 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action. In addition, EPA prepared a Regulatory Impact Analysis (RIA) of the potential costs and benefits associated with this action.

When estimating the $PM_{2.5}$-related human health benefits and compliance costs in Table 14 below, EPA applied methods and assumptions consistent with the state-of-the-science for human health impact assessment, economics and air quality analysis. EPA applied its best professional judgment in performing this analysis and believes that these estimates provide a reasonable indication of the expected benefits and costs to the nation of this rule. The Regulatory Impacts Analysis (RIA) available in the docket describes in detail the empirical basis for EPA's assumptions and characterizes the various sources of uncertainties affecting the estimates below.

When characterizing uncertainty in the PM-mortality relationship, EPA has historically presented a sensitivity analysis applying alternate assumed thresholds in the PM concentration-response relationship. In its synthesis of the current state of the PM science, EPA's 2009 Integrated Science Assessment (ISA) for Particulate Matter concluded that a no-threshold log-linear model most adequately portrays the PM-mortality concentration-response relationship. In the RIA accompanying this rule, rather than segmenting out impacts predicted to be associated levels above and below a "bright line" threshold, EPA includes a "lowest-measured-level (LML)" that illustrates the increasing uncertainty that characterizes exposure attributed to levels of $PM_{2.5}$ below the LML for each study. Figures provided in the RIA show avoided PM mortality impacts predicted relative to the baseline $PM_{2.5}$ levels experienced by the population receiving the $PM_{2.5}$ mortality benefit, as well as the lowest air quality levels measured in each of the epidemiology cohort studies. This information allows readers to determine the portion of PM-related mortality benefits occurring above or below the LML of each study; in general, our confidence in the size of the estimated reduction $PM_{2.5}$-related premature mortality decreases in areas where annual mean $PM_{2.5}$ levels are further below the LML in the cohort studies. Using the Pope *et al.* (2002) study, about 94 percent occur among populations with baseline exposure to annual mean $PM_{2.5}$ levels at or above 7.5 $\mu g/m^3$. Using the Laden *et al.* (2006) study, about 58 percent occur among populations with baseline exposure to annual mean $PM_{2.5}$ levels at or above 10 $\mu g/m^3$. While the LML analysis provides some insight into the level of uncertainty in the estimated PM mortality benefits, EPA does not view the LML as a threshold and continues to quantify PM-related mortality impacts using a full range of modeled air quality concentrations.

Table 14 shows the results of the cost and benefits analysis for this rule.

TABLE 14—SUMMARY OF THE MONETIZED BENEFITS, SOCIAL COSTS, AND NET BENEFITS FOR THE FINAL PORTLAND CEMENT NESHAP AND NSPS IN 2013

[Millions of 2005$][1]

	3% Discount rate	7% Discount rate
Final NESHAP and NSPS		
Total Monetized Benefits[2]	$7,400 to $18,000	$6,700 to $16,000.
Total Social Costs[3]	$926 to $950	$926 to $950.
Net Benefits	$6,500 to $17,000	$5,800 to $15,000
Non-monetized Benefits	4,400 tons of NO_X (includes energy disbenefits).	
	5,200 tons of organic HAPs.	
	5,900 tons of HCl.	
	16,400 pounds of mercury.	
	Health effects from HAPs, NO_2, and SO_2 exposure.	
	Ecosystem effects.	
	Visibility impairment.	
Final NSPS only		
Total Monetized Benefits[2]	$510 to $1,300	$460 to $1,100.
Total Social Costs[3]	$72	$72.
Net Benefits	$440 to $1,200	$390 to $1,000.
Non-monetized Benefits	6,600 tons of NO_X.	
	520 tons of HCl.	

TABLE 14—SUMMARY OF THE MONETIZED BENEFITS, SOCIAL COSTS, AND NET BENEFITS FOR THE FINAL PORTLAND CEMENT NESHAP AND NSPS IN 2013—Continued

[Millions of 2005$] [1]

	3% Discount rate	7% Discount rate
	Health effects from HAPs, NO_2, and SO_2 exposure.	
	Ecosystem effects.	
	Visibility impairment.	
Final NESHAP only		
Total Monetized Benefits [2]	$7,400 to $18,000	$6,700 to $16,000.
Total Social Costs [3]	$904 to $930	$904 to $930.
Net Benefits	$6,500 to $17,000	$5,800 to $16,000.
Non-monetized Benefits	5,200 tons of organic HAPs.	
	5,900 tons of HCl.	
	16,000 pounds of mercury.	
	Health effects from HAPs, SO_2 exposure.	
	Ecosystem effects.	
	Visibility impairment.	
Alternative: More Stringent NSPS and Final NESHAP		
Total Monetized Benefits [2]	$7,400 to $18,000	$6,700 to $16,000.
Total Social Costs [3]	$955 to $979	$955 to $979.
Net Benefits	$6,500 to $17,000	$5,700 to $15,000.
Non-monetized Benefits	7,800 tons of NO_X (includes energy disbenefits).	
	5,200 tons of organic HAPs.	
	5,900 tons of HCl.	
	16,400 pounds of mercury.	
	Health effects from HAPs, NO_2, and SO_2 exposure.	
	Ecosystem effects.	
	Visibility impairment.	

[1] All estimates are for the implementation year (2013), and are rounded to two significant figures.

[2] The total monetized benefits reflect the human health benefits associated with reducing exposure to $PM_{2.5}$ through reductions of directly emitted $PM_{2.5}$ and $PM_{2.5}$ precursors such as NO_X and SO_2. It is important to note that the monetized benefits include many but not all health effects associated with $PM_{2.5}$ exposure. Benefits are shown as a range from Pope *et al.* (2002) to Laden *et al.* (2006). These models assume that all fine particles, regardless of their chemical composition, are equally potent in causing premature mortality because there is no clear scientific evidence that would support the development of differential effects estimates by particle type. The total monetized benefits include the energy disbenefits.

[3] The methodology used to estimate social costs for one year in the multimarket model using surplus changes results in the same social costs for both discount rates.

For more information on the benefits analysis, please refer to the RIA for this rulemaking, which is available in the docket.

B. Paperwork Reduction Act

1. Subpart F

The information requirements in the final amendments to subpart F 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 final amendments to the NSPS for Portland cement plants apply to affected facilities constructed, modified, or reconstructed after June 16, 2008. The owner or operator of a new kiln is required to keep daily records of clinker production, install and operate PM CEMS, and operate NO_X and SO_2 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 2,559 labor-hours per year at a cost of $240,064 per year. The annualized capital costs are estimated at $45,626 per year and operation and maintenance costs are estimated at $52,450 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. When this ICR is approved by OMB, the Agency will publish a technical amendment to 40 CFR part 9 in the **Federal Register** to display the OMB control number for the approved information collection requirements contained in this final rule.

2. Subpart LLL

The information collection requirements in this final rule have been submitted for approval to the 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 1801.07.

In most cases, new and existing kilns and in-line kiln/raw mills at major and area sources that are not already subject to emission limits for THC, mercury, and PM will become subject to the limits and associated compliance provisions in the current rule. Sources will have to install and operate CEMS for mercury, PM, and THC. Records of all calculations and data will be required. New compliance procedures will also apply to area sources subject to a PM limit in a format of lbs/ton of clinker. Cement plants also will be subject to new limits for HCl and associated compliance provisions which include compliance tests using EPA Method 321 and continuous monitoring for HCl for facilities that do not use a wet scrubber for HCl control. These requirements are based on the recordkeeping and reporting requirements in the NESHAP General Provisions (40 CFR part 63, subpart A) which are mandatory for all operators subject to national emission 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 79,790 labor-hours per year at a cost of $7.75 million per year. The average annualized capital costs are estimated at $61.7 million per year and average operation and maintenance costs are estimated at $192,578 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.

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 depending on the size definition for the affected NAICS code (as defined by Small Business Administration (SBA) size standards found at *http://www.sba.gov/idc/groups/public/documents/sba_homepage/serv_sstd_tablepdf.pdf*); (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.

1. Subpart F

After considering the economic impact of this final 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 3 of the 26 existing Portland cement entities are small entities which will not incur any impacts under these final amendments unless an affected facility is constructed, modified, or reconstructed. Based on our economic analysis, 7 new kilns may be constructed during the next five years that will be subject to these NSPS amendments. One of these kilns may be operated by a Portland cement entity that is classified as a small entity according to the SBA small business size standards. Of these 7 kilns, this small entity is expected to incur an annualized compliance cost of between 1.0 and 3.0 percent of sales to comply with the final action.

Although this final 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 the selection of an 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 sources from the least stringent requirement thereby eliminated overlapping monitoring, testing and reporting requirements by requiring that the source comply with only the more stringent of the standards.

2. Subpart LLL

After considering the economic impact of this final 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 3 of the 26 existing Portland cement plants are small entities.

EPA performed a screening analysis for impacts on the three affected small entities by comparing compliance costs to entity revenues. EPA's analysis found that the ratio of compliance cost to company revenue for one small entity (a Tribal government) will have an annualized cost of less than 1 percent of sales. The other two small businesses will have an annualized cost of between 1 and three percent of sales.

Although this final rule will not impact a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities by setting the final emissions limits at the MACT floor, the least stringent level allowed by law. In the case where there are overlapping standards between this NESHAP and the Portland Cement NSPS, we have exempted sources from the least stringent requirement thereby eliminating the overlapping monitoring, testing and reporting requirements by requiring that the source comply with only the more stringent of the standards. In addition, we applied MACT for HCl emissions to major sources only. The reduced compliance costs for two of the three small entities by a factor of 4.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act (UMRA), 2 U.S.C 1531–1538, requires Federal agencies, unless otherwise prohibited by law, to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Federal agencies must also develop a plan to provide notice to small governments that might be significantly or uniquely affected by any regulatory requirements. The plan must enable officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates and must inform, educate, and advise small governments on compliance with the regulatory requirements.

1. Subpart F

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 final rule is not subject to the requirements of section 202 and 205 of the UMRA.

This final action is also not subject to the requirements of section 203 of the UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. This final action contains no requirements that apply to such governments, imposes no obligations upon them, and will not result in expenditures by them of $100 million or more in any one year or any disproportionate impacts on them.

2. Subpart LLL

This rule contains 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. Accordingly, EPA has prepared under section 202 of the UMRA a written statement which is summarized below.

In developing this rule, EPA consulted with small governments under a plan developed pursuant to section 203 of UMRA concerning the regulatory requirements in the rule that might significantly or uniquely affect small governments. EPA has determined that this final action contains regulatory requirements that might significantly or uniquely affect small governments because we identified one of the facilities affected by the final rule as Tribally owned. EPA developed a plan to permit this Tribal entity to have meaningful and timely input into its development.

Consistent with the intergovernmental consultation provisions of section 204 of the UMRA, EPA initiated consultations with the governmental entities affected by this rule. EPA directly contacted the facility in question to insure it was appraised of this rulemaking and potential implications. This facility indicated it was aware of the rulemaking and was participating in meetings with the industry trade association concerning this rulemaking. The facility did not indicate any special issues other than those expressed by the industry in general, We are assuming that they have the same concerns as those expressed by the other non-Tribally owned facilities during the development of this final rule. Subsequent to proposal, EPA again contacted the Tribal Government by letter with an offer of consultation. We received no response to that letter.

Consistent with section 205, EPA has identified and considered a reasonable number of regulatory alternatives. EPA carefully examined regulatory alternatives, and selected the lowest cost/least burdensome alternative that EPA deems adequate to address Congressional concerns and to effectively reduce emissions of mercury, THC and PM. EPA has considered the costs and benefits of the final rule, and has concluded that the costs will fall mainly on the private sector (approximately $479 million). EPA estimates that an additional facility owned by a Tribal government will incur approximately $1.2 million in costs per year. Furthermore, we believe it is unlikely that State, local and Tribal governments would begin operating large industrial facilities, similar to those affected by this rulemaking operated by the private sector. EPA has selected regulatory alternatives that represent the MACT floor level of control, which is the least stringent level allowed by law.

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."

These two final rules do not have federalism implications. They 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 these final rules.

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

Subject to the Executive Order 13175 (65 FR 67249, November 9, 2000) EPA may not issue a regulation that has Tribal implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by Tribal governments, or EPA consults with Tribal officials early in the process of developing the regulation and develops a Tribal summary impact statement.

1. Subpart F

This final action does not have Tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). 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 final rule imposes requirements on owners and operators of specified industrial facilities and not Tribal governments. The only Tribally owned source is not affected by the amendments to subpart F. Thus, Executive Order 13175 does not apply to this action.

2. Subpart LLL

EPA has concluded that this action will have Tribal implications, because it will impose substantial direct compliance costs on Tribal governments, and the Federal government will not provide the funds necessary to pay those costs. One of the facilities affected by this final rule is Tribally owned. We estimate this facility will incur direct compliance costs that are between 1 to 3 percent of sales. Accordingly, EPA provides the following Tribal summary impact statement as required by section 5(b).

EPA consulted with Tribal officials early in the process of developing this regulation to provide them meaningful and timely input into its development. EPA directly contacted the facility in question to insure it was appraised of this rulemaking and potential implications. This facility indicated it was aware of the rulemaking and was participating in meetings with the industry trade association concerning this rulemaking. The facility did not indicate any specific concern, and we are assuming that they have the same concerns as those expresses by the other non-Tribally owned facilities during the development of this rule.

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

EPA interprets Executive Order 13045 (62 FR 19885, April 23, 1997) as applying to those regulatory actions that concern health or safety risks, such that the analysis required under section 5–501 of the Executive 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, (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 rule is not likely to have any adverse energy effects. This rule will result in the addition of control equipment and monitoring systems for existing and new sources.

The final rule under subpart F will result in the addition of alkaline scrubbers to certain kilns to reduce SO_2 emissions. We estimate the additional electrical demand to be 6.9 million kWhr per year by the end of the 2013.

We estimate that under the final subpart LLL rule the additional electrical demand will be 1 billion kWhr per year and the natural gas use will be 1.2 million MMBtu for existing sources. At the end of 2013, electrical demand from new sources will be 180 million kWhr per year.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (“NTTAA”), Public Law 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.

Consistent with the NTTAA, EPA conducted searches through the Enhanced NSSN Database managed by the American National Standards Institute (ANSI). We also contacted VCS organizations, and accessed and searched their databases.

1. Subpart F

This final rulemaking involves technical standards. EPA has decided 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.

2. Subpart LLL

This final rulemaking involves technical standards. EPA will use ASTM D6348–03, “Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform (FTIR) Spectroscopy,” as an acceptable alternative to EPA Method 320 providing the following conditions are met:

(1) The test plan preparation and implementation in the Annexes to ASTM D 6348–03, Sections A1 through A8 are mandatory;

(2) In ASTM D6348–03 Annex A5 (Analyte Spiking Technique), the percent R must be determined for each target analyte (Equation A5.5). In order for the test data to be acceptable for a compound, percent R must be $70 \leq R \leq 130$. If the percent R value does not meet this criterion for a target compound, the test data is not acceptable for that compound and the test must be repeated for that analyte (*i.e.,* the sampling and/or analytical procedure should be adjusted before a retest). The percent R value for each compound must be reported in the test report, and all field measurements must be corrected with the calculated percent R value for that compound by using the following equation: Reported Result = Measured Concentration in the Stack × 100 ÷ percent R.

While the Agency has identified eight 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 and 63.7 (f) of the NESHAP 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.

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

Executive Order (EO) 12898 (59 FR 7629) (February 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 this rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it increases 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 populations. Additionally, the Agency has reviewed this rule to determine if there was existing disproportionately high and adverse human health or environmental effects on minority or low-income populations that could be mitigated by this rulemaking. An analysis of demographic data showed that the average of populations in close proximity to the sources, and thus most likely to be affected by the sources, were similar in demographic composition to national averages.

In determining the aggregate demographic makeup of the communities near affected sources, EPA used census data at the block group level to identify demographics of the populations considered to be living near affected sources, such that they have notable exposures to current emissions from these sources. In this approach, EPA reviewed the distributions of different socio-demographic groups in the locations of the expected emission reductions from this rule. The review identified those census block groups within a circular distance of a half, 3, and 5 miles of affected sources and determined the demographic and socio-economic composition (*e.g.,* race, income, education, *etc.*) of these census block groups. The radius of 3 miles (or approximately 5 kilometers) has been used in other demographic analyses focused on areas around potential sources.[57] [58] [59] [60] EPA's demographic analysis has shown that these areas in aggregate have similar proportions of American Indians, African-Americans, Hispanics, Whites, and "Other and Multi-racial" populations, and similar proportions of families with incomes below the poverty level as the national average.[61]

EPA defines "Environmental Justice" to include meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices.

This final action establishes national emission standards for new and existing cement kilns. EPA estimates that there are 100 facilities covered by this rule. The final rule will reduce emissions of all the listed hazardous air pollutants emitted from this source category. This includes emissions of cadmium, HCl, lead, Hg, and organic hazardous air pollutants. Adverse health effects from these pollutants include cancer, irritation of the lungs, skin, and mucus membranes, effects on the central nervous system, and damage to the kidneys, and acute health disorders. The rule will also result in substantial reductions of criteria pollutants such as NO_X, PM (total and fine), and SO_2. SO_2 and NO_2 are precursors for the formation of $PM_{2.5}$ and ozone. Reducing these emissions will reduce ozone and $PM_{2.5}$ formation and associated health effects, such as adult premature mortality, chronic and acute bronchitis, asthma, and other respiratory and cardiovascular diseases. (Please refer to the RIA contained in the docket for this rulemaking.)

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is a "major rule" as defined by 5 U.S.C. 804(2). These final rules will be effective November 8, 2010.

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.

40 CFR Part 63

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

Dated: August 6, 2010.

Lisa P. Jackson,

Administrator.

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

PART 60—[AMENDED]

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

Authority: 23 U.S.C. 101; 42 U.S.C. 7401–7671q.

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 § 60.56c(b)(4) of subpart Ec, § 60.63(f)(2) and (f)(4) of subpart F, § 60.106(e)(2) of subpart J, §§ 60.104a(d)(3), (d)(5), (d)(6), (h)(3), (h)(4), (h)(5), (i)(3), (i)(4), (i)(5), (j)(3), and (j)(4), 60.105a(d)(4), (f)(2), (f)(4), (g)(2), and (g)(4), 60.106a(a)(1)(iii), (a)(2)(iii), (a)(2)(v), (a)(2)(viii), (a)(3)(ii), and (a)(3)(v), and 60.107a(a)(1)(ii), (a)(1)(iv), (a)(2)(ii), (c)(2), (c)(4), and (d)(2) of subpart Ja, 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 (a)(3) of subpart KKKK of this part.

* * * * *

Subpart F—[Amended]

■ 3. Section 60.62 is revised to read as follows:

§ 60.62 Standards.

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, you may not discharge into the atmosphere from any kiln any gases which:

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

(i) 0.30 pound per ton of feed (dry basis) to the kiln if construction, reconstruction, or modification of the kiln commences after August 17, 1971 but on or before June 16, 2008.

(ii) 0.01 pound per ton of clinker on a 30-operating day rolling average if construction, reconstruction, or modification of the kiln commenced after June 16, 2008. An operating day includes all valid data obtained in any daily 24-hour period during which the kiln operates and excludes any measurements made during the daily 24-hour period when the kiln was not operating.

(2) Exhibit greater than 20 percent opacity, except that this opacity limit does not apply to any kiln subject to a PM limit in paragraph (a)(1) of this section that uses a PM continuous emissions monitoring system (CEMS).

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

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[57] U.S. GAO (Government Accountability Office). *Demographics of People Living Near Waste Facilities.* Washington DC: Government Printing Office; 1995.

[58] Mohai P, Saha R. "Reassessing Racial and Socio-economic Disparities in Environmental Justice Research". *Demography.* 2006;43(2): 383–399.

[59] Mennis J. "Using Geographic Information Systems to Create and Analyze Statistical Surfaces of Populations and Risk for Environmental Justice Analysis". *Social Science Quarterly,* 2002;83(1): 281–297.

[60] Bullard RD, Mohai P, Wright B, Saha R, *et al. Toxic Waste and Race at Twenty 1987–2007.* United Church of Christ. March, 2007.

[61] The results of the demographic analysis are presented in "Review of Environmental Justice Impacts", June 2010, a copy of which is available in the docket.

after June 16, 2008, except this limit does not apply to any alkali bypass installed on the kiln. An operating day includes all valid data obtained in any daily 24-hour period during which the kiln operates and excludes any measurements made during the daily 24-hour period when the kiln was not operating.

(4) Exceed 0.4 pounds of sulfur dioxide (SO_2) per ton of clinker on a 30-operating day rolling average if construction, reconstruction, or modification commences after June 16, 2008, unless you are demonstrating a 90 percent SO_2 emissions reduction measured across the SO_2 control device. An operating day includes all valid data obtained in any daily 24-hour period during which the kiln operates, and excludes any measurements made during the daily 24-hour period when the kiln was not operating.

(b) On and after the date on which the performance test required to be conducted by § 60.8 is completed, you may not discharge into the atmosphere from any clinker cooler any gases which:

(1) Contain PM in excess of:

(i) 0.10 pound per ton of feed (dry basis) to the kiln if construction, reconstruction, or modification of the clinker cooler commenced after August 17, 1971 but on or before June 16, 2008.

(ii) 0.01 pound per ton of clinker on a 30-operating day rolling average if construction, reconstruction, or modification of the clinker cooler commences after June 16, 2008. An operating day includes all valid data obtained in any daily 24-hour period during which the kiln operates, and excludes any measurements made during the daily 24-hour period when the kiln was not operating.

(2) Exhibit 10 percent opacity, or greater, except that this opacity limit does not apply to any clinker cooler subject to a PM limit in paragraph (b)(1) of this section that uses a PM CEMS.

(3) If the kiln and clinker cooler exhaust are combined for energy efficiency purposes and sent to a single control device, the appropriate kiln PM limit may be adjusted using the procedures in § 63.1343(b) of this chapter.

(4) If the kiln has a separate alkali bypass stack, you must combine the PM emissions from the bypass stack with the PM emissions from the main kiln exhaust to determine total PM emissions.

(c) On and after the date on which the performance test required to be conducted by § 60.8 is completed, you may not discharge into the atmosphere from any affected facility other than the kiln and clinker cooler any gases which exhibit 10 percent opacity, or greater.

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

■ 4. Section 60.63 is revised to read as follows:

§ 60.63 Monitoring of operations.

(a) [Reserved]

(b) *Clinker production monitoring requirements.* For any kiln subject to an emissions limitation on PM, NO_X, or SO_2 emissions (lb/ton of clinker), you must:

(1) Determine hourly clinker production by one of two methods:

(i) Install, calibrate, maintain, and operate a permanent weigh scale system to measure and record weight rates of the amount of clinker produced in tons of mass per hour. The system of measuring hourly clinker production must be maintained within ±5 percent accuracy.

(ii) Install, calibrate, maintain, and operate a permanent weigh scale system to measure and record weight rates of the amount of feed to the kiln in tons of mass per hour. The system of measuring feed must be maintained within ±5 percent accuracy. Calculate your hourly clinker production rate using a kiln specific feed-to-clinker ratio based on reconciled clinker production determined for accounting purposes and recorded feed rates. This ratio should be updated monthly. Note that if this ratio changes at clinker reconciliation, you must use the new ratio going forward, but you do not have to retroactively change clinker production rates previously estimated;

(2) Determine, record, and maintain a record of the accuracy of the system of measuring hourly clinker or feed production before initial use (for new sources) or within 30 days of the effective date of this rule (for existing sources). During each quarter of source operation, you must determine, record, and maintain a record of the ongoing accuracy of the system of measuring hourly clinker or feed production.

(3) Record the daily clinker production rates and kiln feed rates; and

(4) Develop an emissions monitoring plan in accordance with paragraphs (i)(1) through (i)(4) of this section.

(c) You must monitor PM emissions of a kiln or clinker cooler subject to a PM emissions limit in § 60.62(a)(1)(ii) or (b)(1)(ii) according to the applicable requirements below:

(1) Install and operate a PM CEMS in accordance with Performance Specification 11 of appendix B and Procedure 2 of appendix F to part 60 of this chapter. The performance test method and the correlation test method for Performance Specification 11 shall be Method 5 or Method 5i of appendix A to this part. The owner or operator must also develop an emissions monitoring plan in accordance with paragraphs (i)(1) through (i)(4) of this section.

(2) Perform Relative Response Audits annually and Response Correlation Audits every 3 years.

(3) Collect readings at least every 15 minutes in order to calculate the 30-operating day rolling average to determine PM emissions. Calculate the 30-operating day rolling average using equation 1 of this section:

$$\text{30-operating day rolling average} = \frac{1}{n}\sum_{i=1}^{n} PM_{15\text{ minutes}} \qquad \text{(Eq. 1)}$$

Where:

$PM_{15\text{ minutes}}$ = PM emissions from a 15-minute period.

n = number of 15 minute periods with valid data over the preceding 30 operating days.

(d) You must install, operate, calibrate, and maintain an instrument for continuously monitoring and recording the concentration by volume of NO_X emissions into the atmosphere for any kiln subject to the NO_X emissions limit in § 60.62(a)(3). If the kiln has an alkali bypass, NO_X emissions from the alkali bypass do not need to be monitored, and NO_X emission monitoring of the kiln exhaust may be done upstream of any comingled alkali bypass gases.

(e) You must install, operate, calibrate, and maintain an instrument for continuously monitoring and recording the concentration by volume of SO_2 emissions into the atmosphere for any kiln subject to the SO_2 emissions limit in § 60.62(a)(4). If you are complying with the alternative 90 percent SO_2 emissions reduction emission limit, you must also continuously monitor and record the concentration by volume of SO_2 present at the wet scrubber inlet.

(f) You must install, operate, and maintain according to Performance Specification 2 (40 CFR part 60, appendix B) and the requirements in paragraphs (f)(1) through (5) of this section each CEMS required under paragraphs (c), (d) and (e) of this section.

(1) The span value of each NO_X monitor must 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) You must 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 must 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 SO_2 monitor must be set at 125 percent of the maximum estimated hourly potential SO_2 emission concentration that translates to the applicable emission limit at full clinker production capacity.

(4) You must conduct performance evaluations of each SO_2 monitor according to the requirements in § 60.13(c) and Performance Specification 2 of Appendix B to part 60. You must 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) You 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.

(g) For each CEMS required under paragraphs (c) through (e) of this section:

(1) You must operate the monitoring system and collect data at all required intervals at all times the affected source is operating, except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments).

(2) You may not use data recorded during the monitoring system malfunctions, repairs associated with monitoring system malfunctions, or required monitoring system quality assurance or control activities in calculations used to report emissions or operating levels. A monitoring system malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring system failures that are caused in part by poor maintenance or careless operation are not malfunctions. An owner or operator must use all the data collected during all other periods in assessing the operation of the control device and associated control system.

(3) You must meet the requirements of § 60.13(h) when determining the 1-hour averages of emissions data.

(h) You must install, operate, calibrate, and maintain instruments for continuously measuring and recording the pollutant per mass flow rate to the atmosphere for each kiln subject to the PM emissions limits in § 60.62(a)(1)(i) and (ii), the NO_X emissions limit in § 60.62(a)(3), or the SO_2 emissions limit in § 60.62(a)(4) according to the requirements in paragraphs (h)(1) through (10) 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, SO_2 or PM CEMS, taking into account the manufacturer's recommendations. The flow rate sensor is that portion of the system that senses the volumetric flow rate and generates an output proportional to that flow rate.

(2) The flow rate monitoring system must be designed to measure the exhaust gas 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 gas flow rate.

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

(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 (h)(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.

(7) The flow rate sensor must have provisions to determine the daily zero and upscale calibration drift (CD) (*see* sections 3.1 and 8.3 of Performance Specification 2 in Appendix B to part 60 of this chapter for a discussion of CD).

(i) Conduct the CD tests at two reference signal levels, zero (*e.g.,* 0 to 20 percent of span) and upscale (*e.g.,* 50 to 70 percent of span).

(ii) The absolute value of the difference between the flow monitor response and the reference signal must be equal to or less than 3 percent of the flow monitor span.

(8) You must perform an initial relative accuracy test of the flow rate monitoring system according to section 8.2 of Performance Specification 6 of Appendix B to part 60 of the chapter, with the exceptions noted in paragraphs (h)(8)(i) and (ii).

(i) The relative accuracy test is to evaluate the flow rate monitoring system alone rather than a continuous emission rate monitoring system.

(ii) The relative accuracy of the flow rate monitoring system shall be no greater than 10 percent of the mean value of the reference method data.

(9) You must verify the accuracy of the flow rate monitoring system at least once per year by repeating the relative accuracy test specified in paragraph (h)(8).

(10) You must operate the flow rate monitoring system and record data during all periods of operation of the affected facility including periods of startup, shutdown, and malfunction, except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments.

(i) *Development and Submittal (Upon Request) of Monitoring Plans.* If you demonstrate compliance with any applicable emission limit through performance stack testing or other emissions monitoring, you must develop a site-specific monitoring plan according to the requirements in paragraphs (i)(1) through (4) of this section. This requirement also applies to you if you petition the EPA Administrator for alternative monitoring parameters under paragraph (h) of this section and § 63.8(f). If you use a BLDS, you must also meet the requirements specified in paragraph § 63.1350(m)(10) of this chapter.

(1) For each continuous monitoring system (CMS) required in this section, you must develop, and submit to the permitting authority for approval upon request, a site-specific monitoring plan that addresses paragraphs (i)(1)(i) through (iii) of this section. You must submit this site-specific monitoring plan, if requested, at least 60 days before the initial performance evaluation of your CMS.

(i) Installation of the CEMS sampling probe or other interface at a measurement location relative to each affected process unit such that the measurement is representative of control of the exhaust emissions (*e.g.,* on or downstream of the last control device);

(ii) Performance and equipment specifications for the sample interface, the pollutant concentration or parametric signal analyzer, and the data collection and reduction systems; and

(iii) Performance evaluation procedures and acceptance criteria (*e.g.,* calibrations).

(2) In your site-specific monitoring plan, you must also address paragraphs (i)(2)(i) through (iii) of this section.

(i) Ongoing operation and maintenance procedures in accordance with the general requirements of § 63.8(c)(1), (c)(3), and (c)(4)(ii);

(ii) Ongoing data quality assurance procedures in accordance with the general requirements of § 63.8(d); and

(iii) Ongoing recordkeeping and reporting procedures in accordance with the general requirements of § 63.10(c), (e)(1), and (e)(2)(i).

(3) You must conduct a performance evaluation of each CMS in accordance with your site-specific monitoring plan.

(4) You must operate and maintain the CMS in continuous operation according to the site-specific monitoring plan.

■ 5. Section 60.64 is revised to read as follows:

§ 60.64 Test methods and procedures

(a) In conducting the performance tests required in § 60.8, you must use reference methods and procedures and the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in § 60.8(b).

(b) Compliance with the PM standards in § 60.62 is determined using the procedures specified in § 60.63.

(1) The PM emission rate is calculated using Equation 2 of this section:

$$E = \left(C_S Q_S\right)/(PK) \qquad \text{(Eq. 2)}$$

Where:

E = emission rate of particulate matter, lb/ton of kiln feed;

C_s = concentration of particulate matter, gr/scf;

Q_s = volumetric flow rate of effluent gas, where C_s and Q_s are on the same basis (either wet or dry), dscf/hr;

P = total kiln feed (dry basis) rate, ton/hr. For kilns constructed, modified or reconstructed on or after June 16, 2008,

p = total kiln clinker production rate; and

K = conversion factor, 7000 gr/lb.

(2) Suitable methods shall be used to determine the kiln feed rate (P), except fuels.

(3) Method 9 and the procedures in § 60.11 must be used to determine opacity.

(4) 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(f), (m)(1) through (4), (m)(10) through (11), (o), and (p) of this chapter.

(5) If your kiln is not equipped with a PM CEMS meeting the requirements of Performance Specification 11 of Appendix B to part 60, and the kiln (including any associated alkali bypass and clinker cooler) was constructed, modified or reconstructed on or after June 16, 2008, you 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 June 16, 2008 must conduct a performance test every 5 years if not equipped with a PM CEMS meeting the requirements of Performance Specification 11 of Appendix B to part 60.

(c) You must calculate and record the 30-operating day rolling emission rate of NO_X and SO_2 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-operating day period using Equation 3 of this section:

$$E = \left(C_S Q_S\right)/(PK) \qquad \text{Eq. 3}$$

Where:

E = emission rate of NO_X or SO_2, lb/ton of clinker production;

C_s = concentration of NO_X or SO_2, gr/scf;

Q_s = volumetric flow rate of effluent gas, where C_s and Q_s are on the same basis (either wet or dry), scf/hr;

P = total kiln clinker production rate, ton/hr; and

K = conversion factor, 7000 gr/lb.

(d) As of December 31, 2011 and within 60 days after the date of completing each performance evaluation or test, as defined in § 63.2, conducted to demonstrate compliance with this subpart, you must submit the relative accuracy test audit data and performance test data, except opacity data, to EPA by successfully submitting the data electronically to EPA's Central Data Exchange (CDX) by using the Electronic Reporting Tool (ERT) (*see http://www.epa.gov/ttn/chief/ert/ert_tool.html/*).

■ 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 to any non-opacity emissions 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.

Appendix B—[Amended]

■ 7. Appendix B to 40 CFR Part 60 is amended as follows:

■ a. Revise Performance Specification 12A.

■ b. Add Performance Specification 12B.

Appendix B to Part 60—Performance Specifications

* * * * *

Performance Specification 12A—Specifications and Test Procedures for Total Vapor Phase Mercury Continuous Emission Monitoring Systems in Stationary Sources

1.0 Scope and Application

1.1 Analyte. The analyte measured by these procedures and specifications is total vapor phase mercury (Hg) in the flue gas, which represents the sum of elemental Hg (Hg°, CAS Number 7439–97–6) and oxidized forms of gaseous Hg (Hg^{+2}), in concentration units of micrograms per cubic meter ($\mu g/m^3$).

1.2 Applicability.

1.2.1 This specification is for evaluating the acceptability of total vapor phase Hg continuous emission monitoring systems (CEMS) installed at stationary sources at the time of or soon after installation and whenever specified in the regulations. The Hg CEMS must be capable of measuring the total concentration in $\mu g/m^3$ of vapor phase Hg, regardless of speciation, and recording that concentration at standard conditions on a wet or dry basis. These specifications do not address measurement of particle bound Hg.

1.2.2 This specification is not designed to evaluate an installed CEMS's performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS's performance. The source owner or operator, however, is responsible to calibrate, maintain, and operate the CEMS properly. The Administrator may require, under section 114 of the Clean Air Act, the operator to conduct CEMS performance evaluations at other times besides the initial performance evaluation test. *See* §§ 60.13(c) and 63.8(e)(1).

1.2.3 Mercury monitoring approaches not entirely suited to these specifications may be approvable under the alternative monitoring or alternative test method provisions of § 60.13(i) and § 63.8(f) or § 60.8(b)(3) and § 63.7(f), respectively.

2.0 Summary of Performance Specification

Procedures for determining CEMS relative accuracy, linearity, and calibration drift are outlined. CEMS installation and measurement location specifications, data reduction procedures, and performance criteria are included.

3.0 Definitions

3.1 *Continuous Emission Monitoring System (CEMS)* means the total equipment required to measure a pollutant concentration. The system generally consists of the following three major subsystems:

3.2 *Sample Interface* means that portion of the CEMS used for one or more of the following: sample acquisition, sample transport, sample conditioning, and protection of the monitor from the effects of the stack effluent.

3.3 *Hg Analyzer* means that portion of the Hg CEMS that measures the total vapor phase Hg mass concentration and generates a proportional output.

3.4 *Data Recorder* means that portion of the CEMS that provides a permanent electronic record of the analyzer output. The data recorder may provide automatic data reduction and CEMS control capabilities.

3.5 *Span Value* means the measurement range as specified in the applicable regulation or other requirement. If the span is not specified in the applicable regulation or other requirement, then it must be a value approximately equivalent to two times the emission standard. Unless otherwise specified, the span value may be rounded up to the nearest multiple of 10.

3.6 *Measurement Error Test* means a test procedure in which the accuracy of the concentrations measured by a CEMS at three or more points over its measurement range is evaluated using reference gases. For Hg CEMS, elemental and oxidized Hg (Hg^0 and mercuric chloride, $HgCl_2$) gas standards of known concentration are used for this procedure.

3.7 *Measurement Error (ME)* means the absolute value of the difference between the concentration indicated by the CEMS and the known concentration of a reference gas, expressed as a percentage of the span value, when the entire CEMS, including the sampling interface, is challenged.

3.8 *Calibration Drift (CD)* means the absolute value of the difference between the CEMS output response and either an upscale Hg reference gas or a zero-level Hg reference gas, expressed as a percentage of the span value, when the entire CEMS, including the sampling interface, is challenged after a stated period of operation during which no unscheduled maintenance or repair took place.

3.9 *Relative Accuracy Test Procedure* means a test procedure consisting of at least nine test runs, in which the accuracy of the concentrations measured by a CEMS is evaluated by comparison against concurrent measurements made with a reference method (RM). Relative accuracy tests repeated on a regular, on-going basis are referred to as relative accuracy test audits or RATAs.

3.10 *Relative Accuracy (RA)* means the absolute mean difference between the pollutant concentrations determined by the CEMS and the values determined by the RM plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests. Alternatively, for sources with an average RM concentration less than 5.0 micrograms per standard cubic meter (µg/scm), the RA may be expressed as the absolute value of the difference between the mean CEMS and RM values.

4.0 Interferences [Reserved]

5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures. The CEMS user's manual and materials recommended by the RM should be consulted for specific precautions to be taken.

6.0 Equipment and Supplies

6.1 CEMS Equipment Specifications.

6.1.1 Data Recorder Scale. The Hg CEMS data recorder output range must include the full range of expected Hg concentration values in the gas stream to be sampled including zero and the span value.

6.1.2 The Hg CEMS design should also provide for the determination of CD and ME at a zero value (zero to 20 percent of the span value) and at upscale values (between 50 and 100 percent of the span value). The Hg CEMS must be constructed to permit the introduction of known concentrations of Hg and $HgCl_2$ separately into the sampling system of the CEMS immediately preceding the sample extraction filtration system such that the entire CEMS can be challenged.

6.2 Reference Gas Delivery System. The reference gas delivery system must be designed so that the flowrate exceeds the sampling system flow requirements of the CEMS and that the gas is delivered to the CEMS at atmospheric pressure.

6.3 Other equipment and supplies, as needed by the reference method used for the Relative Accuracy Test Procedure. *See* Section 8.6.2.

7.0 Reagents and Standards

7.1 Reference Gases. Reference gas standards are required for both elemental and oxidized Hg (Hg and mercuric chloride, $HgCl_2$). The use of National Institute of Standards and Technology (NIST)-traceable standards and reagents is required. The following gas concentrations are required.

7.1.1 Zero-level. 0 to 20 percent of the span value.

7.1.2 Mid-level. 50 to 60 percent of the span value.

7.1.3 High-level. 80 to 100 percent of the span value.

7.2 Reference gas standards may also be required for the reference methods. *See* Section 8.6.2.

8.0 Performance Specification Test Procedure

8.1 Installation and Measurement Location Specifications.

8.1.1 CEMS Installation. Install the CEMS at an accessible location downstream of all pollution control equipment. Place the probe outlet or other sampling interface at a point or location in the stack (or vent) representative of the stack gas concentration of Hg. Since the Hg CEMS sample system normally extracts gas from a single point in the stack, a location that has been shown to be free of stratification for Hg or, alternatively, SO_2 is recommended. If the cause of failure to meet the RA test requirement is determined to be the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated. Measurement locations and points or paths that are most likely to provide data that will meet the RA requirements are described in Sections 8.1.2 and 8.1.3 below.

8.1.2 Measurement Location. The measurement location should be (1) at least two equivalent diameters downstream of the nearest control device, point of pollutant generation or other point at which a change of pollutant concentration may occur, and (2) at least half an equivalent diameter upstream from the effluent exhaust. The equivalent duct diameter is calculated according to Method 1 in appendix A–1 to this part.

8.1.3 Hg CEMS Sample Extraction Point. Use a sample extraction point either (1) no less than 1.0 meter from the stack or duct wall, or (2) within the centroidal velocity traverse area of the stack or duct cross section. This does not apply to cross-stack, in-situ measurement systems.

8.2 Measurement Error (ME) Test Procedure. Sequentially inject each of at least three elemental Hg reference gases (zero, mid-level, and high level, as defined in Section 7.1), three times each for a total of nine injections. Inject the gases in such a manner that the entire CEMS is challenged. Do not inject the same gas concentration twice in succession. At each reference gas concentration, determine the average of the three CEMS responses and subtract the average response from the reference gas value. Calculate the measurement error (ME) using Equation 12–1 by expressing the absolute value of the difference between the average CEMS response (A) and the reference gas value (R) as a percentage of the span (*see* example data sheet in Figure 12A–1). For each elemental Hg reference gas, the absolute value of the difference between the CEMS response and the reference value must not exceed 5 percent of the span value. If this specification is not met, identify and correct the problem before proceeding. Repeat the measurement error test procedure using oxidized Hg reference gases. For each oxidized Hg reference gas, the absolute value of the difference between the CEMS response and the reference value shall not exceed 10 percent of the span value. If this specification is not met, identify and correct the problem before proceeding.

$$ME = \frac{|R - A|}{Span} x100 \qquad \text{(Equation 12A-1)}$$

8.3 Seven-Day Calibration Drift (CD) Test Procedure.

8.3.1 CD Test Period. While the affected facility is operating normally, or as specified in an applicable regulation, determine the magnitude of the CD once each day (at 24-hour intervals, to the extent practicable) for 7 consecutive unit operating days according to the procedures in Sections 8.3.2 and 8.3.3. The 7 consecutive unit operating days need not be 7 consecutive calendar days. Use either Hg° or $HgCl_2$ standards for this test.

8.3.2 The purpose of the CD measurement is to verify the ability of the CEMS to conform to the established CEMS response used for determining emission concentrations or emission rates. Therefore, if periodic automatic or manual adjustments are made to the CEMS zero and upscale response settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined.

8.3.3 Conduct the CD test using the zero gas specified and either the mid-level or high-level gas as specified in Section 7.1. Sequentially introduce the reference gases to the CEMS at the sampling system of the CEMS immediately preceding the sample extraction filtration system. Record the CEMS response (A) for each reference gas and, using Equation 12A–2, subtract the corresponding reference value (R) from the CEMS value, and express the absolute value of the difference as a percentage of the span value (*see also* example data sheet in Figure 12A–2). For each reference gas, the absolute value of the difference between the CEMS response and the reference value must not exceed 5 percent of the span value. If these specifications are not met, identify and correct the problem before proceeding.

$$CD = \frac{|R - A|}{Span} x100 \qquad \text{(Equation 12A-2)}$$

8.4 Relative Accuracy (RA) Test Procedure.

8.4.1 RA Test Period. Conduct the RA test according to the procedure given in Sections 8.4.2 through 8.4.6 while the affected facility is operating normally, or as specified in an applicable subpart. The RA test may be conducted during the CD test period.

8.4.2 Reference Methods (RM). Unless otherwise specified in an applicable subpart of the regulations, use Method 29, Method 30A, or Method 30B in appendix A–8 to this part or American Society of Testing and Materials (ASTM) Method D6784–02 (incorporated by reference, *see* § 60.17) as the RM for Hg concentration. For Method 29 and ASTM Method D6784–02 only, the filterable portion of the sample need not be included when making comparisons to the CEMS results. When Method 29, Method 30B, or ASTM D6784–02 is used, conduct the RM test runs with paired or duplicate sampling systems and use the average of the vapor phase Hg concentrations measured by the two trains. When Method 30A is used, paired sampling systems are not required. If the RM and CEMS measure on a different moisture basis, data derived with Method 4 in appendix A–3 to this part must also be obtained during the RA test.

8.4.3 Sampling Strategy for RM Tests. Conduct the RM tests in such a way that they will yield results representative of the emissions from the source and can be compared to the CEMS data. The RM and CEMS locations need not be immediately adjacent. Locate the RM measurement points in accordance with section 8.1.3 of Performance Specification 2 (PS 2) in this appendix. It is preferable to conduct moisture measurements (if needed) and Hg measurements simultaneously, although moisture measurements that are taken within an hour of the Hg measurements may be used to adjust the Hg concentrations to a consistent moisture basis. In order to correlate the CEMS and RM data properly, note the beginning and end of each RM test period for each paired RM run (including the exact time of day) on the CEMS chart recordings or other permanent record of output.

8.4.4 Number and Length of RM Test Runs. Conduct a minimum of nine RM test runs. When Method 29, Method 30B, or ASTM D6784–02 is used, only test runs for which the paired RM trains meet the relative deviation criteria (RD) of this PS must be used in the RA calculations. In addition, for Method 29 and ASTM D6784–02, use a minimum sample time of 2 hours and for Methods 30A and 30B use a minimum sample time of 30 minutes.

Note: More than nine sets of RM test runs may be performed. If this option is chosen, RM test run results may be excluded so long as the total number of RM test run results used to determine the CEMS RA is greater than or equal to nine. However, all data must be reported including the excluded test run data.

8.4.5 Correlation of RM and CEMS Data. Correlate the CEMS and the RM test data as to the time and duration by first determining from the CEMS final output (the one used for reporting) the integrated average pollutant concentration for each RM test period. Consider system response time, if important, and confirm that the results are on a consistent moisture basis with the RM test. Then, compare each integrated CEMS value against the corresponding RM value. When Method 29, Method 30B, or ASTM D6784–02 is used, compare each CEMS value against the corresponding average of the paired RM values.

8.4.6 Paired RM Outliers.

8.4.6.1 When Method 29, Method 30B, or ASTM D6784–02 is used, outliers are identified through the determination of relative deviation (RD) of the paired RM tests. Data that do not meet the RD criteria must be flagged as a data quality problem and may not be used in the calculation of RA. The primary reason for performing paired RM sampling is to ensure the quality of the RM data. The percent RD of paired data is the parameter used to quantify data quality. Determine RD for paired data points as follows:

$$RD = \frac{|C_a - C_b|}{C_a + C_b} x100 \qquad \text{(Equation 12A-3)}$$

Where:

C_a and C_b are the Hg concentration values determined from the paired samples.

8.4.6.2 The minimum performance criteria for RM Hg data is that RD for any data pair must be ≤ 10 percent as long as the mean Hg concentration is greater than 1.0 μg/m³. If the mean Hg concentration is less than or equal to 1.0 μg/m³, the RD must be ≤ 20 percent or ≤ 0.2 μg/m³ absolute difference. Pairs of RM data exceeding these RD criteria should be eliminated from the data set used to develop a Hg CEMS correlation or to assess CEMS RA.

8.4.7 Calculate the mean difference between the RM and CEMS values in the units of micrograms per cubic meter (μg/m³), the standard deviation, the confidence coefficient, and the RA according to the procedures in Section 12.0.

8.5 Reporting. At a minimum (check with the appropriate EPA Regional Office, State or local Agency for additional requirements, if any), summarize in tabular form the results of the CD tests, the linearity tests, and the RA test or alternative RA procedure, as appropriate. Include all data sheets, calculations, charts (records of CEMS responses), reference gas concentration certifications, and any other information necessary to confirm that the CEMS meets the performance criteria.

9.0 Quality Control [Reserved]

10.0 Calibration and Standardization [Reserved]

11.0 Analytical Procedure

For Method 30A, sample collection and analysis are concurrent. For the other RM, post-run sample analyses are performed. Refer to the RM employed for specific analytical procedures.

12.0 Calculations and Data Analysis

Calculate and summarize the RA test results on a data sheet similar to Figure 12A–3.

12.1 Consistent Basis. All data from the RM and CEMS must be compared in units of micrograms per standard cubic meter (µg/scm), on a consistent and identified moisture basis. The values must be standardized to 20°C, 760 mm Hg.

12.1.1 Moisture Correction (as applicable). If the RM and CEMS measure Hg on a different moisture basis, they will need to be corrected to a consistent basis. Use Equation 12A–4a to correct data from a wet basis to a dry basis.

$$Concentration_{(dry)} = \frac{Concentration_{(wet)}}{\left(1 - B_{ws}\right)} \qquad \text{(Equation 12A-4a)}$$

Use Equation 12A–4b to correct data from a dry basis to a wet basis.

$$Concentration_{(wet)} = Concentration_{(dry)} \times \left(1 - B_{ws}\right) \qquad \text{(Equation 12A-4b)}$$

Where:

B_{ws} is the moisture content of the flue gas from Method 4, expressed as a decimal fraction (*e.g.,* for 8.0 percent H_2O, $B_{ws} = 0.08$).

12.2 Arithmetic Mean. Calculate $\bar{d}$, the arithmetic mean of the differences (d_i) of a data set as follows:

$$\bar{d} = \frac{1}{n}\sum_{i=1}^{n} d_i \qquad \text{(Equation 12A-5)}$$

Where:

n = Number of data points.

12.3 Standard Deviation. Calculate the standard deviation, S_d, as follows:

$$S_d = \left[\frac{\sum_{i=1}^{n} d_i^2 - \frac{\left[\sum_{i=1}^{n} d_i\right]^2}{n}}{n-1}\right]^{\frac{1}{2}} \qquad \text{(Equation 12A-6)}$$

Where:

$\sum_{i=1}^{n} d_i$ = Algebraic sum of the individual differences d_i.

12.3 Confidence Coefficient (CC). Calculate the 2.5 percent error confidence coefficient (one-tailed), CC, as follows:

$$CC = t_{0.975}\frac{S_d}{\sqrt{n}} \qquad \text{(Equation 12A-7)}$$

12.4 Relative Accuracy. Calculate the RA of a set of data as follows:

$$RA = \frac{\left\lfloor \left|\bar{d}\right| + \left|CC\right| \right\rfloor}{\overline{RM}} x\ 100 \qquad \text{(Equation 12A-8)}$$

Where:

$|\bar{d}|$ = Absolute value of the mean of the differences (from Equation 12A–5)

$|CC|$ = Absolute value of the confidence coefficient (from Equation 12A–7)

$\overline{RM}$ = Average reference method value

13.0 Method Performance

13.1 Measurement Error (ME). For Hg^0, the ME must not exceed 5 percent of the span value at the zero-, mid-, and high-level reference gas concentrations. For $HgCl_2$, the ME must not exceed 10 percent of the span value at the zero-, mid-, and high-level reference gas concentrations.

13.2 Calibration Drift (CD). The CD must not exceed 5 percent of the span value on any of the 7 days of the CD test.

13.3 Relative Accuracy (RA). The RA of the CEMS must be no greater than 20 percent of the mean value of the RM test data in terms of units of µg/scm. Alternatively, if the mean RM is less than 5.0 µg/scm, the results are acceptable if the absolute value of the difference between the mean RM and CEMS values does not exceed 1.0 µg/scm.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 Alternative Procedures [Reserved]

17.0 Bibliography

17.1 40 CFR part 60, appendix B, "Performance Specification 2—Specifications and Test Procedures for SO_2 and NO_X Continuous Emission Monitoring Systems in Stationary Sources."

17.2 40 CFR part 60, appendix A, "Method 29—Determination of Metals Emissions from Stationary Sources."

17.3 40 CFR part 60, appendix A, "Method 30A—Determination of Total Vapor Phase Mercury Emissions From Stationary Sources (Instrumental Analyzer Procedure).

17.4 40 CFR part 60, appendix A, "Method 30B—Determination of Total Vapor Phase Mercury Emissions From Coal-Fired Combustion Sources Using Carbon Sorbent Traps."

17.5 ASTM Method D6784–02, "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)."

18.0 Tables and Figures

TABLE 12A–1—T-VALUES

n[a]	$t_{0.975}$	n[a]	$t_{0.975}$	n[a]	$t_{0.975}$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

[a] The values in this table are already corrected for n–1 degrees of freedom. Use n equal to the number of individual values.

FIGURE 12A–1—ME DETERMINATION

	Date	Time	Reference gas value (μg/m^3)	CEMS measured value (μg/m^3)	Absolute difference (μg/m^3)	ME (% of span value)
Zero level						
	Average					
Mid level						
	Average					
High level						
	Average					

FIGURE 12A–2—7-DAY CALIBRATION DRIFT DETERMINATION

	Date	Time	Reference gas value (μg/m^3)	CEMS measured value (μg/m^3)	Absolute difference (μg/m^3)	CD (% of span value)
Zero level						

FIGURE 12A–2—7-DAY CALIBRATION DRIFT DETERMINATION—Continued

	Date	Time	Reference gas value ($\mu g/m^3$)	CEMS measured value ($\mu g/m^3$)	Absolute difference ($\mu g/m^3$)	CD (% of span value)
Upscale (Mid or High)						

FIGURE 12A–3—RELATIVE ACCURACY TEST DATA

Run No.	Date	Begin time	End time	RM value ($\mu g/m^3$)	CEMS value ($\mu g/m^3$)	Difference ($\mu g/m^3$)	Run used? (Yes/No)	RD[1]
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
Average Values								
Arithmetic Mean Difference: Standard Deviation: Confidence Coefficient: T-Value: % Relative Accuracy: $\lvert (RM)_{avg} - (CEMS)_{avg} \rvert$:								

[1] Calculate the RD only if paired samples are taken using RM 30B, RM 29, or ASTM 6784–08. Express RD as a percentage or, for very low RM concentrations (≤ 1.0 $\mu g/m^3$), as the absolute difference between C_a and C_b.

Performance Specification 12B—Specifications and Test Procedures for Monitoring Total Vapor Phase Mercury Emissions From Stationary Sources Using a Sorbent Trap Monitoring System

1.0 Scope and Application

The purpose of Performance Specification 12B (PS 12B) is to establish performance benchmarks for, and to evaluate the acceptability of, sorbent trap monitoring systems used to monitor total vapor-phase mercury (Hg) emissions in stationary source flue gas streams. These monitoring systems involve continuous repetitive in-stack sampling using paired sorbent media traps with periodic analysis of the time-integrated samples. Persons using PS 12B should have a thorough working knowledge of Methods 1, 2, 3, 4, 5 and 30B in appendices A–1 through A–3 and A–8 to this part.

1.1 Analyte. The analyte measured by these procedures and specifications is total vapor phase Hg in the flue gas, which represents the sum of elemental Hg (Hg^0, CAS Number 7439–97–6) and gaseous forms of oxidized Hg (*i.e.,* Hg^{+2}) in mass concentration units of micrograms per dry standard cubic meter (µg/dscm).

1.2 Applicability

1.2.1 These procedures are only intended for use under relatively low particulate conditions (*e.g.,* monitoring after all pollution control devices). This specification is for evaluating the acceptability of total vapor phase Hg sorbent trap monitoring systems installed at stationary sources at the time of, or soon after, installation and whenever specified in the regulations. The Hg monitoring system must be capable of measuring the total concentration of vapor phase Hg (regardless of speciation), in units of µg/dscm.

1.2.2 This specification contains routine procedures and specifications designed to evaluate an installed sorbent trap monitoring system's performance over time; Procedure 5 of appendix F to this part contains additional procedures and specifications which may be required for long term operation. In addition, the source owner or operator is responsible to calibrate, maintain, and operate the monitoring system properly. The Administrator may require the owner or operator, under section 114 of the Clean Air Act, to conduct performance evaluations at other times besides the initial test to evaluate the CEMS performance. *See* § 60.13(c) and 63.8(e)(1).

2.0 Principle

Known volumes of flue gas are continuously extracted from a stack or duct through paired, in-stack, pre-spiked sorbent media traps at appropriate nominal flow rates. The sorbent traps in the sampling system are periodically exchanged with new ones, prepared for analysis as needed, and analyzed by any technique that can meet the performance criteria. For quality-assurance purposes, a section of each sorbent trap is spiked with Hg^0 prior to sampling. Following sampling, this section is analyzed separately and a specified minimum percentage of the spike must be recovered. Paired train sampling is required to determine method precision.

3.0 Definitions

3.1 *Sorbent Trap Monitoring System* means the total equipment required for the collection of gaseous Hg samples using paired three-partition sorbent traps.

3.2 *Relative Accuracy Test Procedure* means a test procedure consisting of at least nine runs, in which the accuracy of the total vapor phase Hg concentrations measured by the sorbent trap monitoring system is evaluated by comparison against concurrent measurements made with a reference method (RM). Relative accuracy tests repeated on a regular, on-going basis are referred to as relative accuracy test audits or RATAs.

3.3 *Relative Accuracy (RA)* means the absolute mean difference between the pollutant (Hg) concentrations determined by the sorbent trap monitoring system and the values determined by the reference method (RM) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests. Alternatively, for low concentration sources, the RA may be expressed as the absolute value of the difference between the mean sorbent trap monitoring system and RM values.

3.4 *Relative Deviation (RD)* means the absolute difference of the Hg concentration values obtained with a pair of sorbent traps divided by the sum of those concentrations, expressed as a percentage. RD is used to assess the precision of the sorbent trap monitoring system.

3.5 *Spike Recovery* means the mass of Hg recovered from the spiked trap section, expressed as a percentage of the amount spiked. Spike recovery is used to assess sample matrix interference.

4.0 Interferences [Reserved]

5.0 Safety

The procedures required under this performance specification may involve hazardous materials, operations, and equipment. This performance specification may not address all of the safety problems associated with these procedures. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicable regulatory limitations prior to performing these procedures.

6.0 Equipment and Supplies

6.1 Sorbent Trap Monitoring System Equipment Specifications.

6.1.1 Monitoring System. The equipment described in Method 30B in appendix A–8 to this part must be used to continuously sample for Hg emissions, with the substitution of three-section traps in place of two-section traps, as described below. A typical sorbent trap monitoring system is shown in Figure 12B–1.

6.1.2 Three-Section Sorbent Traps. The sorbent media used to collect Hg must be configured in traps with three distinct and identical segments or sections, connected in series, to be separately analyzed. Section 1 is designated for primary capture of gaseous Hg. Section 2 is designated as a backup section for determination of vapor-phase Hg breakthrough. Section 3 is designated for quality assurance/quality control (QA/QC) purposes. Section 3 must be spiked with a known amount of gaseous Hg^0 prior to sampling and later analyzed to determine the spike (and hence sample) recovery efficiency.

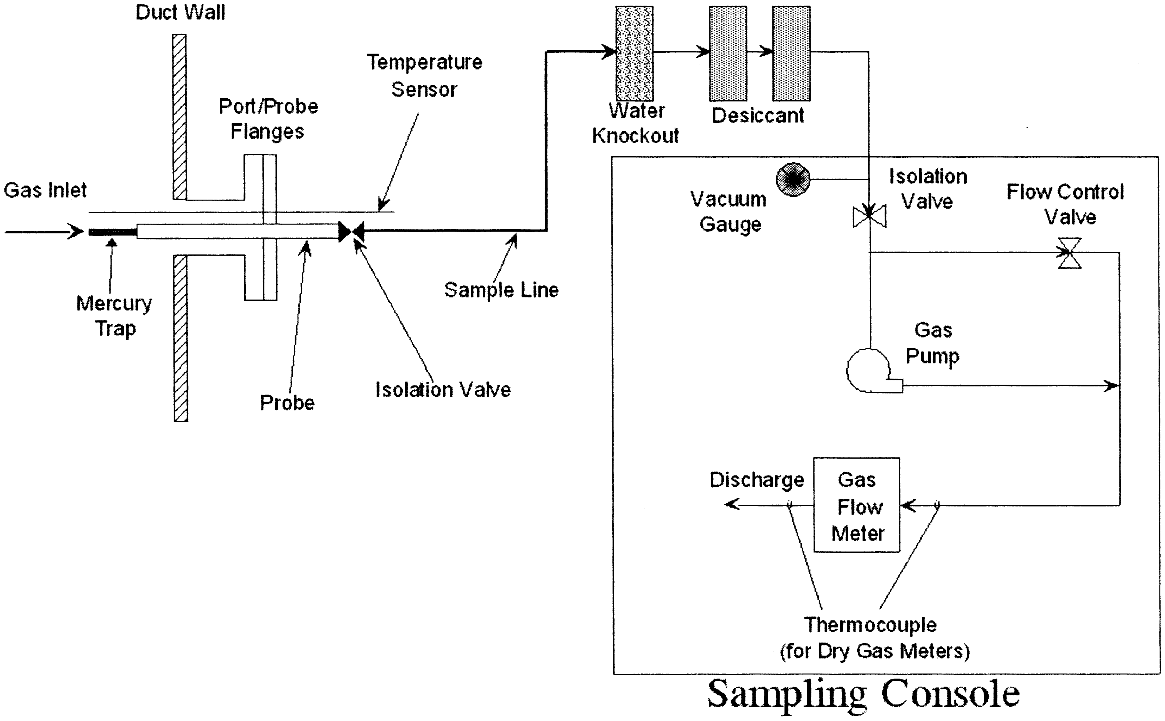

Figure 12B-1. Typical Sorbent Trap Monitoring System (only one trap and associated sampling system is illustrated).

6.1.3 Gaseous Hg^0 Sorbent Trap Spiking System. A known mass of gaseous Hg^0 must be spiked onto section 3 of each sorbent trap prior to sampling. Any approach capable of quantitatively delivering known masses of Hg^0 onto sorbent traps is acceptable. Several technologies or devices are available to meet this objective. Their practicality is a function of Hg mass spike levels. For low levels, NIST-certified or NIST-traceable gas generators or tanks may be suitable, but will likely require long preparation times. A more practical, alternative system, capable of delivering almost any mass required, employs NIST-certified or NIST-traceable Hg salt solutions (*e.g.,* $Hg(NO_3)_2$). With this system, an aliquot of known volume and concentration is added to a reaction vessel containing a reducing agent (*e.g.,* stannous chloride); the Hg salt solution is reduced to Hg^0 and purged onto section 3 of the sorbent trap by using an impinger sparging system.

6.1.4 Sample Analysis Equipment. Any analytical system capable of quantitatively recovering and quantifying total gaseous Hg from sorbent media is acceptable provided that the analysis can meet the performance criteria in Table 12B–1 in Section 9 of this performance specification. Candidate recovery techniques include leaching, digestion, and thermal desorption. Candidate analytical techniques include ultraviolet atomic fluorescence (UV AF); ultraviolet atomic absorption (UV AA), with and without gold trapping; and in-situ X-ray fluorescence (XRF).

7.0 Reagents and Standards

Only NIST-certified or NIST-traceable calibration gas standards and reagents must be used for the tests and procedures required under this performance specification. The sorbent media may be any collection material (*e.g.,* carbon, chemically treated filter, *etc.*) capable of quantitatively capturing and recovering for subsequent analysis, all gaseous forms of Hg in the emissions from the intended application. Selection of the sorbent media must be based on the material's ability to achieve the performance criteria contained in this method as well as the sorbent's vapor phase Hg capture efficiency for the emissions matrix and the expected sampling duration at the test site.

8.0 Performance Specification Test Procedure

8.1 Installation and Measurement Location Specifications.

8.1.1 Selection of Monitoring Site. Sampling site information should be obtained in accordance with Method 1 in appendix A–1 to this part. Place the probe inlet at a point or location in the stack (or vent) downstream of all pollution control equipment and representative of the stack gas concentration of Hg. A location that has been shown to be free of stratification for Hg or, alternatively, SO_2 is recommended. An estimation of the expected stack Hg concentration is required to establish a target sample flow rate, total gas sample volume, and the mass of Hg^0 to be spiked onto section 3 of each sorbent trap.

8.1.2 Pre-sampling Spiking of Sorbent Traps. Based on the estimated Hg concentration in the stack, the target sample rate and the target sampling duration, calculate the expected mass loading for section 1 of each sorbent trap (*see* Section 12.1 of this performance specification). The pre-sampling spike to be added to section 3 of each sorbent trap must be within ± 50 percent of the expected section 1 mass loading. Spike section 3 of each sorbent trap at this level, as described in Section 6.1.3 of this performance specification. For each sorbent trap, keep a record of the mass of Hg^0 added to section 3. This record must include, at a minimum, the identification number of the trap, the date and time of the spike, the name of the analyst performing the procedure, the method of spiking, the mass of Hg^0 added to section 3 of the trap (µg), and the supporting calculations.

8.1.3 Pre-monitoring Leak Check. Perform a leak check with the sorbent traps in place in the sampling system. Draw a vacuum in each sample train. Adjust the vacuum in each sample train to ~15″ Hg. Use the gas flow meter to determine leak rate. The leakage rate must not exceed 4 percent of the target sampling rate. Once the leak check passes this criterion, carefully release the vacuum in the sample train, then seal the sorbent trap inlet until the probe is ready for insertion into the stack or duct.

8.1.4 Determination of Flue Gas Characteristics. Determine or measure the flue gas measurement environment characteristics (gas temperature, static pressure, gas velocity, stack moisture, *etc.*) in order to determine ancillary requirements such as probe heating requirements (if any), sampling rate, proportional sampling conditions, moisture management, *etc.*

8.2 Monitoring.

8.2.1 System Preparation and Initial Data Recording. Remove the plug from the end of each sorbent trap and store each plug in a clean sorbent trap storage container. Remove the stack or duct port cap and insert the probe(s) with the inlet(s) aligned perpendicular to the stack gas flow. Secure the probe(s) and ensure that no leakage occurs between the duct and environment. Record initial data including the sorbent trap ID, start time, starting gas flow meter readings, initial temperatures, set points, and any other appropriate information.

8.2.2 Flow Rate Control. Set the initial sample flow rate at the target value from section 8.1.1 of this performance specification. Then, for every operating hour during the sampling period, record the date and time, the sample flow rate, the gas flow meter reading, the stack temperature (if needed), the flow meter temperatures (if needed), temperatures of heated equipment such as the vacuum lines and the probes (if heated), and the sampling system vacuum readings. Also, record the stack gas flow rate and the ratio of the stack gas flow rate to the sample flow rate. Adjust the sampling flow rate to maintain proportional sampling, *i.e.,* keep the ratio of the stack gas flow rate to sample flow rate within ± 25 percent of the reference ratio from the first hour of the data collection period (*see* section 12.2 of this performance specification). The sample flow rate through a sorbent trap monitoring system during any hour (or portion of an hour) that the unit is not operating must be zero.

8.2.3 Stack Gas Moisture Determination. If data from the sorbent trap monitoring system will be used to calculate Hg mass emissions, determine the stack gas moisture content using a continuous moisture monitoring system or other means acceptable to the Administrator, such as the ones described in § 75.11(b) of this chapter. Alternatively, for combustion of coal, wood, or natural gas in boilers only, a default moisture percentage from § 75.11(b) of this chapter may be used.

8.2.4 Essential Operating Data. Obtain and record any essential operating data for the facility during the test period, *e.g.,* the barometric pressure for correcting the sample volume measured by a dry gas meter to standard conditions. At the end of the data collection period, record the final gas flow meter reading and the final values of all other essential parameters.

8.2.5 Post-monitoring Leak Check. When the monitoring period is completed, turn off the sample pump, remove the probe/sorbent trap from the port and carefully re-plug the end of each sorbent trap. Perform a leak check with the sorbent traps in place, at the maximum vacuum reached during the monitoring period. Use the same general approach described in section 8.1.3 of this performance specification. Record the leakage rate and vacuum. The leakage rate must not exceed 4 percent of the average sampling rate for the monitoring period. Following the leak check, carefully release the vacuum in the sample train.

8.2.6 Sample Recovery. Recover each sampled sorbent trap by removing it from the probe and seal both ends. Wipe any deposited material from the outside of the sorbent trap. Place the sorbent trap into an appropriate sample storage container and store/preserve it in an appropriate manner.

8.2.7 Sample Preservation, Storage, and Transport. While the performance criteria of this approach provide for verification of appropriate sample handling, it is still important that the user consider, determine, and plan for suitable sample preservation, storage, transport, and holding times for these measurements. Therefore, procedures in recognized voluntary consensus standards such as those in ASTM D6911–03 "Standard Guide for Packaging and Shipping Environmental Samples for Laboratory Analysis" should be followed for all samples.

8.2.8 Sample Custody. Proper procedures and documentation for sample chain of custody are critical to ensuring data integrity. Chain of custody procedures in recognized voluntary consensus standards such as those in ASTM D4840–99 "Standard Guide for Sample Chain-of-Custody Procedures" should be followed for all samples (including field samples and blanks).

8.3 Relative Accuracy (RA) Test Procedure

8.3.1 For the initial certification of a sorbent trap monitoring system, a RA Test is required. Follow the basic RA test procedures and calculation methodology described in Sections 8.4.1 through 8.4.7 and 12.4 of PS 12A in this appendix, replacing the term "CEMS" with "sorbent trap monitoring system".

8.3.2 Special Considerations. The type of sorbent material used in the traps must be the same as that used for daily operation of the monitoring system; however, the size of the traps used for the RA test may be smaller than the traps used for daily operation of the system. Spike the third section of each sorbent trap with elemental Hg, as described in section 8.1.2 of this performance specification. Install a new pair of sorbent traps prior to each test run. For each run, the sorbent trap data must be validated according to the quality assurance criteria in Table 12B–1 in Section 9.0, below.

8.3.3 Acceptance Criteria. The RA of the sorbent trap monitoring system must be no greater than 20 percent of the mean value of the RM test data in terms of units of µg/scm. Alternatively, if the RM concentration is less than or equal to 5.0 µg/scm, then the RA results are acceptable if the absolute difference between the means of the RM and sorbent trap monitoring system values does not exceed 1.0 µg/scm.

9.0 Quality Assurance and Quality Control (QA/QC)

Table 12B–1 summarizes the QA/QC performance criteria that are used to validate the Hg emissions data from a sorbent trap monitoring system. Failure to achieve these performance criteria will result in invalidation of Hg emissions data, except where otherwise noted.

TABLE 12B–1—QA/QC CRITERIA FOR SORBENT TRAP MONITORING SYSTEM OPERATION AND CERTIFICATION

QA/QC test or specification	Acceptance criteria	Frequency	Consequences if not met
Pre-monitoring leak check	≤4% of target sampling rate	Prior to monitoring	Monitoring must not commence until the leak check is passed.
Post-monitoring leak check	≤4% of average sampling rate	After monitoring	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap (see Section 12.7.1.3).
Ratio of stack gas flow rate to sample flow rate.	Hourly ratio may not deviate from the reference ratio by more than ± 25%..	Every hour throughout monitoring period.	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap (*see* Section 12.7.1.3).
Sorbent trap section 2 breakthrough.	≤5% of Section 1 Hg mass	Every sample	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap (*see* Section 12.7.1.3).

TABLE 12B–1—QA/QC CRITERIA FOR SORBENT TRAP MONITORING SYSTEM OPERATION AND CERTIFICATION—Continued

QA/QC test or specification	Acceptance criteria	Frequency	Consequences if not met
Paired sorbent trap agreement	$\leq$10% Relative Deviation (RD) if the average concentration is > 1.0 μg/m^3. $\leq$20% RD if the average concentration is $\leq$ 1.0 μg/m^3. Results also acceptable if absolute difference between concentrations from paired traps is $\leq$ 0.03 μg/m^3.	Every sample	Either invalidate the data from the paired traps or report the results from the trap with the higher Hg concentration.
Spike Recovery Study	Average recovery between 85% and 115% for each of the 3 spike concentration levels.	Prior to analyzing field samples and prior to use of new sorbent media.	Field samples must not be analyzed until the percent recovery criteria has been met.
Multipoint analyzer calibration	Each analyzer reading within ± 10% of true value and $r^2 \geq 0.99$.	On the day of analysis, before analyzing any samples.	Recalibrate until successful
Analysis of independent calibration standard..	Within ± 10% of true value	Following daily calibration, prior to analyzing field samples.	Recalibrate and repeat independent standard analysis until successful.
Spike recovery from section 3 of both sorbent traps.	75–125% of spike amount	Every sample	Invalidate the data from the paired traps or, if certain conditions are met, report adjusted data from a single trap (*see* Section 12.7.1.3).
Relative Accuracy	RA $\leq$20.0% of RM mean value; or if RM mean value $\leq$5.0 μg/scm, absolute difference between RM and sorbent trap monitoring system mean values $\leq$1.0 μg/scm.	RA specification must be met for initial certification.	Data from the system are invalid until a RA test is passed.
Gas flow meter calibration	An initial calibration factor (Y) has been determined at 3 settings; for mass flow meters, initial calibration with stack gas has been performed. For subsequent calibrations, Y within ± 5% of average value from the most recent 3-point calibration.	At 3 settings prior to initial use and at least quarterly at one setting thereafter.	Recalibrate meter at 3 settings to determine a new value of Y.
Temperature sensor calibration	Absolute temperature measured by sensor within ± 1.5% of a reference sensor.	Prior to initial use and at least quarterly thereafter.	Recalibrate; sensor may not be used until specification is met.
Barometer calibration	Absolute pressure measured by instrument within ± 10 mm Hg of reading with a NIST-traceable barometer.	Prior to initial use and at least quarterly thereafter.	Recalibrate; instrument may not be used until specification is met.

10.0 Calibration and Standardization

10.1 Gaseous and Liquid Standards. Only NIST certified or NIST-traceable calibration standards (*i.e.,* calibration gases, solutions, *etc.*) must be used for the spiking and analytical procedures in this performance specification.

10.2 Gas Flow Meter Calibration. The manufacturer or supplier of the gas flow meter should perform all necessary set-up, testing, programming, *etc.,* and should provide the end user with any necessary instructions, to ensure that the meter will give an accurate readout of dry gas volume in standard cubic meters for the particular field application.

10.2.1 Initial Calibration. Prior to its initial use, a calibration of the flow meter must be performed. The initial calibration may be done by the manufacturer, by the equipment supplier, or by the end user. If the flow meter is volumetric in nature (*e.g.,* a dry gas meter), the manufacturer, equipment supplier, or end user may perform a direct volumetric calibration using any gas. For a mass flow meter, the manufacturer, equipment supplier, or end user may calibrate the meter using a bottled gas mixture containing 12 ± 0.5% CO_2, 7 ± 0.5% O_2, and balance N_2, or these same gases in proportions more representative of the expected stack gas composition. Mass flow meters may also be initially calibrated on-site, using actual stack gas.

10.2.1.1 Initial Calibration Procedures. Determine an average calibration factor (Y) for the gas flow meter, by calibrating it at three sample flow rate settings covering the range of sample flow rates at which the sorbent trap monitoring system typically operates. Either the procedures in section 10.3.1 of Method 5 in appendix A–3 to this part or the procedures in section 16 of Method 5 in appendix A–3 to this part may be followed. If a dry gas meter is being calibrated, use at least five revolutions of the meter at each flow rate.

10.2.1.2 Alternative Initial Calibration Procedures. Alternatively, the initial calibration of the gas flow meter may be performed using a reference gas flow meter (RGFM). The RGFM may be either: (1) A wet test meter calibrated according to section 10.3.1 of Method 5 in appendix A–3 to this part; (2) A gas flow metering device calibrated at multiple flow rates using the procedures in section 16 of Method 5 in appendix A–3 to this part; or (3) A NIST-traceable calibration device capable of measuring volumetric flow to an accuracy of 1 percent. To calibrate the gas flow meter using the RGFM, proceed as follows: While the sorbent trap monitoring system is sampling the actual stack gas or a compressed gas mixture that simulates the stack gas composition (as applicable), connect the RGFM to the discharge of the system. Care should be taken to minimize the dead volume between the sample flow meter being tested and the RGFM. Concurrently measure dry gas volume with the RGFM and the flow meter being calibrated for a minimum of 10 minutes at each of three flow rates covering the typical range of operation of the sorbent trap monitoring system. For each 10-minute (or longer) data collection period, record the total sample volume, in units of dry standard cubic meters (dscm), measured by the RGFM and the gas flow meter being tested.

10.2.1.3 Initial Calibration Factor. Calculate an individual calibration factor Yi at each tested flow rate from section 10.2.1.1 or 10.2.1.2 of this performance specification (as applicable), by taking the ratio of the reference sample volume to the sample volume recorded by the gas flow meter. Average the three Yi values, to determine Y, the calibration factor for the flow meter. Each of the three individual values of Yi must be within ±0.02 of Y. Except as otherwise provided in sections 10.2.1.4 and 10.2.1.5 of this performance specification, use the average Y value from the three level calibration to adjust all subsequent gas volume measurements made with the gas flow meter.

10.2.2 Initial On-Site Calibration Check. For a mass flow meter that was initially calibrated using a compressed gas mixture, an on-site calibration check must be performed before using the flow meter to provide data. While sampling stack gas, check the calibration of the flow meter at one intermediate flow rate typical of normal operation of the monitoring system. Follow the basic procedures in section 10.2.1.1 or 10.2.1.2 of this performance specification. If the onsite calibration check shows that the value of Yi, the calibration factor at the tested flow rate, differs by more than 5 percent from the value of Y obtained in the initial calibration of the meter, repeat the full 3-level calibration of the meter using stack gas to determine a new value of Y, and apply the new Y value to all subsequent gas volume measurements made with the gas flow meter.

10.2.3 Ongoing Quality Control. Recalibrate the gas flow meter quarterly at one intermediate flow rate setting representative of normal operation of the monitoring system. Follow the basic procedures in section 10.2.1.1 or 10.2.1.2 of this performance specification. If a quarterly recalibration shows that the value of Yi, the calibration factor at the tested flow rate, differs from the current value of Y by more than 5 percent, repeat the full 3-level calibration of the meter to determine a new value of Y, and apply the new Y value to all subsequent gas volume measurements made with the gas flow meter.

10.3 Calibration of Thermocouples and Other Temperature Sensors. Use the procedures and criteria in section 10.3 of Method 2 in appendix A–1 to this part to calibrate in-stack temperature sensors and thermocouples. Calibrations must be performed prior to initial use and at least quarterly thereafter. At each calibration point, the absolute temperature measured by the temperature sensor must agree to within ±1.5 percent of the temperature measured with the reference sensor, otherwise the sensor may not continue to be used.

10.4 Barometer Calibration. Calibrate the barometer against another barometer that has a NIST-traceable calibration. This calibration must be performed prior to initial use and at least quarterly thereafter. At each calibration point, the absolute pressure measured by the barometer must agree to within ±10 mm Hg of the pressure measured by the NIST-traceable barometer, otherwise the barometer may not continue to be used.

10.5 Calibration of Other Sensors and Gauges. Calibrate all other sensors and gauges according to the procedures specified by the instrument manufacturer(s).

10.6 Analytical System Calibration. *See* section 11.1 of this performance specification.

11.0 Analytical Procedures

The analysis of the Hg samples may be conducted using any instrument or technology capable of quantifying total Hg from the sorbent media and meeting the performance criteria in section 9 of this performance specification.

11.1 Analyzer System Calibration. Perform a multipoint calibration of the analyzer at three or more upscale points over the desired quantitative range (multiple calibration ranges must be calibrated, if necessary). The field samples analyzed must fall within a calibrated, quantitative range and meet the necessary performance criteria. For samples that are suitable for aliquotting, a series of dilutions may be needed to ensure that the samples fall within a calibrated range. However, for sorbent media samples that are consumed during analysis (*e.g.,* thermal desorption techniques), extra care must be taken to ensure that the analytical system is appropriately calibrated prior to sample analysis. The calibration curve range(s) should be determined based on the anticipated level of Hg mass on the sorbent media. Knowledge of estimated stack Hg concentrations and total sample volume may be required prior to analysis. The calibration curve for use with the various analytical techniques (*e.g.,* UV AA, UV AF, and XRF) can be generated by directly introducing standard solutions into the analyzer or by spiking the standards onto the sorbent media and then introducing into the analyzer after preparing the sorbent/standard according to the particular analytical technique. For each calibration curve, the value of the square of the linear correlation coefficient, *i.e.,* r^2, must be ≥ 0.99, and the analyzer response must be within ±10 percent of reference value at each upscale calibration point. Calibrations must be performed on the day of the analysis, before analyzing any of the samples. Following calibration, an independently prepared standard (not from same calibration stock solution) must be analyzed. The measured value of the independently prepared standard must be within ±10 percent of the expected value.

11.2 Sample Preparation. Carefully separate the three sections of each sorbent trap. Combine for analysis all materials associated with each section, *i.e.,* any supporting substrate that the sample gas passes through prior to entering a media section (*e.g.,* glass wool, polyurethane foam, *etc.*) must be analyzed with that segment.

11.3 Spike Recovery Study. Before analyzing any field samples, the laboratory must demonstrate the ability to recover and quantify Hg from the sorbent media by performing the following spike recovery study for sorbent media traps spiked with elemental mercury. Using the procedures described in sections 6.2 and 12.1 of this performance specification, spike the third section of nine sorbent traps with gaseous Hg^0, *i.e.,* three traps at each of three different mass loadings, representing the range of masses anticipated in the field samples. This will yield a 3 × 3 sample matrix. Prepare and analyze the third section of each spiked trap, using the techniques that will be used to prepare and analyze the field samples. The average recovery for each spike concentration must be between 85 and 115 percent. If multiple types of sorbent media are to be analyzed, a separate spike recovery study is required for each sorbent material. If multiple ranges are calibrated, a separate spike recovery study is required for each range.

11.4 Field Sample Analyses. Analyze the sorbent trap samples following the same procedures that were used for conducting the spike recovery study. The three sections of each sorbent trap must be analyzed separately (*i.e.,* section 1, then section 2, then section 3). Quantify the total mass of Hg for each section based on analytical system response and the calibration curve from section 11.1 of this performance specification. Determine the spike recovery from sorbent trap section 3. The spike recovery must be no less than 75 percent and no greater than 125 percent. To report the final Hg mass for each trap, add together the Hg masses collected in trap sections 1 and 2.

12.0 Calculations, Data Reduction, and Data Analysis

12.1 Calculation of Pre-Sampling Spiking Level. Determine sorbent trap section 3 spiking level using estimates of the stack Hg concentration, the target sample flow rate, and the expected monitoring period. Calculate M_{exp}, the expected Hg mass that will be collected in section 1 of the trap, using Equation 12B–1. The pre-sampling spike must be within ±50 percent of this mass.

$$M_{\exp} = \left[Q_s \ t_s \ \ C_{est} \right] x 10^{-3} \qquad \text{(Equation 12B-1)}$$

Where:

M_{exp} = Expected sample mass (μg)
Q_s = Sample flow rate (L/min)
t_s = Expected monitoring period (min)
C_{est} = Estimated Hg concentration in stack gas (μg/m³)
10^{-3} = Conversion factor (m³/L)

Example calculation: For an estimated stack Hg concentration of 5 μg/m³, a target sample rate of 0.30 L/min, and a monitoring period of 5 days:

M_{exp} = (0.30 L/min)(1440 min/day)(5 days)(10^{-3} m^3/L)(5 μg/m^3) = 10.8 μg

A pre-sampling spike of 10.8 μg ±50 percent is, therefore, appropriate.

12.2 Calculations for Flow-Proportional Sampling. For the first hour of the data collection period, determine the reference ratio of the stack gas volumetric flow rate to the sample flow rate, as follows:

$$R_{ref} = \frac{KQ_{ref}}{F_{ref}} \qquad \text{(Equation 12B-2)}$$

Where:

R_{ref} = Reference ratio of hourly stack gas flow rate to hourly sample flow rate
Q_{ref} = Average stack gas volumetric flow rate for first hour of collection period (scfh)
F_{ref} = Average sample flow rate for first hour of the collection period, in appropriate units (*e.g.,* liters/min, cc/min, dscm/min)
K = Power of ten multiplier, to keep the value of R_{ref} between 1 and 100. The appropriate K value will depend on the selected units of measure for the sample flow rate.

Then, for each subsequent hour of the data collection period, calculate ratio of the stack gas flow rate to the sample flow rate using Equation 12B–3:

$$R_h = \frac{KQ_h}{F_h} \qquad \text{(Equation 12B-3)}$$

Where:

R_h = Ratio of hourly stack gas flow rate to hourly sample flow rate
Q_h = Average stack gas volumetric flow rate for the hour (scfh)
F_h = Average sample flow rate for the hour, in appropriate units (*e.g.,* liters/min, cc/min, dscm/min)
K = Power of ten multiplier, to keep the value of R_h between 1 and 100. The appropriate K value will depend on the selected units of measure for the sample flow rate and the range of expected stack gas flow rates.

Maintain the value of R_h within ±25 percent of R_{ref} throughout the data collection period.

12.3 Calculation of Spike Recovery. Calculate the percent recovery of each section 3 spike, as follows:

$$\%R = \frac{M_3}{M_s} \times 100 \qquad \text{(Equation 12B-4)}$$

Where:

%R = Percentage recovery of the pre-sampling spike
M_3 = Mass of Hg recovered from section 3 of the sorbent trap, (μg)
M_s = Calculated Hg mass of the pre-sampling spike, from section 8.1.2 of this performance specification, (μg)

12.4 Calculation of Breakthrough. Calculate the percent breakthrough to the second section of the sorbent trap, as follows:

$$\%B = \frac{M_2}{M_1} \times 100 \qquad \text{(Equation 12B-5)}$$

Where:

%B = Percent breakthrough
M_2 = Mass of Hg recovered from section 2 of the sorbent trap, (μg)
M_1 = Mass of Hg recovered from section 1 of the sorbent trap, (μg)

12.5 Calculation of Hg Concentration. Calculate the Hg concentration for each sorbent trap, using the following equation:

$$C = \frac{M^*}{V_t} \qquad \text{(Equation 12B-6)}$$

Where:

C = Concentration of Hg for the collection period, (μg/dscm)
M* = Total mass of Hg recovered from sections 1 and 2 of the sorbent trap, (μg)
V_t = Total volume of dry gas metered during the collection period, (dscm). For the purposes of this performance specification, standard temperature and pressure are defined as 20 °C and 760 mm Hg, respectively.

12.6 Calculation of Paired Trap Agreement. Calculate the relative deviation (RD) between the Hg concentrations measured with the paired sorbent traps:

$$RD = \frac{|C_a - C_b|}{C_a + C_b} x100 \qquad \text{(Equation 12B-7)}$$

Where:

RD = Relative deviation between the Hg concentrations from traps "a" and "b" (percent)
C_a = Concentration of Hg for the collection period, for sorbent trap "a" (μg/dscm)
C_b = Concentration of Hg for the collection period, for sorbent trap "b" (μg/dscm)

12.7 Calculation of Relative Accuracy. Calculate the relative accuracy as described in Section 12.4 of PS 12A in this appendix.

12.8 Data Reduction. Typical monitoring periods for normal, day-to-day operation of a sorbent trap monitoring system range from about 24 hours to 168 hours. For the required RA tests of the system, smaller sorbent traps are often used, and the "monitoring period" or time per run is considerably shorter (*e.g.,* 1 hour or less). Generally speaking, to validate sorbent trap monitoring system data, the acceptance criteria for the following five QC specifications in Table 12B–1 above must be met for both traps: (a) the post-monitoring leak check; (b) the ratio of stack gas flow rate to sample flow rate; (c) section 2 breakthrough; (d) paired trap agreement; and (e) section 3 spike recovery.

12.8.1 For routine day-to-day operation of a sorbent trap monitoring system, when both traps meet the acceptance criteria for all five QC specifications, the two measured Hg concentrations must be averaged arithmetically and the average value must be applied to each hour of the data collection period.

12.8.2 To validate a RA test run, both traps must meet the acceptance criteria for all five QC specifications. However, as specified in Section 12.8.3 below, for routine day-to-day operation of the monitoring system, a monitoring period may, in certain instances, be validated based on the results from one trap.

12.8.3 For the routine, day-to-day operation of the monitoring system, when one of the two sorbent trap samples or sampling systems either: (a) Fails the post-monitoring leak check; or (b) has excessive section 2 breakthrough; or (c) fails to maintain the proper stack flow-to-sample flow ratio; or (d) fails to achieve the required section 3 spike recovery, provided that the other trap meets the acceptance criteria for all four of these QC specifications, the Hg concentration measured by the valid trap may be multiplied by a factor of 1.111 and then used for reporting purposes. Further, if both traps meet the acceptance criteria for all four of these QC specifications, but the acceptance criterion for paired trap agreement is not met, the owner or operator may report the higher of the two Hg concentrations measured by the traps, in lieu of invalidating the data from the paired traps.

12.8.4 Whenever the data from a pair of sorbent traps must be invalidated and no quality-assured data from a certified backup Hg monitoring system or Hg reference method are available to cover the hours in the data collection period, treat those hours in the manner specified in the applicable regulation (*i.e.,* use missing data substitution procedures or count the hours as monitoring system down time, as appropriate).

13.0 Monitoring System Performance

These monitoring criteria and procedures have been successfully applied to coal-fired utility boilers (including units with post-combustion emission controls), having vapor-phase Hg concentrations ranging from 0.03 μg/dscm to approximately 100 μg/dscm.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 Alternative Procedures [Reserved]

17.0 Bibliography

17.1 40 CFR Part 60, Appendix B, "Performance Specification 2—Specifications and Test Procedures for SO_2 and NO_X Continuous Emission Monitoring Systems in Stationary Sources."

17.2 40 CFR Part 60, Appendix B, "Performance Specification 12A—Specifications and Test Procedures for Total Vapor Phase Mercury Continuous Emission Monitoring Systems in Stationary Sources."

Appendix F—[Amended]

■ 8. Appendix F to 40 CFR part 60 is amended to add and reserve Procedures 3 and 4, and add Procedure 5, to read as follows:

Appendix F to Part 60—Quality Assurance Procedures

* * * * *

Procedure 3. [Reserved]

Procedure 4. [Reserved]

Procedure 5. Quality Assurance Requirements for Vapor Phase Mercury Continuous Emissions Monitoring Systems and Sorbent Trap Monitoring Systems Used for Compliance Determination at Stationary Sources

1.0 Applicability and Principle

1.1 Applicability. The purpose of Procedure 5 is to establish the minimum requirements for evaluating the effectiveness of quality control (QC) and quality assurance (QA) procedures as well as the quality of data produced by vapor phase mercury (Hg) continuous emissions monitoring systems (CEMS) and sorbent trap monitoring systems. Procedure 5 applies to Hg CEMS and sorbent trap monitoring systems used for continuously determining compliance with emission standards or operating permit limits as specified in an applicable regulation or permit. Other QA/QC procedures may apply to other auxiliary monitoring equipment that may be needed to determine Hg emissions in the units of measure specified in an applicable permit or regulation.

Procedure 5 covers the measurement of Hg emissions as defined in Performance Specification 12A (PS 12A) and Performance Specification 12B (PS 12B) in appendix B to this part, *i.e.,* total vapor phase Hg representing the sum of the elemental (Hg°, CAS Number 7439–97–6) and oxidized (Hg^{+2}) forms of gaseous Hg.

Procedure 5 specifies the minimum requirements for controlling and assessing the quality of Hg CEMS and sorbent trap monitoring system data submitted to EPA or a delegated permitting authority. You must meet these minimum requirements if you are responsible for one or more Hg CEMS or sorbent trap monitoring systems used for compliance monitoring. We encourage you to develop and implement a more extensive QA program or to continue such programs where they already exist.

You must comply with the basic requirements of Procedure 5 immediately following successful completion of the initial performance test described in PS 12A or PS 12B in appendix B to this part (as applicable).

1.2 Principle. The QA procedures consist of two distinct and equally important functions. One function is the assessment of the quality of the Hg CEMS or sorbent trap monitoring system data by estimating accuracy. The other function is the control and improvement of the quality of the CEMS or sorbent trap monitoring system data by implementing QC policies and corrective actions. These two functions form a control loop: When the assessment function indicates that the data quality is inadequate, the quality control effort must be increased until the data quality is acceptable. In order to provide uniformity in the assessment and reporting of data quality, this procedure explicitly specifies assessment methods for calibration drift, system integrity, and accuracy. Several of the procedures are based on those of PS 12A and PS 12B in appendix B to this part. Because the control and corrective action function encompasses a variety of policies, specifications, standards, and corrective measures, this procedure treats QC requirements in general terms to allow each source owner or operator to develop a QC system that is most effective and efficient for the circumstances.

2.0 Definitions

2.1 *Mercury Continuous Emission Monitoring System (Hg CEMS)* means the equipment required for the determination of the total vapor phase Hg concentration in the stack effluent. The Hg CEMS consists of the following major subsystems:

2.1.1 *Sample Interface* means that portion of the CEMS used for one or more of the following: sample acquisition, sample transport, sample conditioning, and protection of the monitor from the effects of the stack effluent.

2.1.2 *Hg Analyzer* means that portion of the Hg CEMS that measures the total vapor phase Hg concentration and generates a proportional output.

2.1.3 *Data Recorder* means that portion of the CEMS that provides a permanent electronic record of the analyzer output. The data recorder may provide automatic data reduction and CEMS control capabilities.

2.2 *Sorbent Trap Monitoring System* means the total equipment required for the collection of gaseous Hg samples using paired three-partition sorbent traps as described in PS 12B in appendix B to this part.

2.3 *Span Value* means the measurement range as specified for the affected source category in the applicable regulation and/or monitoring performance specification.

2.4 *Zero, Mid-Level, and High Level Values* means the reference gas concentrations used for calibration drift assessments and system integrity checks on a Hg CEMS, expressed as percentages of the span value (*see* section 7.1 of PS 12A in appendix B to this part).

2.5 *Calibration Drift (CD)* means the absolute value of the difference between the CEMS output response and either the upscale Hg reference gas or the zero-level Hg reference gas, expressed as a percentage of the span value, when the entire CEMS, including the sampling interface, is challenged after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.6 *System Integrity (SI) Check* means a test procedure assessing transport and measurement of oxidized Hg by a Hg CEMS. In particular, system integrity is expressed as the absolute value of the difference between the CEMS output response and the reference value of either a mid- or high-level mercuric chloride ($HgCl_2$) reference gas, as a percentage of span, when the entire CEMS, including the sampling interface, is challenged.

2.7 *Relative Accuracy (RA)* means the absolute mean difference between the pollutant concentrations determined by a continuous monitoring system (*e.g.,* Hg CEMS or sorbent trap monitoring system) and the values determined by a reference method (RM) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests. Alternatively, for sources with an average RM concentration less than 5.0 micrograms per standard cubic meter (µg/scm), the RA may be expressed as the absolute value of the difference between the mean CEMS and RM values.

2.8 *Relative Accuracy Test Audit (RATA)* means an audit test procedure consisting of at least nine runs, in which the accuracy of the total vapor phase Hg concentrations measured by a CEMS or sorbent trap monitoring system is evaluated by comparison against concurrent measurements made with a reference test method.

2.9 *Quarterly Gas Audit (QGA)* means an audit procedure in which the accuracy of the total vapor phase Hg concentrations measured by a CEMS is evaluated by challenging the CEMS with a zero and two upscale reference gases.

3.0 QC Requirements

3.1 Each source owner or operator must develop and implement a QC program. At a minimum, each QC program must include written procedures which should describe in detail, complete, step-by-step procedures and operations for each of the following activities (as applicable):

(a) Calibration drift (CD) checks of Hg CEMS.

(b) CD determination and adjustment of Hg CEMS.

(c) Weekly system integrity check procedures for Hg CEMS.

(d) Routine operation, maintenance, and QA/QC procedures for sorbent trap monitoring systems.

(e) Routine and preventive maintenance procedures for Hg CEMS (including spare parts inventory).

(f) Data recording, calculations, and reporting.

(g) Accuracy audit procedures for Hg CEMS and sorbent trap monitoring systems including sampling and analysis methods.

(h) Program of corrective action for malfunctioning Hg CEMS and sorbent trap monitoring systems.

These written procedures must be kept on record and available for inspection by the responsible enforcement agency. Also, as noted in Section 5.2.4, below, whenever excessive inaccuracies of a Hg CEMS occur for two consecutive quarters, the source owner or operator must revise the current written procedures or modify or replace the CEMS or sorbent trap monitoring system to correct the deficiency causing the excessive inaccuracies.

4.0 Calibration Drift (CD) Assessment

4.1 CD Requirement. As described in 40 CFR 60.13(d) and 63.8(c), source owners and operators of Hg CEMS must check, record, and quantify the CD at two concentration values at least once daily (approximately 24 hours) in accordance with the method prescribed by the manufacturer. The Hg CEMS calibration must, as minimum, be adjusted whenever the daily zero (or low-level) CD or the daily high-level CD exceeds two times the limits of the applicable PS in appendix B of this part.

4.2 Recording Requirement for Automatic CD Adjusting CEMS. CEMS that automatically adjust the data to the corrected calibration values (*e.g.,* microprocessor control) must either be programmed to record the unadjusted concentration measured in the CD prior to resetting the calibration, if performed, or to record the amount of adjustment.

4.3 Criteria for Excessive CD. If either the zero (or low-level) or high-level CD result exceeds twice the applicable drift specification in section 13.2 of PS 12A in appendix B to this part for five, consecutive, daily periods, the CEMS is out-of-control. If either the zero (or low-level) or high-level CD result exceeds four times the applicable drift specification in PS 12A during any CD check, the CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action. Following corrective action, repeat the CD checks.

4.3.1 Out-Of-Control Period Definition. The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive, daily CD check with a CD in excess of two times the allowable limit, or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD in excess of four times the allowable limit. The end of the out-of-control period is the time corresponding to the completion of the CD check following corrective action that results in the CD's at both the zero (or low-level) and high-level measurement points being within the corresponding allowable CD limit (*i.e.,* either two times or four times the allowable limit in the applicable PS in appendix B).

4.3.2 CEMS Data Status During Out-of-Control Period. During the period the CEMS is out-of-control, the CEMS data may not be used either to determine compliance with an emission limit or to meet a minimum data availability requirement specified in an applicable regulation or permit.

5.0 Data Accuracy Assessment

5.1 Hg CEMS Audit Requirements. For each Hg CEMS, an accuracy audit must be performed at least once each calendar quarter. Successive quarterly audits must, to the extent practicable, be performed no less than 2 months apart. The audits must be conducted as follows:

5.1.1 Relative Accuracy Test Audit (RATA). A RATA of the Hg CEMS must be conducted at least once every four calendar quarters, except as otherwise noted in section 5.1.4 of this appendix. Perform the RATA as described in section 8.5 of PS 12A in appendix B to this part. Calculate the results according to section 12.4 of PS 12A.

5.1.2 Quarterly Gas Audit. A quarterly gas audit (QGA) may be conducted in three of four calendar quarters, but in no more than three quarters in succession. To perform a QGA, challenge the CEMS with a zero-level and two upscale level audit gases of known concentrations, first of elemental Hg and then of oxidized Hg, within the following ranges:

Audit point	Audit range
1	20 to 30% of span value.
2	50 to 60% of span value.

Sequentially inject each of the three audit gases (zero and two upscale), three times each for a total of nine injections. Inject the gases in such a manner that the entire CEMS is challenged. Do not inject the same gas concentration twice in succession.

Use elemental Hg and oxidized Hg (mercuric chloride, $HgCl_2$) audit gases that are National Institute of Standards and Technology (NIST)-certified or NIST-traceable following an EPA Traceability Protocol. If audit gas cylinders are used, do not dilute gas when challenging the Hg CEMS. For each reference gas concentration, determine the average of the three CEMS responses and subtract the average response from the reference gas value. Calculate the measurement error at each gas level using Equation 12A–1 in section 8.2 of PS 12A.

5.1.3 Relative Accuracy Audit (RAA). As an alternative to the QGA, a RAA may be conducted in three of four calendar quarters, but in no more than three quarters in succession. To conduct a RAA, follow the RATA test procedures in section 8.5 of PS 12A in appendix B to this part, except that only three test runs are required.

5.1.4 Alternative Quarterly Audits. Alternative quarterly audit procedures may be used as approved by the Administrator for three of four calendar quarters. One RATA is required at least every four calendar quarters, except in the case where the affected facility is off-line (does not operate) in the fourth calendar quarter since the quarter of the previous RATA. In that case, the RATA must be performed in the quarter in which the unit recommences operation. Also, quarterly gas audits (or RAAs, if applicable) are not required for calendar quarters in which the affected facility does not operate.

5.2 Sorbent Trap Monitoring System Audit Requirements. For each sorbent trap monitoring system, a RATA must be conducted at least once every four calendar quarters, except as otherwise noted in section 5.1.4 of this appendix. Perform the RATA as described in section 8.3 of PS 12B in appendix B to this part. Calculate the results according to section 12.4 of PS 12A.

5.3 Excessive Audit Inaccuracy. If the results of a RATA, QGA, or RAA exceed the applicable criteria in section 5.3.3, the Hg CEMS or sorbent trap monitoring system is out-of-control. If the Hg CEMS or sorbent trap monitoring system is out-of-control, take necessary corrective action to eliminate the problem. Following corrective action, the source owner or operator must audit the CEMS or sorbent trap monitoring system using the same type of test that failed to meet the accuracy criterion. For instance, a RATA must always be performed following an out-of-control period resulting from a failed RATA. Whenever audit results show the Hg CEMS or sorbent trap monitoring system to be out-of-control, the owner or operator must report both the results of the failed test and the results of the retest following corrective action showing the CEMS to be operating within specifications.

5.3.1 Out-Of-Control Period Definition. The beginning of the out-of-control period is the hour immediately following the completion of a RATA, RAA, QGA or system integrity check that fails to meet the applicable performance criteria in section 5.3.3, below. The end of the out-of-control period is the time corresponding to the completion of a subsequent successful test of the same type.

5.3.2 Monitoring Data Status During Out-Of-Control Period. During the period the monitor is out-of-control, the monitoring data may not be used to determine compliance with an applicable emission limit or to meet a minimum data availability requirement in an applicable regulation or permit.

5.3.3 Criteria for Excessive Audit Inaccuracy. Unless specified otherwise in an applicable regulation or permit, the criteria for excessive inaccuracy are:

(a) For the RATA, the allowable RA in the applicable PS in appendix B (*e.g.,* PS 12A or PS 12B).

(b) For the QGA, ±15 percent of the average audit value or ±0.5 $\mu g/m^3$, whichever is greater.

(c) For the RAA, ±20 percent of the three run average or ±10 percent of the applicable standard, whichever is greater.

5.3.4 Criteria for Acceptable QC Procedures. Repeated excessive inaccuracies (*i.e.,* out-of-control conditions resulting from the quarterly audits) indicates the QC procedures are inadequate or that the CEMS or sorbent trap monitoring system is incapable of providing quality data. Therefore, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the QC procedures (*see* Section 3) or modify, repair, or replace the CEMS or sorbent trap monitoring system.

6.0 Reporting Requirements

6.1 Data Assessment Report. At the reporting interval specified in the applicable regulation or permit, report for each Hg CEMS and/or sorbent trap monitoring system the accuracy assessment results from Section 5, above. For Hg CEMS, also report the CD assessment results from Section 4, above. Report this information as a Data Assessment Report (DAR), and include the appropriate DAR(s) with the emissions report required under the applicable regulation or permit.

6.2 Contents of the DAR. At a minimum, the DAR must contain the following information:

6.2.1 Facility name and address including identification of source owner/operator.

6.2.2 Identification and location of each Hg CEMS and/or sorbent trap monitoring system.

6.2.3 Manufacturer, model, and serial number of each Hg CEMS and/or sorbent trap monitoring system.

6.2.4 CD Assessment for each Hg CEMS, including the identification of out-of-control periods.

6.2.5 System integrity check data for each Hg CEMS.

6.2.6 Accuracy assessment for each Hg CEMS and/or sorbent trap monitoring system, including the identification of out-of-control periods. The results of all required RATAs, QGAs, RAAs, and audits of auxiliary equipment must be reported. If an accuracy audit shows a CEMS or sorbent trap monitoring system to be out-of-control, report both the audit results that caused the out-of-control period and the results of the retest following corrective action, showing the monitoring system to be operating within specifications.

6.2.6. Summary of all corrective actions taken when the Hg CEMS and/or sorbent trap monitoring system was determined to be out-of-control.

6.3 Data Retention. As required in 40 CFR 60.7(d) and 63.10(b), all measurements from CEMS and sorbent trap monitoring systems, including the quality assurance data required by this procedure, must be retained by the source owner for at least 5 years.

7.0 Bibliography

7.1 Calculation and Interpretation of Accuracy for Continuous Emission Monitoring Systems (CEMS). Section 3.0.7 of the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods. EPA–600/4–77–027b. August 1977. U.S. Environmental Protection Agency. Office of Research and Development Publications, 26 West St. Clair Street, Cincinnati, OH 45268.

PART 63—[AMENDED]

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

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

■ 10. Section 63.14 is amended by revising paragraph (b)(54) to read as follows:

§ 63.14 Incorporations by reference.

* * * * *

(b) * * *

(54) ASTM D6348–03, Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy, incorporation by reference (IBR) approved for § 63.1349(b)(4)(iii) of subpart LLL and table 4 to subpart DDDD of this part as specified in the subpart.

* * * * *

Subpart LLL—[Amended]

■ 11. Section 63.1340 is revised to read as follows:

§ 63.1340 What parts of my plant does this subpart cover?

(a) The provisions of this subpart apply to each new and existing portland cement plant which is a major source or an area source as defined in § 63.2.

(b) The affected sources subject to this subpart are:

(1) Each kiln including alkali bypasses, except for kilns that burn hazardous waste and are subject to and regulated under subpart EEE of this part;

(2) Each clinker cooler at any portland cement plant;

(3) Each raw mill at any portland cement plant;

(4) Each finish mill at any portland cement plant;

(5) Each raw material dryer at any portland cement plant;

(6) Each raw material, clinker, or finished product storage bin at any portland cement plant;

(7) Each conveying system transfer point including those associated with coal preparation used to convey coal from the mill to the kiln at any portland cement plant;

(8) Each bagging and bulk loading and unloading system at any portland cement plant; and

(9) Each open clinker pile at any portland cement plant.

(c) Crushers are not covered by this subpart regardless of their location.

(d) If you are subject to any of the provisions of this subpart you are also subject to title V permitting requirements.

■ 12. Section 63.1341 is amended by adding definitions for “Affirmative defense,” “Clinker,” “Crusher,” “Enclosed storage pile,” “Inactive clinker pile,” “New source,” “Operating day,” “Sorbent,” “Total organic HAP” and “Totally enclosed conveying system transfer point” in alphabetic order, and revising the definition of “Kiln” to read as follows:

§ 63.1341 Definitions.

* * * * *

Affirmative defense means, in the context of an enforcement proceeding, a response or defense put forward by a defendant, regarding which the defendant has the burden of proof, and the merits of which are independently and objectively evaluated in a judicial or administrative proceeding.

* * * * *

Clinker means the product of the process in which limestone and other materials are heated in the kiln and is then ground with gypsum and other materials to form cement.

* * * * *

Crusher means a machine designed to reduce large rocks from the quarry into materials approximately the size of gravel.

* * * * *

Enclosed storage pile means any storage pile that is completely enclosed in a building or structure consisting of a solid roof and walls.

* * * * *

Inactive clinker pile is a pile of clinker material that has not been disturbed, removed, and/or added to as a result of loading, unloading, and/or transferring activities for 30 (thirty) consecutive days.

* * * * *

Kiln means a device, including any associated preheater or precalciner devices, inline raw mills, or alkali bypasses that produces clinker by heating limestone and other materials for subsequent production of portland cement. Because the inline raw mill is considered an integral part of the kiln, for purposes of determining the appropriate emissions limit, the term kiln also applies to the exhaust of the inline raw mill.

* * * * *

New source means any source that commenced construction after May 6, 2009, for purposes of determining the applicability of the kiln, clinker cooler and raw material dryer emissions limits for mercury, PM, THC, and HCl, and the requirements for open clinker storage piles.

* * * * *

Operating day means any daily 24-hour period during which the kiln operates. For 30-day rolling averages, *operating days* include only days of normal operation and do not include periods of operation during startup or shutdown. For 7-day rolling averages, *operating days* include only days of operation during startup and shutdown and do not include periods of normal operation. Data attributed to an *operating day* includes all valid data obtained during the daily 24-hour period and excludes any measurements made when the kiln was not operating.

* * * * *

Sorbent means activated carbon, lime, or any other type of material injected into kiln exhaust for the purposes of capturing and removing any hazardous air pollutant.

* * * * *

Total organic HAP means, for the purposes of this subpart, the sum of the concentrations of compounds of formaldehyde, benzene, toluene, styrene, m-xylene, p-xylene, o-xylene, acetaldehyde, and naphthalene as measured by EPA Test Method 320 of appendix A to this part or ASTM D6348–03. Only the measured concentration of the listed analytes that are present at concentrations exceeding one-half the quantitation limit of the analytical method are to be used in the sum. If any of the analytes are not detected or are detected at concentrations less than one-half the quantitation limit of the analytical method, the concentration of those analytes will be assumed to be zero for the purposes of calculating the total organic HAP for this subpart.

* * * * *

Totally enclosed conveying system transfer point means a conveying system transfer point that is enclosed on all sides, top, and bottom.

* * * * *

■ 13. Section 63.1343 is revised to read as follows:

§ 63.1343 What standards apply to my kilns, clinker coolers, raw material dryers, and open clinker piles?

(a) *General.* The provisions in this section apply to each kiln and any alkali bypass associated with that kiln, clinker cooler, and raw material dryer. All dioxin D/F, HCl, and total hydrocarbon (THC) emission limits are on a dry basis. The D/F, HCl and THC limits for kilns are corrected to 7 percent oxygen except during periods of startup and shutdown. The raw material dryer THC limits are corrected to 19 percent oxygen except during startup and shutdown. During startup and shutdown no oxygen correction is applied. All (THC) emission limits are measured as propane. Standards for mercury, PM, and THC are based on a 30-day rolling average, except for periods of startup and shutdown, where the standard is based on a 7-day rolling average. The 30-day and 7-day periods mean 30 and 7 consecutive operating days, respectively, where an operating day is any daily 24-hour period during which the kiln operates. Data attributed to an operating day includes all valid data obtained during the daily 24-hour period and excludes any measurements made when the kiln was not operating. If using a CEMS to determine compliance with the HCl standard, this standard is based on a 30-day rolling average, except for periods of startup and shutdown, where the standard is based on a 7-day rolling average. You must ensure appropriate corrections for moisture are made when measuring flowrates used to calculate particulate matter (PM) and mercury emissions.

(b)(1) *Kilns, clinker coolers, raw material dryers, raw mills, and finish mills.* The emission limits for these sources are shown in table 1 below.

TABLE 1—EMISSIONS LIMITS FOR KILNS (ROWS 1–8), CLINKER COOLERS (ROWS 9–12), RAW MATERIAL DRYERS (ROWS 13–15), RAW AND FINISH MILLS (ROW 16)

	If your source is	And the operating mode is:	And if is located	Your emissions limits are:	And the units of the emissions limit are:	The oxygen correction factor is:
1.	An existing kiln	Normal operation	At a major or area source.	PM—0.04	lb/ton clinker	NA.
				D/F—0.2[1]	ng/dscm (TEQ)	7 percent.
				Mercury—55	lb/MM tons clinker	NA.
				THC—24[2,3]	ppmvd	7 percent.
2.	An existing kiln	Normal operation	At a major source	HCl—3	ppmvd	7 percent.
3.	An existing kiln	Startup and shutdown.	At a major or area source.	PM—0.004	gr/dscf	NA.
				D/F—0.2[1]	ng/dscm (TEQ)	NA.
				Mercury—10	ug/dscm	NA.
				THC—24[2,3]	ppmvd	NA.
4.	An existing kiln	Startup and shutdown.	At a major source	HCl—3[4]	ppmvd	NA.
5.	A new kiln	Normal operation	At a major or area source.	PM—0.01	lb/ton clinker	NA.
				D/F—0.2[1]	ng/dscm (TEQ)	7 percent.
				Mercury—21	lb/MM tons clinker	NA.
				THC—24[2,3]	ppmvd	7 percent.
6.	A new kiln	Normal operation	At a major source	HCl—3[4]	ppmvd	7 percent.
7.	A new kiln	Startup or shutdown	At a major or area source.	PM—0.0008	gr/dscf	NA.
				D/F—0.2[1]	ng/dscm (TEQ)	NA.
				Mercury—4	ug/dscm	NA.
				THC—24[2,3]	ppmvd	NA.
8.	A new kiln	Startup and shutdown.	At a major source	HCl—3	ppmvd	NA.
9.	An existing clinker cooler.	Normal operation	At a major or area source.	PM—0.04	lb/ton clinker	NA.
10.	An existing clinker cooler.	Startup and shutdown.	At a major or area source.	PM—0.004	gr/dscf	NA.
11.	A new clinker cooler.	Normal operation	At a major or area source.	PM—0.01	lb/ton clinker	NA.
12.	A new clinker cooler.	Startup and shutdown.	At a major or area source.	PM—0.0008	gr/dscf	NA.
13.	An existing or new raw material dryer.	Normal operation	At a major or area source.	THC—24[2,3]	ppmvd	19 percent.
14.	An existing or new raw material dryer.	Startup and shutdown.	At a major or area source.	THC—24[2,3]	ppmvd	NA.
15.	An existing or new raw material dryer.	All operating modes	At a major source	Opacity—10	percent	NA.
16.	An existing or new raw or finish mill.	All operating modes		Opacity—10	percent	NA.

[1] If the average temperature at the inlet to the first particulate matter control device (fabric filter or electrostatic precipitator) during the D/F performance test is 400 °F or less this limit is changed to 0.4 ng/dscm (TEQ).

[2] Measured as propane.

[3] Any source subject to the 24 ppmvd THC limit may elect to meet an alternative limit of 9 ppmvd for total organic HAP. If the source demonstrates compliance with the total organic HAP under the requirements of § 63.1349 then the source's THC limit will be adjusted to equal the average THC emissions measured during the organic HAP compliance test.

[4] If the kiln does not have a HCl CEM, the emissions limit is zero.

(2) When there is an alkali bypass associated with a kiln, the combined PM emissions from the kiln or in-line kiln/raw mill and the alkali bypass stack are subject to the PM emissions limit. Existing kilns that combine the clinker cooler exhaust with the kiln exhaust for energy efficiency purposes and send the combined exhaust to the PM control device as a single stream may meet an alternative PM emissions limit. This limit is calculated using the equation 1 of this section:

$$PM_{alt} = 0.004 \text{ x } 1.65 \text{ x } \left(Q_k + Q_c\right)/7000 \qquad \text{(Eq. 1)}$$

Where:

0.004 is the PM exhaust concentration (gr/dscf) equivalent to 0.04 lb per ton clinker where clinker cooler and kiln exhaust gas are not combined.

1.65 is the conversion factor of lb feed per lb clinker

Q_k is the exhaust flow of the kiln (dscf/ton raw feed)

Q_c is the exhaust flow of the clinker cooler (dscf/ton raw feed).

For new kilns that combine kiln exhaust and clinker cooler gas the limit is calculated using the equation 2 of this section:

$$PM_{alt} = 0.0008 \text{ x } 1.65 \text{ x } \left((Q_k + Q_c\right)/7000 \qquad \text{(Eq. 2)}$$

Where:

0.0008 is the PM exhaust concentration (gr/dscf) equivalent to 0.01 lb per ton clinker where clinker cooler and kiln exhaust gas are not combined

1.65 is the conversion factor of lb feed per lb clinker

Q_k is the exhaust flow of the kiln (dscf/ton raw feed)

Q_c is the exhaust flow of the clinker cooler (dscf/ton raw feed).

(c) If clinker material storage and handling activities occur more than 1,000 feet from the facility property-line you must comply with the following:

(1) Utilize a three-sided barrier with roof, provided the open side is covered with a wind fence material of a maximum 20 percent porosity, allowing a removable opening for vehicle access. The removable wind fence for vehicle access may be removed only during minor or routine maintenance activities, the creation or reclamation of outside storage piles, the importation of clinker from outside the facility, and reclamation of plant clean-up materials. The removable opening must be less than 50 percent of the total surface area of the wind fence and the amount of time must be minimized to the extent feasible.

(2) Contain storage and handling of material that is immediately adjacent to the three-sided barrier within an area next to the structure with a wind fence on at least two sides, with at least a 5-foot freeboard above the top of the storage pile to provide wind sheltering, and completely cover the material with an impervious tarp, revealing only the active disturbed portion during material loading and unloading activities.

(3) Storage and handling of other active clinker material must be conducted within an area surrounded on three sides by a barrier or wind fences with one side of the wind fence facing the prevailing wind and at least a 5-foot freeboard above the top of the storage pile to provide wind sheltering. The clinker must remain completely covered at all times with an impervious tarp, revealing only the active disturbed portion during material loading and unloading activities. The barrier or wind fence must extend at least 20 feet beyond the active portion of the material at all times.

(4) Inactive clinker material may be alternatively stored using a continuous and impervious tarp, covered at all times, provided records are kept demonstrating the inactive status of such stored material.

(d) If clinker material storage and handling activities occur 1,000 feet or less from the facility property-line these activities must be in an enclosed storage area that meets the emissions limits specified in § 63.1345.

■ 14. Section 63.1344 is revised to read as follows:

§ 63.1344 Affirmative defense for exceedance of emission limit during malfunction.

In response to an action to enforce the standards set forth in paragraph § 63.1343(b) you may assert an affirmative defense to a claim for civil penalties for exceedances of such standards that are caused by malfunction, as defined at 40 CFR 63.2. Appropriate penalties may be assessed, however, if the respondent fails to meet its burden of proving all of the requirements in the affirmative defense. The affirmative defense shall not be available for claims for injunctive relief.

(a) To establish the affirmative defense in any action to enforce such a limit, the owners or operators of facilities must timely meet the notification requirements in paragraph (b) of this section, and must prove by a preponderance of evidence that:

(1) The excess emissions:

(i) Were caused by a sudden, short, infrequent, and unavoidable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner, and

(ii) Could not have been prevented through careful planning, proper design or better operation and maintenance practices; and

(iii) Did not stem from any activity or event that could have been foreseen and avoided, or planned for; and

(iv) Were not part of a recurring pattern indicative of inadequate design, operation, or maintenance; and

(2) Repairs were made as expeditiously as possible when the applicable emission limitations were being exceeded. Off-shift and overtime labor were used, to the extent practicable to make these repairs; and

(3) The frequency, amount and duration of the excess emissions (including any bypass) were minimized to the maximum extent practicable during periods of such emissions; and

(4) If the excess emissions resulted from a bypass of control equipment or a process, then the bypass was unavoidable to prevent loss of life, severe personal injury, or severe property damage; and

(5) All possible steps were taken to minimize the impact of the excess emissions on ambient air quality, the environment and human health; and

(6) All emissions monitoring and control systems were kept in operation if at all possible; and

(7) Your actions in response to the excess emissions were documented by properly signed, contemporaneous operating logs; and

(8) At all times, the facility was operated in a manner consistent with good practices for minimizing emissions; and

(9) The owner or operator has prepared a written root cause analysis to determine, correct, and eliminate the primary causes of the malfunction and the excess emissions resulting from the malfunction event at issue. The analysis shall also specify, using best monitoring methods and engineering judgment, the amount of excess emissions that were the result of the malfunction.

(b) *Notification.* The owner or operator of the facility experiencing an exceedance of its emission limit(s) during a malfunction shall notify the Administrator by telephone or facsimile (FAX) transmission as soon as possible, but no later than two business days after the initial occurrence of the malfunction, if it wishes to avail itself of an affirmative defense to civil penalties for that malfunction. The owner or operator seeking to assert an affirmative defense shall also submit a written report to the Administrator within 30 days of the initial occurrence of the exceedance of the standard in § 63.1343(b) to demonstrate, with all necessary supporting documentation, that it has met the requirements set forth in paragraph (a) of this section.

■ 15. Section 63.1345 is revised to read as follows:

§ 63.1345 Emissions limits for affected sources other than kilns; in-line kiln/raw mills; clinker coolers; new and reconstructed raw material dryers; and raw and finish mills, and open clinker piles.

The owner or operator of each new or existing raw material, clinker, or finished product storage bin; conveying system transfer point; bagging system; and bulk loading or unloading system; and each existing raw material dryer, at a facility which is a major source subject to the provisions of this subpart must not cause to be discharged any gases from these affected sources which exhibit opacity in excess of ten percent.

16. Section 63.1346 is revised to read as follows:

§ 63.1346 Operating limits for kilns.

(a) The owner or operator of a kiln subject to a D/F emission limitation under § 63.1343 must operate the kiln such that the temperature of the gas at the inlet to the kiln particulate matter control device (PMCD) and alkali bypass PMCD, if applicable, does not exceed the applicable temperature limit specified in paragraph (b) of this section. The owner or operator of an in-line kiln/raw mill subject to a D/F emission limitation under § 63.1343 must operate the in-line kiln/raw mill, such that:

(1) When the raw mill of the in-line kiln/raw mill is operating, the applicable temperature limit for the main in-line kiln/raw mill exhaust, specified in paragraph (b) of this section and established during the performance test when the raw mill was operating is not exceeded, except during periods of startup/shutdown when the temperature limit may be exceeded by no more than 10 percent.

(2) When the raw mill of the in-line kiln/raw mill is not operating, the applicable temperature limit for the main in-line kiln/raw mill exhaust, specified in paragraph (b) of this section and established during the performance test when the raw mill was not operating, is not exceeded, except during periods of startup/shutdown when the temperature limit may be exceeded by no more than 10 percent.

(3) If the in-line kiln/raw mill is equipped with an alkali bypass, the applicable temperature limit for the alkali bypass specified in paragraph (b) of this section and established during the performance test, with or without the raw mill operating, is not exceeded, except during periods of startup/shutdown when the temperature limit may be exceeded by no more than 10 percent.

(b) The temperature limit for affected sources meeting the limits of paragraph (a) of this section or paragraphs (a)(1) through (a)(3) of this section is determined in accordance with § 63.1349(b)(3)(iv).

(c) For an affected source subject to a D/F emission limitation under § 63.1343 that employs sorbent injection as an emission control technique you must operate the sorbent injection system in accordance with paragraphs (c)(1) and (c)(2) of this section.

(1) The three-hour rolling average activated sorbent injection rate must be equal to or greater than the sorbent injection rate determined in accordance with § 63.1349(b)(3)(vi).

(2) You must either:

(i) Maintain the minimum activated carbon injection carrier gas flow rate, as a three-hour rolling average, based on the manufacturer's specifications. These specifications must be documented in the test plan developed in accordance with § 63.7(c), or

(ii) Maintain the minimum activated carbon injection carrier gas pressure drop, as a three-hour rolling average, based on the manufacturer's specifications. These specifications must be documented in the test plan developed in accordance with § 63.7(c).

(d) Except as provided in paragraph (e) of this section, for an affected source subject to a D/F emission limitation under § 63.1343 that employs carbon injection as an emission control technique you must specify and use the brand and type of sorbent used during the performance test until a subsequent performance test is conducted, unless the site-specific performance test plan contains documentation of key parameters that affect adsorption and the owner or operator establishes limits based on those parameters, and the limits on these parameters are maintained.

(e) For an affected source subject to a D/F emission limitation under § 63.1343 that employs carbon injection as an emission control technique you may substitute, at any time, a different brand or type of sorbent provided that the replacement has equivalent or improved properties compared to the sorbent specified in the site-specific performance test plan and used in the performance test. The owner or operator must maintain documentation that the substitute sorbent will provide the same or better level of control as the original sorbent.

(f) No kiln may use as a raw material or fuel any fly ash where the mercury content of the fly ash has been increased through the use of activated carbon, or any other sorbent, unless the facility can demonstrate that the use of that fly ash will not result in an increase in mercury emissions over baseline emissions (*i.e.,* emissions not using the fly ash). The facility has the burden of proving there has been no emissions increase over baseline. Once the kiln must comply with a mercury limit specified in § 63.1343, this paragraph no longer applies.

■ 17. Section 63.1347 is revised to read as follows:

§ 63.1347 Operation and maintenance plan requirements.

(a) You must prepare, for each affected source subject to the provisions of this subpart, a written operations and maintenance plan. The plan must be submitted to the Administrator for review and approval as part of the application for a part 70 permit and must include the following information:

(1) Procedures for proper operation and maintenance of the affected source and air pollution control devices in order to meet the emission limits and operating limits of §§ 63.1343 through 63.1348;

(2) Corrective actions to be taken when required by paragraph § 63.1350(f)(3);

(3) Procedures to be used during an inspection of the components of the combustion system of each kiln and each in-line kiln raw mill located at the facility at least once per year.

(b) Failure to comply with any provision of the operations and maintenance plan developed in accordance with this section is a violation of the standard.

■ 18. Section 63.1348 is revised to read as follows:

§ 63.1348 Compliance requirements.

(a) *Initial compliance requirements.* For an affected source subject to this subpart, you must demonstrate initial compliance with the emissions standards and operating limits by using the test methods and procedures in §§ 63.1349 and 63.7.

(1) *PM compliance.* If you are subject to limitations on PM emissions under § 63.1343(b), you must demonstrate initial compliance with the PM emissions standards by using the test methods and procedures in § 63.1349(b)(1).

(i) You must demonstrate initial compliance by conducting a performance test as specified in § 63.1349(b)(1)(i).

(ii) Compliance with the PM emissions standard must be determined based on the first 30 operating days you operate a PM CEMS.

(2) *Opacity compliance.* If you are subject to the limitations on opacity under § 63.1345, you must demonstrate initial compliance with the opacity emissions standards by using the performance test methods and procedures in § 63.1349(b)(2). The maximum 6-minute average opacity exhibited during the performance test period must be used to determine whether the affected source is in initial compliance with the standard.

(3) *D/F compliance.*

(i) If you are subject to limitations on D/F emissions under § 63.1343(b), you must demonstrate initial compliance with the D/F emissions standards by using the performance test methods and procedures in § 63.1349(b)(3). The owner or operator of a kiln with an in-line raw mill must demonstrate initial compliance by conducting separate performance tests while the raw mill is operating and the raw mill is not operating. The D/F concentration must be determined for each run and the arithmetic average of the concentrations measured for the three runs must be calculated to determine compliance.

(ii) If you are subject to a D/F emission limitation under § 63.1343(b), you must demonstrate initial compliance with the temperature operating limits specified in § 63.1344 by using the performance test methods and procedures in § 63.1349(b)(3)(ii) through (b)(3)(iv). The average of the run temperatures will determine the applicable temperature limit.

(iii) If activated carbon injection is used and you are subject to a D/F emission limitation under § 63.1343(b), you must demonstrate initial compliance with the activated carbon injection rate operating limits specified in § 63.1344 by using the performance test methods and procedures in § 63.1349(b)(3)(v). The average of the run injection rates will determine the applicable injection rate limit.

(iv) If activated carbon injection is used, you must also develop a carrier gas parameter during the performance test conducted under § 63.1349(b)(3) that meets the requirements of § 63.1349(b)(3)(vi). Compliance is demonstrated if the system is maintained within ± 5 percent accuracy during the performance test.

(4)(i) *THC compliance.* If you are subject to limitations on THC emissions under § 63.1343(b), you must demonstrate initial compliance with the THC emissions standards by using the performance test methods and procedures in § 63.1349(b)(4)(i). The average THC concentration obtained during the first 30 operating days must be used to determine initial compliance.

(ii) *Total organic HAP emissions tests.* If you elect to demonstrate compliance with the total organic HAP emissions limit under § 63.1343(b) in lieu of the THC emissions limit, you must demonstrate initial compliance with the total organic HAP emissions standards by using the performance test methods and procedures in § 63.1349(b)(4)(iii) and (b)(4)(iv).

(iii) If you are demonstrating initial compliance, you must conduct the separate performance tests as specified in § 63.1349(b)(4)(iii) while the raw mill kiln is operating and while the raw mill of the kiln is not operating.

(iv) The average total organic HAP concentration measured during the initial performance test specified by § 63.1349(b)(4)(iii) must be used to determine initial compliance.

(v) The average THC concentration measured during the initial performance test specified by § 63.1349(b)(4)(iv) must be used to determine the site-specific THC limit. This limit should be a weighted average of the THC levels measured during raw mill on and raw mill off testing.

(5) *Mercury compliance.* If you are subject to limitations on mercury emissions in § 63.1343(b), you must demonstrate initial compliance with the mercury standards by using the performance test methods and procedures in § 63.1349(b)(5). You must demonstrate initial compliance by operating a mercury CEMS or a sorbent trap based integrated monitor. The first 30 operating days of daily mercury concentration data must be used to determine initial compliance.

(6) *HCl compliance.* If you are subject to limitations on HCl emissions under § 63.1343(b), you must demonstrate initial compliance with the HCl standards by using the performance test methods and procedures in § 63.1349(b)(6).

(i) For an affected source that is equipped with a wet scrubber or tray tower, you must demonstrate initial compliance by conducting a performance test as specified in § 63.1349(b)(6)(i). The HCl concentration must be determined for each run and the arithmetic average of the concentrations measured for the three runs must be calculated to determine compliance. You must also have established appropriate site-specific parameter limits.

(ii) For an affected source that is not equipped with a wet scrubber or tray tower, you must demonstrate initial compliance by operating a CEMS as specified in § 63.1349(b)(6)(ii). The average hourly HCl concentration obtained during the first 30 operating days must be used to determine initial compliance.

(b) *Continuous compliance requirements.* You must demonstrate continuous compliance with the emissions standards and operating limits by using the performance test methods and procedures in §§ 63.1350 and 63.8 for each affected source.

(1) *General requirements.*

(i) You must monitor and collect data according to § 63.1350 and the site-specific monitoring plan required by § 63.1350(o).

(ii) Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), you must operate the monitoring system and collect data at all required intervals at all times the affected source is operating. Any period for which data collection is required and the operation of the CEMS is not otherwise exempt and for which the monitoring system is out-of-control and data are not available for required calculations constitutes a deviation from the monitoring requirements.

(iii) You may not use data recorded during monitoring system malfunctions, repairs associated with monitoring system malfunctions, or required monitoring system quality assurance or control activities in calculations used to report emissions or operating levels. A monitoring system malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring system failures that are caused in part by poor maintenance or careless operation are not malfunctions. The owner or operator must use all the data collected during all other periods in assessing the operation of the control device and associated control system

(iv) *Clinker production.* If you are subject to limitations on PM emissions (lb/ton of clinker) or mercury (lb/MM tons of clinker) under § 63.1343(b), you must demonstrate continuous compliance with the PM emissions standards by determining the hourly production rate of clinker according to the requirements of § 63.1350(d).

(2) *PM compliance.* If you are subject to limitations on PM emissions under § 63.1343(b), you must demonstrate continuous compliance with the PM emissions standards by using the monitoring methods and procedures in § 63.1350(b) and (d).

(i) *PM CEMS.* You must demonstrate continuous compliance with the PM emissions standards by using the monitoring methods and procedures in § 63.1350(b) for each affected source subject to PM emissions limitations. Continuous compliance is demonstrated by a 30-day rolling average PM emissions in lb/ton clinker, except for periods of startup and shutdown, where the compliance is demonstrated based on a 7-day rolling average.

(3) *Opacity compliance.* If you are subject to the limitations on opacity under § 63.1345, you must demonstrate continuous compliance with the opacity emissions standards by using the monitoring methods and procedures in § 63.1350(f).

(i) Continuous compliance is demonstrated by conducting specified visible emissions observations and follow up opacity readings, as indicated in § 63.1350(f)(1) and (f)(2). The maximum 6-minute average opacity exhibited during the performance test period must be used to determine whether the affected source is in compliance with the standard. Corrective actions must be initiated within one hour of detecting visible emissions.

(ii) *COMS.* If you install a COMS in lieu of conducting the daily visible emissions testing, you must demonstrate continuous compliance by operating and maintaining the COMS such that it meets the requirements of § 63.1350(f)(4)(i).

(iii) *BLDS.* If you install a BLDS on a raw mill or finish mill in lieu of conducting the daily visible emissions testing, you must demonstrate continuous compliance by operating and maintaining the BLDS such that it meets the requirements of § 63.1350(f)(4)(ii).

(4) *D/F compliance.* If you are subject to a D/F emission limitation under § 63.1343(b), you must demonstrate continuous compliance with the temperature operating limits specified in § 63.1346 by using the installing, operating, and maintaining a continuous monitor to record the temperature of specified gas streams such that it meets the requirements of § 63.1350(g). Continuous compliance is demonstrated by a 3-hour rolling average temperature.

(5)(i) *Activated carbon injection compliance.* If activated carbon injection is used and you are subject to a D/F emission limitation under § 63.1343(b), you must demonstrate continuous compliance with the activated carbon injection rate operating limits specified in § 63.1346 by installing, operating, and maintaining a continuous monitor to record the rate of activated carbon injection that meets the requirements of § 63.1350(h)(1). Continuous compliance is demonstrated by a 3-hour rolling average injection rate.

(ii) If you are subject to a D/F emission limitation under § 63.1343(b), you must demonstrate continuous compliance with the activated carbon injection system gas parameter by installing, operating, and maintaining a continuous monitor to record the gas parameter that meets the requirements of § 63.1350(h)(2). Continuous compliance is demonstrated by a 3-hour rolling average of the parameter value.

(6) THC compliance. If you are subject to limitations on THC emissions under § 63.1343(b), you must demonstrate continuous compliance with the THC emissions standards by using the monitoring methods and procedures in § 63.1350 (i) and (j). Continuous compliance is demonstrated by a 30-day rolling average THC concentration, except for periods of startup and shutdown, where the standard is based on a 7-day rolling average.

(7) Mercury compliance. If you are subject to limitations on mercury emissions in § 63.1343(b), you must demonstrate continuous compliance with the mercury standards by using the monitoring methods and procedures in § 63.1350(k). Continuous compliance is demonstrated by a 30-day rolling average mercury emission rate in lb/MM tons clinker, except for periods of startup and shutdown, where the standard is based on a 7-day rolling average mercury concentration.

(8) *HCl compliance.* If you are subject to limitations on HCl emissions under § 63.1343(b), you must demonstrate continuous compliance with the HCl standards by using the performance test methods and procedures in § 63.1349(b)(6).

(i) For an affected source that is not equipped with a wet scrubber or tray tower, you must demonstrate continuous compliance by using the monitoring methods and procedures in § 63.1350(l)(1). Continuous compliance is demonstrated by a 30-day rolling average HCl concentration, except for periods of startup and shutdown, where the standard is based on a 7-day rolling average.

(ii) For an affected source that is equipped with a wet scrubber or tray tower, you must demonstrate continuous compliance by using the monitoring methods and procedures in § 63.1350(l)(2). Continuous compliance is demonstrated by a 30-day rolling average of the required parameters, except for periods of startup and shutdown, where the standard is based on a 7-day rolling average.

(c) *Changes in operations.*

(1) If you plan to undertake a change in operations that may adversely affect compliance with an applicable standard, operating limit, or parametric monitoring value under this subpart, the source must conduct a performance test as specified in § 63.1349(b).

(2) In preparation for and while conducting a performance test required in § 63.1349(b), you may operate under the planned operational change conditions for a period not to exceed 360 hours, provided that the conditions in (c)(2)(i) through (c)(2)(iv) of this section are met. You must submit temperature and other monitoring data that are recorded during the pretest operations.

(i) You must provide the Administrator written notice at least 60 days prior to undertaking an operational change that may adversely affect compliance with an applicable standard under this subpart for any source, or as soon as practicable where 60 days advance notice is not feasible. Notice provided under this paragraph must include a description of the planned change, the emissions standards that may be affected by the change, and a schedule for completion of the performance test required under paragraph (c)(1) of this section, including when the planned operational change period would begin.

(ii) The performance test results must be documented in a test report according to § 63.1349(a).

(iii) A test plan must be made available to the Administrator prior to performance testing, if requested.

(iv) The performance test must be conducted completed within 360 hours after the planned operational change period begins.

(d) *General duty to minimize emissions.* At all times you must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source.

■ 19. Section 63.1349 is revised to read as follows:

§ 63.1349 Performance testing requirements.

(a) Performance test results must be documented in complete test reports that contain the information required by paragraphs (a)(1) through (a)(10) of this section, as well as all other relevant information. As described in § 63.7(c)(2)(i), the site-specific plan to be followed during performance testing must be made available to the Administrator prior to testing, if requested.

(1) A brief description of the process and the air pollution control system;

(2) Sampling location description(s);

(3) A description of sampling and analytical procedures and any modifications to standard procedures;

(4) Test results;

(5) Quality assurance procedures and results;

(6) Records of operating conditions during the performance test, preparation of standards, and calibration procedures;

(7) Raw data sheets for field sampling and field and laboratory analyses;

(8) Documentation of calculations;

(9) All data recorded and used to establish parameters for monitoring; and

(10) Any other information required by the performance test method.

(b)(1) *PM emissions tests.*

(i)(A) If you are subject to the limitations on emissions of PM, you must install, operate, calibrate, and maintain a PM CEMS in accordance with the requirements in § 63.1350(b).

(B) You must determine, record, and maintain a record of the accuracy of the volumetric flow rate monitoring system according to the procedures in § 63.1350(m)(5).

(C) The initial compliance test must be based on the first 30 operating days in which the affected source operates using a CEMS. Hourly PM concentration and stack gas volumetric flow rate data must be obtained.

(ii) You must determine the clinker production rate using the methods in § 63.1350(d).

(iii) The emission rate, E, of PM (lb/ton of clinker) must be computed for each run using equation 3 of this section:

$$E = \left(C_S Q_S\right)/(PK) \qquad \text{(Eq. 3)}$$

Where:

E = emission rate of particulate matter, lb/ton of clinker production;

C_s = concentration of particulate matter, gr/scf;

Q_s = volumetric flow rate of effluent gas, where C_s and Q_s are on the same basis (either wet or dry), scf/hr;

P = total kiln clinker production rate, ton/hr; and

K = conversion factor, 7000 gr/lb.

(iv) When there is an alkali bypass associated with a kiln, the main exhaust and alkali bypass of the kiln must be tested simultaneously and the combined emission rate of particulate matter from the kiln and alkali bypass must be computed for each computed for each run using equation 4 of this section:

$$E_c = \frac{\left[\left(C_{sk}\, Q_{sk}\right) + \left(C_{sb}\, Q_{sb}\right)\right]}{K\, P} \qquad \text{(Eq. 4)}$$

Where:

E_c = combined emission rate of particulate matter from the kiln or in-line kiln/raw mill and bypass stack, lb/ton of kiln clinker production;

C_{sk} = concentration of particulate matter in the kiln or in-line kiln/raw mill effluent gas, gr/scf;

Q_{sk} = volumetric flow rate of kiln or in-line kiln/raw mill effluent gas, where C_{sk} and Q_{sk} are on the same basis (either wet or dry), scf/hr;

C_{sb} = concentration of particulate matter in the alkali bypass gas, gr/scf;

Q_{sb} = volumetric flow rate of alkali bypass effluent gas, where C_{sb} and Q_{sb} are on the same basis (either wet or dry), scf/hr;

P = total kiln clinker production rate, ton/hr; and

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

(2) *Opacity tests.* If you are subject to limitations on opacity under this subpart, you must conduct opacity tests in accordance with Method 9 of appendix A–4 to part 60 of this chapter. The duration of the Method 9 performance test must be 3 hours (30 6-minute averages), except that the duration of the Method 9 performance test may be reduced to 1 hour if the conditions of paragraphs (b)(2)(i) through (b)(2)(ii) of this section apply. For batch processes that are not run for 3-hour periods or longer, compile observations totaling 3 hours when the unit is operating.

(i) There are no individual readings greater than 10 percent opacity;

(ii) There are no more than three readings of 10 percent for the first 1-hour period.

(3) *D/F emissions tests.* If you are subject to limitations on D/F emissions under this subpart, you must conduct a performance test using Method 23 of appendix A–7 to part 60 of this chapter. The owner or operator of a kiln or in-line kiln/raw mill equipped with an alkali bypass must conduct simultaneous performance tests of the kiln or in-line kiln/raw mill exhaust and the alkali bypass. However, the owner or operator of an in-line kiln/raw mill may conduct a performance test of the alkali bypass exhaust when the raw mill of the in-line kiln/raw mill is operating or not operating.

(i) Each performance test must consist of three separate runs conducted under representative conditions. The duration of each run must be at least 3 hours, and the sample volume for each run must be at least 2.5 dscm (90 dscf).

(ii) The temperature at the inlet to the kiln or in-line kiln/raw mill PMCD, and, where applicable, the temperature at the inlet to the alkali bypass PMCD must be continuously recorded during the period of the Method 23 test, and the continuous temperature record(s) must be included in the performance test report.

(iii) Hourly average temperatures must be calculated for each run of the performance test.

(iv) The run average temperature must be calculated for each run, and the average of the run average temperatures must be determined and included in the performance test report and will determine the applicable temperature limit in accordance with § 63.1344(b).

(v)(A) If sorbent injection is used for D/F control, the rate of sorbent injection to the kiln or in-line kiln/raw mill exhaust, and where applicable, the rate of sorbent injection to the alkali bypass exhaust, must be continuously recorded during the period of the Method 23 test in accordance with the conditions in § 63.1350(m)(9), and the continuous injection rate record(s) must be included in the performance test report. Sorbent injection rate parameters must be determined in accordance with paragraphs (b)(3)(vi) of this section.

(B) The performance test report must include the brand and type of sorbent used during the performance test.

(C) The owner or operator must maintain a continuous record of either the carrier gas flow rate or the carrier gas pressure drop for the duration of the performance test. If the carrier gas flow rate is used, the owner or operator must determine, record, and maintain a record of the accuracy of the carrier gas flow rate monitoring system according to the procedures in appendix A to part 75 of this chapter. If the carrier gas pressure drop is used, the owner or operator must determine, record, and maintain a record of the accuracy of the carrier gas pressure drop monitoring system according to the procedures in § 63.1350(m)(6).

(vi) The run average sorbent injection rate must be calculated for each run and the average of the run average injection rates must be determined and included in the performance test report and will determine the applicable injection rate limit in accordance with § 63.1344(c)(1).

(4)(i) *THC CEMS relative accuracy test.*

(A) If you are subject to limitations on THC emissions, you must operate a continuous emissions monitoring system (CEMS) in accordance with the requirements in § 63.1350(1). For the purposes of conducting the accuracy and quality assurance evaluations for CEMS, the THC span value (as propane) is 50 ppmvd. You demonstrate compliance with a RATA when the accuracy between the CEMS and the test audit is within 20 percent or when the test audit results are within 10 percent of the standard

(B) The initial compliance test must be based on the first 30 operating days of operation in which the affected source operates using a CEMS.

(ii) *Total organic HAP emissions tests.* Instead of conducting the performance test specified in paragraph (b)(4)(i) of this section, you may conduct a performance test to determine emissions of total organic HAP by following the procedures in paragraphs (b)(4)(iii) through (b)(4)(iv) of this section.

(iii) Method 320 of appendix A to this part or ASTM D6348–03 (incorporated by reference—*See* § 63.14) must be used to determine emissions of total organic HAP. Each performance test must consist of three separate runs under the conditions that exist when the affected source is operating at the representative performance conditions in accordance with § 63.7(e). Each run must be conducted for at least 1 hour.

(iv) At the same time that you are conducting the performance test for total organic HAP, you must also determine THC emissions by operating a CEMS in accordance with the requirements of § 63.1350(j). The duration of the performance test must be 3 hours and the average THC concentration (as calculated from the 1-minute averages) during the 3-hour test must be calculated.

(5) *Mercury emissions tests.* If you are subject to limitations on mercury emissions, you must operate a mercury CEMS in accordance with the requirements of § 63.1350(k). The initial compliance test must be based on the first 30 operating days in which the affected source operates using a CEMS. Hourly mercury concentration and stack gas volumetric flow rate data must be obtained. If you use a sorbent trap monitoring system, daily data must be obtained with each day assumed to equal the daily average of the sorbent trap collection period covering that day.

(i) If you are using a mercury CEMS, you must install, operate, calibrate, and maintain an instrument for continuously measuring and recording the exhaust gas flow rate to the atmosphere according to the requirements in § 63.1350(k)(4).

(ii) The emission rate must be computed by dividing the average mercury emission rate by the clinker production rate during the same 30-day rolling period using the equation 5 of this section:

$$E = \left(C_s Q_s\right)/(PK) \qquad \text{(Eq. 5)}$$

Where:

E = emission rate of mercury, lb/million tons of clinker production;
C_s = concentration of mercury, g/scm;
Q_s = volumetric flow rate of effluent gas, where C_s and Q_s are on the same basis (wet or dry), scm/hr;
P = total kiln clinker production rate, million ton/hr; and
K = conversion factor, 1000 g/kg (454 g/lb).

(6) *HCl emissions tests.* For a source subject to limitations on HCl emissions you must conduct performance testing by one of the following methods:

(i)(A) If the source is equipped with a wet scrubber, or tray tower, you must conduct performance testing using Method 321 of appendix A to this part unless you have installed a CEMS that meets the requirements § 63.1350(l)(1) .

(B) You must establish site specific parameter limits by using the CPMS required in§ 63.1350(l)(1). Measure and record the pressure drop across the scrubber and/or liquid flow rate and pH in intervals of no more than 15 minutes during the HCl test. Compute and record the 24-hour average pressure drop, pH, and average scrubber water flow rate for each sampling run in which the applicable emissions limit is met.

(ii)(A) If the source is not controlled by a wet scrubber, you must operate a CEMS in accordance with the requirements of § 63.1350(l)(1). The initial performance test must be the first 30 operating days you use the CEMS.

(B) The initial compliance test must be based on the 30 operating days in which the affected source operates using a CEMS. Hourly HCl concentration and stack gas volumetric flow rate data must be obtained.

(c) *Performance test frequency.* Except as provided in § 63.1348(b), performance tests are required for affected sources that are subject to a dioxin, total organic HAP, or HCl, emissions limit and must be repeated every 30 months except for pollutants where that specific pollutant is monitored using CEMS.

(d) *Performance test reporting requirements.*

(1) You must submit the information specified in paragraphs (d)(1)(i) and (d)(2) of this section no later than 60 days following the initial performance test. All reports must be signed by the facility's manager.

(i) The initial performance test data as recorded under paragraph (b) of this section.

(ii) The values for the site-specific operating limits or parameters established pursuant to paragraphs (b)(3), (b)(4)(iii), (b)(5)(ii), and (b)(6)(i) of this section, as applicable, and a description, including sample calculations, of how the operating parameters were established during the initial performance test.

(2) As of December 31, 2011 and within 60 days after the date of completing each performance evaluation or test, as defined in § 63.2, conducted to demonstrate compliance with this subpart, you must submit the relative accuracy test audit data and performance test data, except opacity data, to EPA by successfully submitting the data electronically to EPA's Central Data Exchange (CDX) by using the Electronic Reporting Tool(ERT) (*see http://www.epa.gov/ttn/chief/ert/ert_tool.html/*).

(e) Performance tests must be conducted under such conditions as the Administrator specifies to the owner or operator based on representative performance of the affected source for the period being tested. Upon request, you must make available to the Administrator such records as may be necessary to determine the conditions of performance tests.

20. Section 63.1350 is revised to read as follows:

§ 63.1350 Monitoring requirements.

(a) All continuous monitoring data for periods of startup and shutdown must be compiled and averaged separately from data gathered during periods of normal operation.

(b) *PM monitoring requirements for sources using PM CEMS.*

(1) For a kiln or clinker cooler subject to emissions limitation on particulate matter emissions in § 63.1343(b) and using a PM CEMS, you must install and operate a continuous emissions monitor in accordance with Performance Specification 11 of appendix B and Procedure 2 of appendix F to part 60 of this chapter. The performance test method and the correlation test method for Performance Specification 11 must be Method 5 or Method 5i of appendix A to Part 60 of this chapter. You must also develop an emissions monitoring plan in accordance with paragraphs (o)(1) through (o)(4) of this section.

(2) You must perform Relative Response Audits annually and Response Correlation Audits every 3 years.

(3) If you are using a PM CEMS, you must install, operate, calibrate, and maintain an instrument for continuously measuring and recording the exhaust gas flow rate to the atmosphere according to the requirements in paragraphs (n)(1) through (n)(10) of this section.

(4) In order to calculate the 30-day or 7-day rolling average, collect readings at least every 15 minutes. Sum the hourly data to daily data and then into a 30-day rolling average. You must use all data, except those recorded during monitoring system malfunctions, repairs associated with monitoring system malfunctions, or required monitoring system quality assurance or control activities, in calculations.

(c) [Reserved]

(d) *Clinker production monitoring requirements.* If you are subject to an emissions limitation on particulate matter, mercury, NO_X, or SO_2 emissions (lb/ton of clinker), you must:

(1) Determine hourly clinker production by one of two methods:

(i) Install, calibrate, maintain, and operate a permanent weigh scale system 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.

(ii) Install, calibrate, maintain, and operate a permanent weigh scale system to measure and record weight rates in tons-mass per hour of the amount of feed to the kiln. The system of measuring feed must be maintained within ±5 percent accuracy. Calculate your hourly clinker production rate using a kiln specific feed to clinker ratio based on reconciled clinker production determined for accounting purposes and recorded feed rates. This ratio must be updated monthly. Note that if this ratio changes at clinker reconciliation, you must use the new ratio going forward, but you do not have to retroactively change clinker production rates previously estimated.

(2) Determine, record, and maintain a record of the accuracy of the system of measuring hourly clinker production (or feed mass flow if applicable) before initial use (for new sources) or within 30 days of the effective date of this rule (for existing sources). During each quarter of source operation, you must determine, record, and maintain a record of the ongoing accuracy of the system of measuring hourly clinker production (or feed mass flow).

(3) Record the daily clinker production rates and kiln feed rates; and

(4) Develop an emissions monitoring plan in accordance with paragraphs (o)(1) through (o)(4) of this section.

(e) [Reserved]

(f) *Opacity monitoring requirements.* If you are subject to a limitation on opacity under § 63.1345, you must conduct required emissions monitoring in accordance with the provisions of paragraphs (f)(1)(i) through (f)(1)(vii) of this section and in accordance with the operation and maintenance plan developed in accordance with § 63.1347. You must conduct emissions monitoring in accordance with paragraphs (f)(2)(i) through (f)(2)(iii) of this section and in accordance with the operation and maintenance plan developed in accordance with (p)(1) through (p)(4) of this section. You must also develop an opacity emissions monitoring plan in accordance with paragraphs (o)(1) through (o)(4) and paragraph (o)(5), if applicable, of this section.

(1)(i) You must conduct a monthly 10-minute visible emissions test of each affected source in accordance with Method 22 of appendix A–7 to part 60 of this chapter. The performance test must be conducted while the affected source is in operation.

(ii) If no visible emissions are observed in six consecutive monthly tests for any affected source, the owner or operator may decrease the frequency of performance testing from monthly to semi-annually for that affected source. If visible emissions are observed during any semi-annual test, you must resume performance testing of that affected source on a monthly basis and maintain that schedule until no visible emissions are observed in six consecutive monthly tests.

(iii) If no visible emissions are observed during the semi-annual test for any affected source, you may decrease the frequency of performance testing from semi-annually to annually for that affected source. If visible emissions are observed during any annual performance test, the owner or operator must resume performance testing of that affected source on a monthly basis and maintain that schedule until no visible emissions are observed in six consecutive monthly tests.

(iv) If visible emissions are observed during any Method 22 performance test, of appendix A–7 to part 60 of this chapter, you must conduct five 6-minute averages of opacity in accordance with Method 9 of appendix A–4 to part 60 of this chapter. The Method 9 performance test, of appendix A–4 to part 60 of this chapter, must begin within 1 hour of any observation of visible emissions.

(v) The requirement to conduct Method 22 visible emissions monitoring under this paragraph do not apply to any totally enclosed conveying system transfer point, regardless of the location of the transfer point. "Totally enclosed conveying system transfer point" must mean a conveying system transfer point that is enclosed on all sides, top, and bottom. The enclosures for these transfer points must be operated and maintained as total enclosures on a continuing basis in accordance with the facility operations and maintenance plan.

(vi) If any partially enclosed or unenclosed conveying system transfer point is located in a building, you must have the option to conduct a Method 22 performance test, of appendix A–7 to part 60 of this chapter, according to the requirements of paragraphs (f)(1)(i) through (f)(1)(iv) of this section for each such conveying system transfer point located within the building, or for the building itself, according to paragraph (f)(1)(vii) of this section.

(vii) If visible emissions from a building are monitored, the requirements of paragraphs (f)(1)(i) through (f)(1)(iv) of this section apply to the monitoring of the building, and you must also test visible emissions from each side, roof, and vent of the building for at least 10 minutes.

(2)(i) For a raw mill or finish mill, you must monitor opacity by conducting daily visual emissions observations of the mill sweep and air separator particulate matter control devices (PMCD) of these affected sources in accordance with the procedures of Method 22 of appendix A–7 to part 60 of this chapter. The duration of the Method 22 performance test must be 6 minutes.

(ii) Within 24 hours of the end of the Method 22 performance test in which visible emissions were observed, the owner or operator must conduct a follow up Method 22 performance test of each stack from which visible emissions were observed during the previous Method 22 performance test.

(iii) If visible emissions are observed during the follow-up Method 22 performance test required by paragraph (a)(5)(ii) of this section from any stack from which visible emissions were observed during the previous Method 22 performance test required by paragraph (a)(5)(i) of the section, you must conduct a visual opacity test of each stack from which emissions were observed during the follow up Method 22 performance test in accordance with Method 9 of appendix A–4 to part 60 of this chapter. The duration of the Method 9 test must be 30 minutes.

(3) *Corrective actions.* If visible emissions are observed during any Method 22 visible emissions test conducted under paragraphs (f)(1) or (f)(2) of this section, you must initiate, within one-hour, the corrective actions specified in the site specific operating and maintenance plan provisions in § 63.1347.

(4) The requirements under paragraph (f)(2) of this section to conduct daily Method 22 testing do not apply to any specific raw mill or finish mill equipped with a continuous opacity monitoring system (COMS) or bag leak detection system (BLDS).

(i) If the owner or operator chooses to install a COMS in lieu of conducting the daily visual emissions testing required under paragraph (f)(2) of this section, then the COMS must be installed at the outlet of the PM control device of the raw mill or finish mill and the COMS must be installed, maintained, calibrated, and operated as required by the general provisions in subpart A of this part and according to PS–1 of appendix B to part 60 of this chapter.

(ii) If you choose to install a BLDS in lieu of conducting the daily visual emissions testing required under paragraph (f)(2) of this section, the requirements in paragraphs (m)(1) through (m)(4), (m)(10) and (m)(11) of this section apply.

(g) *D/F monitoring requirements.* If you are subject to an emissions limitation on D/F emissions, you must comply with the monitoring requirements of paragraphs (g)(1) through (g)(6) and paragraphs (m)(1) through (m)(4) of this section to demonstrate continuous compliance with the D/F emissions standard. You must also develop an emissions monitoring plan in accordance with paragraphs (p)(1) through (p)(4) of this section.

(1) You must install, calibrate, maintain, and continuously operate a continuous monitor to record the temperature of the exhaust gases from the kiln, in-line kiln/raw mill, and alkali bypass, if applicable, at the inlet to, or upstream of, the kiln, in-line kiln/raw mill and/or alkali bypass PMCDs.

(i) The temperature recorder response range must include zero and 1.5 times the average temperature established according to the requirements in § 63.1349(b)(3)(iv).

(ii) The calibration reference for the temperature measurement must be a National Institute of Standards and Technology calibrated reference thermocouple-potentiometer system or alternate reference, subject to approval by the Administrator.

(iii) The calibration of all thermocouples and other temperature sensors must be verified at least once every three months.

(2) You must monitor and continuously record the temperature of the exhaust gases from the kiln, in-line kiln/raw mill, and alkali bypass, if applicable, at the inlet to the kiln, in-line kiln/raw mill and/or alkali bypass PMCD.

(3) The required minimum data collection frequency must be one minute.

(4) Each hour, calculate the three-hour average temperature for the previous 3 hours of process operation using all of the one-minute data available (*i.e.,* the CMS is not out-of-control.)

(5) When the operating status of the raw mill of the in-line kiln/raw mill is changed from off to on or from on to off, the calculation of the three-hour rolling average temperature must begin anew, without considering previous recordings.

(h) *Monitoring requirements for sources using sorbent injection.* If you are subject to an operating limit on D/F emissions that employs carbon injection as an emission control technique, you must comply with the additional monitoring requirements of paragraphs (h)(1) and (h)(2) and paragraphs (m)(1) through (m)(4) and (m)(9) of this section. You must also develop an emissions monitoring plan in accordance with paragraphs (p)(1) through (p)(4) of this section.

(1) Install, operate, calibrate, and maintain a continuous monitor to record the rate of activated carbon injection. The accuracy of the rate measurement device must be ±1 percent of the rate being measured.

(i) Verify the calibration of the device at least once every three months.

(ii) Each hour, calculate the three-hour rolling average activated carbon injection rate for the previous 3 hours of process operation using all of the one-minute data available (*i.e.,* the CMS is not out-of-control.)

(iii) When the operating status of the raw mill of the in-line kiln/raw mill is changed from off to on or from on to off, the calculation of the three-hour rolling average activated carbon injection rate must begin anew, without considering previous recordings.

(2)(i) Install, operate, calibrate, and maintain a continuous monitor to record the activated carbon injection system carrier gas parameter (either the carrier gas flow rate or the carrier gas pressure drop) established during the D/F performance test in accordance with § 63.1349(b)(3).

(ii) Each hour, calculate the three-hour rolling average of the selected parameter value for the previous 3 hours of process operation using all of the one-minute data available (*i.e.,* the CMS is not out-of-control.)

(i) *THC Monitoring Requirements.* If you are subject to an emissions limitation on THC emissions, you must comply with the monitoring requirements of paragraphs (i)(1) and (i)(2) and (m)(1) through (m)(4) of this section. You must also develop an emissions monitoring plan in accordance with paragraphs (p)(1) through (p)(4) of this section.

(1) You must install, operate, and maintain a THC continuous emission monitoring system in accordance with Performance Specification 8 of appendix B to part 60 of this chapter and comply with all of the requirements for continuous monitoring systems found in the general provisions, subpart A of this part. The owner or operator must operate and maintain each CEMS according to the quality assurance requirements in Procedure 1 of appendix F in part 60 of this chapter.

(2) For sources equipped with an alkali bypass stack, instead of installing a CEMS, you may use the results of the initial or subsequent performance test to demonstrate compliance with the THC emission limit.

(j) *Total organic HAP monitoring requirements.* If you are complying with the total organic HAP emissions limits, you must continuously monitor THC according to paragraph (i)(1) and (2) or in accordance with Performance Specification 15 of appendix B to part 60 of this chapter and comply with all of the requirements for continuous monitoring systems found in the general provisions, subpart A of this part. You must operate and maintain each CEMS according to the quality assurance requirements in Procedure 1 of appendix F in part 60 of this chapter. In addition, your must follow the monitoring requirements in paragraphs (m)(1) through (m)(4) of this section. You must also develop an emissions monitoring plan in accordance with paragraphs (p)(1) through (p)(4) of this section.

(k) *Mercury monitoring requirements.* If you have a kiln or in-line kiln/raw mill subject to an emissions limitation on mercury emissions, you must install and operate a mercury continuous emissions monitoring system (Hg CEMS) in accordance with Performance Specification 12A of appendix B to part 60 of this chapter or a sorbent trap-based integrated monitoring system in accordance with Performance Specification 12B of appendix B to part 60 of this chapter. You must continuously monitor mercury according to paragraphs (k)(1) through (k)(3) and (m)(1) through (m)(4) of this section. You must also develop an emissions monitoring plan in accordance with paragraphs (p)(1) through (p)(4) of this section.

(1) The span value for any Hg CEMS must include the intended upper limit of the mercury concentration measurement range during normal “mill on” operation which may be exceeded during “mill off” operation or other short term conditions lasting less than 24 consecutive kiln operating hours. However, the span should be at least equivalent to approximately two times the emissions standard and it may be rounded to the nearest multiple of 10 $\mu g/m^3$ of total mercury.

(2) You must operate and maintain each Hg CEMS or sorbent trap-based integrated monitoring system according to the quality assurance requirements in Procedure 5 of appendix F to part 60 of this chapter.

(3) Relative accuracy testing of mercury monitoring systems under Performance Specification 12A, Performance Specification 12B, or Procedure 5 must be at normal operating conditions with the raw mill on.

(4) If you use a mercury CEMS, you must install, operate, calibrate, and maintain an instrument for continuously measuring and recording the exhaust gas flow rate to the atmosphere according to the requirements in paragraphs (n)(1) through (n)(10) of this section.

(l) *HCl Monitoring Requirements.* If you are subject to an emissions limitation on HCl emissions in § 63.1343, you must continuously monitor HCl according to paragraph (l)(1) and (2) and paragraphs (m)(1) through (m)(4) of this section. You must also develop an emissions monitoring plan in accordance with paragraphs (p)(1) through (p)(4) of this section.

(1) Continuously monitor compliance with the HCl limit by operating a continuous emission monitor in accordance with Performance Specification 15 of appendix B to part 60 of this chapter. You must operate and maintain each CEMS according to the quality assurance requirements in Procedure 1 of 40 CFR of appendix F to part 60 of this chapter except that the Relative Accuracy Test Audit requirements of Procedure 1 must be replaced with the validation requirements and criteria of sections 11.1.1 and 12.0 of Performance Specification 15, or

(2) Install, operate, and maintain a CMS to monitor wet scrubber parameters as specified in paragraphs (m)(5) and (m)(7) of this section.

(m) *Parameter monitoring requirements.* If you have an operating limit that requires the use of a CMS, you must install, operate, and maintain each continuous parameter monitoring system (CPMS) according to the procedures in paragraphs (n)(1) through (4) of this section by the compliance date specified in § 63.1351. You must also meet the applicable specific parameter monitoring requirements in paragraphs (m)(5) through (m)(11) that are applicable to you.

(1) The CMS must complete a minimum of one cycle of operation for each successive 15-minute period. You must have a minimum of four successive cycles of operation to have a valid hour of data.

(2) You must conduct all monitoring in continuous operation at all times that the unit is operating.

(3) Determine the 3-hour block average of all recorded readings.

(4) Record the results of each inspection, calibration, and validation check.

(5) *Liquid flow rate monitoring requirements.* If you have an operating limit that requires the use of a flow measurement device, you must meet the requirements in paragraphs (m)(5)(i) through (iv) of this section.

(i) Locate the flow sensor and other necessary equipment in a position that provides a representative flow.

(ii) Use a flow sensor with a measurement sensitivity of 2 percent of the flow rate.

(iii) Reduce swirling flow or abnormal velocity distributions due to upstream and downstream disturbances.

(iv) Conduct a flow sensor calibration check at least semiannually.

(6) *Specific pressure monitoring requirements.* If you have an operating limit that requires the use of a pressure measurement device, you must meet the requirements in paragraphs (m)(6)(i) through (vi) of this section.

(i) Locate the pressure sensor(s) in a position that provides a representative measurement of the pressure.

(ii) Minimize or eliminate pulsating pressure, vibration, and internal and external corrosion.

(iii) Use a gauge with a minimum tolerance of 1.27 centimeters of water or a transducer with a minimum tolerance of 1 percent of the pressure range.

(iv) Check pressure tap pluggage daily.

(v) Using a manometer, check gauge calibration quarterly and transducer calibration monthly.

(vi) Conduct calibration checks any time the sensor exceeds the manufacturer's specified maximum operating pressure range or install a new pressure sensor.

(7) *Specific pH monitoring requirements.* If you have an operating limit that requires the use of a pH measurement device, you must meet the requirements in paragraphs (m)(7)(i) through (iii) of this section.

(i) Locate the pH sensor in a position that provides a representative measurement of scrubber effluent pH.

(ii) Ensure the sample is properly mixed and representative of the fluid to be measured.

(iii) Check the pH meter's calibration on at least two points every 8 hours of process operation.

(8) [Reserved]

(9) *Mass flow rate (for sorbent injection) monitoring requirements.* If you have an operating limit that requires the use of equipment to monitor sorbent injection rate (*e.g.,* weigh belt, weigh hopper, or hopper flow measurement device), you must meet the requirements in paragraphs (m)(9)(i) through (iii) of this section.

(i) Locate the device in a position(s) that provides a representative measurement of the total sorbent injection rate.

(ii) Install and calibrate the device in accordance with manufacturer's procedures and specifications.

(iii) At least annually, calibrate the device in accordance with the manufacturer's procedures and specifications.

(10) *Bag leak detection monitoring requirements.* If you elect to use a fabric filter bag leak detection system to comply with the requirements of this subpart, you must install, calibrate, maintain, and continuously operate a bag leak detection system as specified in paragraphs (m)(10)(i) through (viii) of this section.

(i) You must install and operate a bag leak detection system for each exhaust stack of the fabric filter.

(ii) Each bag leak detection system must be installed, operated, calibrated, and maintained in a manner consistent with the manufacturer's written specifications and recommendations and in accordance with the guidance provided in EPA–454/R–98–015, September 1997.

(iii) The bag leak detection system must be certified by the manufacturer to be capable of detecting particulate matter emissions at concentrations of 10 or fewer milligrams per actual cubic meter.

(iv) The bag leak detection system sensor must provide output of relative or absolute particulate matter loadings.

(v) The bag leak detection system must be equipped with a device to continuously record the output signal from the sensor.

(vi) The bag leak detection system must be equipped with an alarm system that will alert an operator automatically when an increase in relative particulate matter emissions over a preset level is detected. The alarm must be located such that the alert is detected and recognized easily by an operator.

(vii) For positive pressure fabric filter systems that do not duct all compartments of cells to a common stack, a bag leak detection system must be installed in each baghouse compartment or cell.

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

(11) For each BLDS, the owner or operator must initiate procedures to determine the cause of every alarm within 8 hours of the alarm. The owner or operator must alleviate the cause of the alarm within 24 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.

(n) *Continuous emissions rate monitoring system.* You must install, operate, calibrate, and maintain instruments, according to the requirements in paragraphs (n)(1) and (2) of this section, for continuously measuring and recording the pollutant per mass flow rate to the atmosphere from sources subject to an emissions limitation that has a pounds per ton of clinker unit.

(1) You 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 mercury or PM CEMS, taking into account the manufacturer's recommendations. The flow rate sensor is that portion of the system that senses the volumetric flow rate and generates an output proportional to that flow rate.

(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 (n)(1) 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.

(7) The flow rate sensor must have provisions to determine the daily zero and upscale calibration drift (CD) (*see* sections 3.1 and 8.3 of Performance Specification 2 in appendix B to Part 60 of this chapter for a discussion of CD).

(i) Conduct the CD tests at two reference signal levels, zero (*e.g.,* 0 to 20 percent of span) and upscale (*e.g.,* 50 to 70 percent of span).

(ii) The absolute value of the difference between the flow monitor response and the reference signal must be equal to or less than 3 percent of the flow monitor span.

(8) You must perform an initial relative accuracy test of the flow rate monitoring system according to Section 8.2 of Performance Specification 6 of appendix B to Part 60 of the chapter with the exceptions in paragraphs (n)(8)(i) and (n)(8)(ii) of this section.

(i) The relative accuracy test is to evaluate the flow rate monitoring system alone rather than a continuous emission rate monitoring system.

(ii) The relative accuracy of the flow rate monitoring system shall be no greater than 10 percent of the mean value of the reference method data.

(9) You must verify the accuracy of the flow rate monitoring system at least once per year by repeating the relative accuracy test specified in paragraph (n)(8).

(10) You must operate the flow rate monitoring system and record data during all periods of operation of the affected facility including periods of startup, shutdown, and malfunction, except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments).

(o) *Alternate monitoring requirements approval.* You may submit an application to the Administrator for approval of alternate monitoring requirements to demonstrate compliance with the emission standards of this subpart, except for emission standards for THC, subject to the provisions of paragraphs (n)(1) through (n)(6) of this section.

(1) The Administrator will not approve averaging periods other than those specified in this section, unless you document, using data or information, that the longer averaging period will ensure that emissions do not exceed levels achieved during the performance test over any increment of time equivalent to the time required to conduct three runs of the performance test.

(2) If the application to use an alternate monitoring requirement is approved, you must continue to use the original monitoring requirement until approval is received to use another monitoring requirement.

(3) You must submit the application for approval of alternate monitoring requirements no later than the notification of performance test. The

application must contain the information specified in paragraphs (m)(3)(i) through (iii) of this section:

(i) Data or information justifying the request, such as the technical or economic infeasibility, or the impracticality of using the required approach;

(ii) A description of the proposed alternative monitoring requirement, including the operating parameter to be monitored, the monitoring approach and technique, the averaging period for the limit, and how the limit is to be calculated; and

(iii) Data or information documenting that the alternative monitoring requirement would provide equivalent or better assurance of compliance with the relevant emission standard.

(4) The Administrator will notify you of the approval or denial of the application within 90 calendar days after receipt of the original request, or within 60 calendar days of the receipt of any supplementary information, whichever is later. The Administrator will not approve an alternate monitoring application unless it would provide equivalent or better assurance of compliance with the relevant emission standard. Before disapproving any alternate monitoring application, the Administrator will provide:

(i) Notice of the information and findings upon which the intended disapproval is based; and

(ii) Notice of opportunity for you to present additional supporting information before final action is taken on the application. This notice will specify how much additional time is allowed for you to provide additional supporting information.

(5) You are responsible for submitting any supporting information in a timely manner to enable the Administrator to consider the application prior to the performance test. Neither submittal of an application, nor the Administrator's failure to approve or disapprove the application relieves you of the responsibility to comply with any provision of this subpart.

(6) The Administrator may decide at any time, on a case-by-case basis that additional or alternative operating limits, or alternative approaches to establishing operating limits, are necessary to demonstrate compliance with the emission standards of this subpart.

(p) *Development and submittal (upon request) of monitoring plans.* If you demonstrate compliance with any applicable emission limit through performance stack testing or other emissions monitoring, you must develop a site-specific monitoring plan according to the requirements in paragraphs (p)(1) through (4) of this section. This requirement also applies to you if you petition the EPA Administrator for alternative monitoring parameters under paragraph (n) of this section and § 63.8(f). If you use a BLDS, you must also meet the requirements specified in paragraph (o)(5) of this section.

(1) For each continuous monitoring system (CMS) required in this section, you must develop, and submit to the permitting authority for approval upon request, a site-specific monitoring plan that addresses paragraphs (o)(1)(i) through (iii) of this section. You must submit this site-specific monitoring plan, if requested, at least 60 days before your initial performance evaluation of your CMS.

(i) Installation of the CMS sampling probe or other interface at a measurement location relative to each affected process unit such that the measurement is representative of control of the exhaust emissions (*e.g.,* on or downstream of the last control device);

(ii) Performance and equipment specifications for the sample interface, the pollutant concentration or parametric signal analyzer, and the data collection and reduction systems; and

(iii) Performance evaluation procedures and acceptance criteria (*e.g.,* calibrations).

(2) In your site-specific monitoring plan, you must also address paragraphs (o)(2)(i) through (iii) of this section.

(i) Ongoing operation and maintenance procedures in accordance with the general requirements of § 63.8(c)(1), (c)(3), and (c)(4)(ii);

(ii) Ongoing data quality assurance procedures in accordance with the general requirements of § 63.8(d); and

(iii) Ongoing recordkeeping and reporting procedures in accordance with the general requirements of § 63.10(c), (e)(1), and (e)(2)(i).

(3) You must conduct a performance evaluation of each CMS in accordance with your site-specific monitoring plan.

(4) You must operate and maintain the CMS in continuous operation according to the site-specific monitoring plan.

(5) *BLDS monitoring plan.* Each monitoring plan must describe the items in paragraphs (o)(5)(i) through (v) of this section. At a minimum, you must retain records related to the site-specific monitoring plan and information discussed in paragraphs (m)(1) through (4), (m)(10) and (m)(11) of this section for a period of 5 years, with at least the first 2 years on-site;

(i) Installation of the BLDS;

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

(iii) Operation of the BLDS, including quality assurance procedures;

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

(v) How the BLDS output will be recorded and stored.

■ 21. Section 63.1351 is revised to read as follows:

§ 63.1351 Compliance dates.

(a) Except as noted in paragraph (b) of this section, the compliance date for an owner or operator of an existing affected source subject to the provisions of this subpart is June 14, 2002.

(b) The compliance date for existing sources with the PM, mercury, THC, and HCl emissions limits in § 63.1343(b) which became effective in November 8, 2010 will be September 9, 2013.

(c) Except as noted in paragraph (d) of this section, the compliance date for an owner or operator of an affected source subject to the provisions of this subpart that commences new construction or reconstruction after March 24, 1998, is June 14, 1999, or upon startup of operations, whichever is later.

(d) The compliance date for new sources with the PM, mercury, THC, and HCl emissions limits in § 63.1343(b) is November 8, 2010 or startup, whichever is later.

■ 22. Section 63.1352 is revised to read as follows:

§ 63.1352 Additional test methods.

(a) If you are conducting tests to determine the rates of emission of HCl from kilns and associated bypass stacks at portland cement manufacturing facilities, for use in applicability determinations under § 63.1340, you may use Method 320 or Method 321 of appendix A of this part.

(b) Owners or operators conducting tests to determine the rates of emission of specific organic HAP from raw material dryers, kilns and in-line kiln/raw mills at Portland cement manufacturing facilities, solely for use in applicability determinations under § 63.1340 of this subpart are permitted to use Method 320 of appendix A to this part, or Method 18 of appendix A to part 60 of this chapter.

■ 23. Section 63.1354 is amended by adding paragraphs (b)(9)(vi) and (c) to read as follows:

§ 63.1354 Reporting requirements.

* * * * *

(b) * * *

(9) * * *

(vi) Monthly rolling average mercury, THC, PM, and HCl (if applicable) emissions levels in the units of the applicable emissions limit for each kiln, clinker cooler, and raw material dryer.

* * * * *

(c) The semiannual report required by paragraph (b)(9) of this section must include the number, duration, and a brief description for each type of malfunction which occurred during the reporting period and which caused or may have caused any applicable emission limitation to be exceeded. The report must also include a description of actions taken by an owner or operator during a malfunction of an affected source to minimize emissions in accordance with § 63.1348(d), including actions taken to correct a malfunction.

■ 24. Section 63.1355 is amended by revising paragraphs (e) and paragraph (f) and adding paragraph (g) to read as follows:

§ 63.1355 Recordkeeping requirements.

* * * * *

(e) You must keep records of the daily clinker production rates and kiln feed rates.

(f) You must keep records of the occurrence and duration of each startup or shutdown.

(g)(1) You must keep records of the occurrence and duration of each malfunction of operation (*i.e.,* process equipment) or the air pollution control and monitoring equipment.

(2) You must keep records of actions taken during periods of malfunction to minimize emissions in accordance with § 63.1348(d) including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation.

■ 25. Section 63.1356 is revised to read as follows:

§ 63.1356 Sources with multiple emission limits or monitoring requirements.

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.

■ 26. Table 1 to Subpart LLL of Part 63 is revised to read as follows:

TABLE 1 TO SUBPART LLL OF PART 63—APPLICABILITY OF GENERAL PROVISIONS

Citation	Requirement	Applies to subpart LLL	Explanation
63.1(a)(1)–(4)	Applicability	Yes.	
63.1(a)(5)		No	[Reserved].
63.1(a)(6)–(8)	Applicability	Yes.	
63.1(a)(9)		No	[Reserved].
63.1(a)(10)–(14)	Applicability	Yes.	
63.1(b)(1)	Initial Applicability Determination.	No	§ 63.1340 specifies applicability.
63.1(b)(2)–(3)	Initial Applicability Determination.	Yes.	
63.1(c)(1)	Applicability After Standard Established.	Yes.	
63.1(c)(2)	Permit Requirements	Yes	Area sources must obtain Title V permits.
63.1(c)(3)		No	[Reserved].
63.1(c)(4)–(5)	Extensions, Notifications	Yes.	
63.1(d)		No	[Reserved].
63.1(e)	Applicability of Permit Program.	Yes.	
63.2	Definitions	Yes	Additional definitions in § 63.1341.
63.3(a)–(c)	Units and Abbreviations	Yes.	
63.4(a)(1)–(3)	Prohibited Activities	Yes.	
63.4(a)(4)		No	[Reserved].
63.4(a)(5)	Compliance date	Yes.	
63.4(b)–(c)	Circumvention, Severability	Yes.	
63.5(a)(1)–(2)	Construction/Reconstruction	Yes.	
63.5(b)(1)	Compliance Dates	Yes.	
63.5(b)(2)		No	[Reserved].
63.5(b)(3)–(6)	Construction Approval, Applicability.	Yes.	
63.5(c)		No	[Reserved].
63.5(d)(1)–(4)	Approval of Construction/Reconstruction.	Yes.	
63.5(e)	Approval of Construction/Reconstruction.	Yes.	
63.5(f)(1)–(2)	Approval of Construction/Reconstruction.	Yes.	
63.6(a)	Compliance for Standards and Maintenance.	Yes.	
63.6(b)(1)–(5)	Compliance Dates	Yes.	
63.6(b)(6)		No	[Reserved].
63.6(b)(7)	Compliance Dates	Yes.	
63.6(c)(1)–(2)	Compliance Dates	Yes.	
63.6(c)(3)–(4)		No	[Reserved].
63.6(c)(5)	Compliance Dates	Yes.	
63.6(d)		No	[Reserved].

TABLE 1 TO SUBPART LLL OF PART 63—APPLICABILITY OF GENERAL PROVISIONS—Continued

Citation	Requirement	Applies to subpart LLL	Explanation
63.6(e)(1)–(2)	Operation & Maintenance	No	*See* § 63.1348(d) for general duty requirement. Any reference to § 63.6(e)(1)(i) in other General Provisions or in this subpart is to be treated as a cross-reference to § 63.1348(d).
63.6(e)(3)	Startup, Shutdown Malfunction Plan.	No.	
63.6(f)(1)	Compliance with Emission Standards.	No	Compliance obligations specified in subpart LLL.
63.6(f)(2)–(3)	Compliance with Emission Standards.	Yes.	
63.6(g)(1)–(3)	Alternative Standard	Yes.	
63.6(h)(1)	Opacity/VE Standards	No	Compliance obligations specified in subpart LLL.
63.6(h)(2)	Opacity/VE Standards	Yes.	
63.6(h)(3)		No	[Reserved].
63.6(h)(4)–(h)(5)(i)	Opacity/VE Standards	Yes.	
63.6(h)(5)(ii)–(iv)	Opacity/VE Standards	No	Test duration specified in subpart LLL.
63.6(h)(6)	Opacity/VE Standards	Yes.	
63.6(h)(7)	Opacity/VE Standards	Yes.	
63.6(i)(1)–(14)	Extension of Compliance	Yes.	
63.6(i)(15)		No	[Reserved].
63.6(i)(16)	Extension of Compliance	Yes.	
63.6(j)	Exemption from Compliance	Yes.	
63.7(a)(1)–(3)	Performance Testing Requirements.	Yes	§ 63.1349 has specific requirements.
63.7(b)	Notification	Yes.	
63.7(c)	Quality Assurance/Test Plan	Yes.	
63.7(d)	Testing Facilities	Yes.	
63.7(e)(1)	Conduct of Tests	No	*See* § 63.1349(e). Any reference to 63.7(e)(1) in other General Provisions or in this subpart is to be treated as a cross-reference to § 63.1349(e).
63.7(e)(2)–(4)	Conduct of tests	Yes.	
63.7(f)	Alternative Test Method	Yes.	
63.7(g)	Data Analysis	Yes.	
63.7(h)	Waiver of Tests	Yes.	
63.8(a)(1)	Monitoring Requirements	Yes.	
63.8(a)(2)	Monitoring	No	§ 63.1350 includes CEMS requirements.
63.8(a)(3)		No	[Reserved].
63.8(a)(4)	Monitoring	No	Flares not applicable.
63.8(b)(1)–(3)	Conduct of Monitoring	Yes.	
63.8(c)(1)–(8)	CMS Operation/Maintenance	Yes	Temperature and activated carbon injection monitoring data reduction requirements given in subpart LLL.
63.8(d)	Quality Control	Yes, except for the reference to the SSM Plan in the last sentence.	
63.8(e)	Performance Evaluation for CMS.	Yes.	
63.8(f)(1)–(5)	Alternative Monitoring Method	Yes	Additional requirements in § 63.1350(l).
63.8(f)(6)	Alternative to RATA Test	Yes.	
63.8(g)	Data Reduction	Yes.	
63.9(a)	Notification Requirements	Yes.	
63.9(b)(1)–(5)	Initial Notifications	Yes.	
63.9(c)	Request for Compliance Extension.	Yes.	
63.9(d)	New Source Notification for Special Compliance Requirements.	Yes.	
63.9(e)	Notification of Performance Test.	Yes.	
63.9(f)	Notification of VE/Opacity Test.	Yes	Notification not required for VE/opacity test under § 63.1350(e) and (j).
63.9(g)	Additional CMS Notifications	Yes.	
63.9(h)(1)–(3)	Notification of Compliance Status.	Yes.	
63.9(h)(4)		No	[Reserved].
63.9(h)(5)–(6)	Notification of Compliance Status.	Yes.	
63.9(i)	Adjustment of Deadlines	Yes.	
63.9(j)	Change in Previous Information.	Yes.	

TABLE 1 TO SUBPART LLL OF PART 63—APPLICABILITY OF GENERAL PROVISIONS—Continued

Citation	Requirement	Applies to subpart LLL	Explanation
63.10(a)	Recordkeeping/Reporting	Yes.	
63.10(b)(1)	General Recordkeeping Requirements.	Yes.	
63.10(b)(2)(i)–(ii)	General Recordkeeping Requirements.	No	*See* § 63.1355(g) and (h).
63.10(b)(2)(iii)	General Recordkeeping Requirements.	Yes.	
63.10(b)(2)(iv)–(v)	General Recordkeeping Requirements.	No.	
63.10(b)(2)(vi)–(ix)	General Recordkeeping Requirements.	Yes.	
63.10(c)(1)	Additional CMS Recordkeeping.	Yes	PS–8A supersedes requirements for THC CEMS.
63.10(c)(1)	Additional CMS Recordkeeping.	Yes	PS–8A supersedes requirements for THC CEMS.
63.10(c)(2)–(4)		No	[Reserved].
63.10(c)(5)–(8)	Additional CMS Recordkeeping.	Yes	PS–8A supersedes requirements for THC CEMS.
63.10(c)(9)		No	[Reserved].
63.10(c)(10)–(15)	Additional CMS Recordkeeping.	Yes	PS–8A supersedes requirements for THC CEMS.
63.10(d)(1)	General Reporting Requirements.	Yes.	
63.10(d)(2)	Performance Test Results	Yes.	
63.10(d)(3)	Opacity or VE Observations	Yes.	
63.10(d)(4)	Progress Reports	Yes.	
63.10(d)(5)	Startup, Shutdown, Malfunction Reports.	No	*See* § 63.1354(c) for reporting requirements. Any reference to § 63.10(d)(5) in other General Provisions or in this subpart is to be treated as a cross-reference to § 63.1354(c).
63.10(e)(1)–(2)	Additional CMS Reports	Yes.	
63.10(e)(3)	Excess Emissions and CMS Performance Reports.	Yes	Exceedances are defined in subpart LLL.
63.10(f)	Waiver for Recordkeeping/Reporting.	Yes.	
63.11(a)–(b)	Control Device Requirements	No	Flares not applicable.
63.12(a)–(c)	State Authority and Delegations.	Yes.	
63.13(a)–(c)	State/Regional Addresses	Yes.	
63.14(a)–(b)	Incorporation by Reference	Yes.	
63.15(a)–(b)	Availability of Information	Yes.	

Appendix A to Part 63—[Amended]

■ 27. Section 1.3.2 of Method 321 of Appendix A to Part 63—Test Methods is revised to read as follows:

Appendix A to Part 63—Test Methods

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Test Method 321—Measurement of Gaseous Hydrogen Chloride Emissions at Portland Cement Kilns by Fourier Transform Infrared (FTIR) Spectroscopy

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1.3.2 The practical lower quantification range is usually higher than that indicated by the instrument performance in the laboratory, and is dependent upon (1) the presence of interfering species in the exhaust gas (notably H_2O), (2) the optical alignment of the gas cell and transfer optics, and (3) the quality of the reflective surfaces in the cell (cell throughput). Under typical test conditions (moisture content of up to 30 percent, 10 meter absorption path length, liquid nitrogen-cooled IR detector, 0.5 cm^{-1} resolution, and an interferometer sampling time of 60 seconds) a typical lower quantification range for HCl is 0.1 to 1.0 ppm.

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