97% since 1990, from 431 g TEQ/yr to 13.1 g TEQ/yr.[123]

c. What Is the MACT Floor for New Sources? At proposal, we identified floor control for new sources as temperature control at the inlet to the particulate matter control device at 409°F. The proposed floor emission level was 0.20 ng TEQ/dscm, or temperature at the inlet to the particulate matter control device not to exceed 409°F. In the May 1997 NODA, we identified an alternative data analysis method to identify floor control and the floor emission level. The May 1997 NODA dioxin/furan floor control for new sources was defined as temperature control at the inlet to the electrostatic precipitator or fabric filter at 400°F, which was based on an engineering evaluation of the emissions data and other available information. That analysis resulted in a floor emission level of 0.20 ng TEQ/dscm, or 0.40 ng TEQ/dscm and temperature at the inlet to the electrostatic precipitator or fabric filter not to exceed 400°F. We continue to believe that the floor methodology is appropriate for new sources and we adopt this approach in this final rule.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In both the April 1996 proposal and May 1997 NODA, we proposed activated carbon injection as beyond-the-floor control and a beyond-the-floor standard of 0.20 ng TEQ/dscm for new sources. For reasons discussed above for existing sources, we conclude that it is also not cost-effective for new cement kilns to achieve this level. Thus, we do not adopt a beyond-the-floor dioxin/furan standard for new cement kilns.

3. What Are the Mercury Standards?

In today's rule, we establish a standard for existing and new cement kilns that limits mercury emissions to 120 and 56 µg/dscm, respectively. The rationale for these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? All cement kilns use either electrostatic precipitators or fabric filters for particulate matter control. However, since mercury is generally in the vapor form in and downstream of the combustion chamber, including the air pollution control device, electrostatic precipitators and fabric filters do not achieve good mercury control. Mercury emissions from cement kilns are currently regulated by the Boiler and Industrial Furnace rule, which establishes limits on the maximum feedrate of mercury in total feedstreams (e.g., hazardous waste, raw materials, coal). Thus, MACT floor control is based on hazardous waste feed control.

In the April 1996 proposal, we identified floor control as hazardous waste feedrate control not to exceed a feedrate level of 110 µg/dscm, expressed as a maximum theoretical emission concentration, and proposed a floor standard of 130 µg/dscm based on an analysis of data from all cement kilns with a hazardous waste mercury feedrate of this level or lower. (61 FR at 17393.) In May 1997 NODA, we conducted a breakpoint analysis on low to high ranked mercury emissions data from sources floor control and established the floor level as the test condition average emission of the breakpoint source. The breakpoint analysis was intended to reflect an engineering-based evaluation of the data so that the few cement kilns spiking mercury during compliance testing did not drive the floor standard to levels higher than the preponderance of the emissions data. We reasoned that sources with emissions higher than the breakpoint source were not controlling the hazardous waste feedrate of mercury to levels representative of MACT. This analysis resulted in a MACT floor level of 72 µg/dscm. (62 FR at 24227.)

For today's rule, in response to comments questioning our May 1997 NODA approach, we use a revised engineering evaluation and data analysis method to establish the MACT floor for mercury. As discussed in greater detail in the methodology section previously, we use an aggregate feedrate approach to establish MACT floors for the three metal hazardous air pollutant groups and hydrochloric acid/chlorine gas. The aggregate feedrate approach first identifies a MACT floor feedrate level for mercury and then establishes the floor emission level as the highest emissions level achieved by any cement kilns using floor control or better. Using this approach, the resulting mercury floor emission level is 120 µg/dscm.

We received comments on several overarching issues including the appropriateness of considering feedrate control of mercury in hazardous waste as a MACT floor control technique and the specific procedure of identifying breakpoints in arrayed emissions data. These issues and our response to them are discussed in the floor methodology section in Part Four, Section V. In addition, we received comment on a special provision that would allow cement kilns (and lightweight aggregate kilns) to petition the Administrator for an alternative mercury standard for kilns with mercury concentrations in their mineral and related process raw materials that causes an exceedance of the emission standard. This issue and the alternative standard promulgated in the final rule is fully discussed in Part Five, Section X.A.

We also received comments from the cement manufacturing industry indicating that cement kilns with in-line raw mills have unique design and operating procedures that necessitate the use of emission averaging when demonstrating compliance with the emission standards. These commenters stated that the mercury standard is not achievable without a procedure for kilns to emissions average. The commenters supported a provision allowing cement kilns with in-line raw mills to demonstrate compliance with the emission standards on a time-weighted average basis to account for different emission characteristics when the raw mill is active as opposed to when it is inactive. After fully considering comments received, we adopt an emission averaging provision in the final rule. This provision is fully discussed in Part Five, Section X.E.

Several commenters expressed concern that the mercury emissions data base for cement kilns is comprised of normal data, that is, cement kilns did not spike mercury during RCRA compliance testing as they did for other metals and chlorine. Thus, commenters stated that an emissions variability factor should be added to a floor level derived directly from the emissions data to ensure that the floor emission level is being achieved in practice. As discussed in Section V.D.1 above, we conclude that emissions variability is adequately accounted for by the MACT floor methodology finalized today.

We estimate that 85 percent of cement kilns currently meet the floor level. The national annualized compliance cost for cement kilns to reduce mercury emissions to comply with the floor level is $1.1 million for the entire hazardous waste burning cement industry and will reduce mercury emissions by 0.2 Mg/yr or 15 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 NPRM, we proposed a beyond-the-floor standard of 50 µg/dscm based on flue gas temperature reduction to 400 °F followed by activated carbon injection for mercury capture. (61 FR at 17394.) In the May 1997 NODA, we considered a beyond-the-floor standard of 30 µg/dscm based on activated carbon

[123] USEPA, "Final Technical Support Document for HWC MACT Standards, Volume V: Emission Estimates and Engineering Costs", July 1999. See also 63 FR 17338, April 10, 1998.

injection; however, an evaluation was not conducted to determine if such a level would be cost-effective. (62 FR at 24227.)

In developing the final rule, we identified three techniques for control of mercury as a basis to evaluate a beyond-the-floor standard: (1) Activated carbon injection; (2) limiting the feed of mercury in the hazardous waste; and (3) limiting the feed of mercury in the raw materials. The results of each analysis are discussed below.

i. Activated Carbon Injection. To investigate activated carbon injection, we applied a carbon injection capture efficiency of 80 percent to the floor emission level of 120 μg/dscm. Our basis for selecting a capture efficiency of 80 percent[124] is discussed in the support document.[125] The resulting beyond-the-floor emission level is 25 μg/dscm.

We then determined the cost of achieving this reduction to determine if a beyond-the-floor standard of 25 μg/dscm would be appropriate. The national incremental annualized compliance cost for the remaining cement kilns to meet this beyond-the-floor level, rather than comply with the floor controls, would be approximately $11.1 million for the entire hazardous waste burning cement kiln industry and would provide an incremental reduction in mercury emissions nationally beyond the MACT floor controls of 0.7 Mg/yr. Based on these costs of approximately $16 million per additional Mg of mercury removed, we conclude that this mercury beyond-the-floor option for cement kilns is not acceptably cost-effective nor otherwise justified. Therefore, we do not adopt this beyond-the-floor standard.

ii. Limiting the Feedrate of Mercury in the Hazardous Waste. We also considered a beyond-the-floor standard of 50 μg/dscm based on limiting the feedrate of mercury in the hazardous waste. An emission level of 50 μg/dscm represents the practicable extent that additional feedrate control of mercury in hazardous waste (beyond feedrate control needed to achieve the floor emission level) can be used and still achieve modest emissions reductions. We investigated the cost of achieving this reduction to determine if this beyond-the-floor standard would be appropriate. The national incremental annualized compliance cost for cement kilns to meet a beyond-the-floor level of 50 μg/dscm, rather than comply with the floor controls, would be approximately $4.2 million for the entire hazardous waste burning cement kiln industry and would provide an incremental reduction in mercury emissions nationally beyond the MACT floor controls of 0.4 Mg/yr. Based on these costs of approximately $10.9 million per additional Mg of mercury removed, we conclude that this mercury beyond-the-floor option for cement kilns is not warranted. Therefore, we did not adopt this mercury beyond-the-floor standard.

iii. Limiting the Feedrate of Mercury in Raw Materials. Finally, we considered a beyond-the-floor standard based on limiting the feedrate of mercury in the raw materials. Cement manufacturing involves the heating of raw materials such as limestone, clay, shale, sand, and iron ore. Limestone, shale, and clay comprise the vast majority of raw material feed to the kiln, and these materials are typically mined at quarries nearby the cement kiln. Since feed materials can contain significant quantities of hazardous air pollutants, we considered establishing a beyond-the-floor standard based on limiting the feedrate of mercury in these raw materials. A source can achieve a reduction in mercury emissions by substituting a feed material containing lower levels of mercury for a primary raw material with higher mercury levels. For example, shale is the primary feed material used as a source of silica. Under this beyond-the-floor option, a source using a high mercury-containing shale could substitute a feed material lower in mercury such as a coal ash to achieve lower mercury emissions. This beyond-the-floor option appears to be less cost-effective compared to either of the options evaluated above, however. This conclusion is based on the fact that cement kilns are sited proximate to primary raw material supply and transporting large quantities of an alternative source of raw material(s) is likely to be cost-prohibitive, thereby making a beyond-the-floor standard not cost-effective. Therefore, we do not adopt this mercury beyond-the-floor standard.

Thus, the promulgated mercury standard for existing hazardous waste burning cement kilns is the floor level of 120 μg/dscm.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, we identified floor control for new sources as hazardous waste mercury feedrate control not to exceed a feedrate level of 28 μg/dscm expressed as a maximum theoretical emission concentration. We proposed a floor level of 82 μg/dscm. We discussed a floor emission level for new cement kilns in the May 1997 NODA of 72 μg/dscm, based on a floor feedrate control level of 110 μg/dscm.

Today we identify floor control for new cement kilns as feedrate control of mercury in the hazardous waste, expressed as a maximum theoretical emission concentration, based on the single source with the best aggregate feedrate of mercury in hazardous waste. Using the aggregate feedrate approach to establish this floor level of control and the corresponding floor emission level, we identify a MACT floor emission level of 56 μg/dscm for new hazardous waste burning cement kilns.[126]

d. What Are Our Beyond-the-Floor Considerations for New Sources? At proposal, we based beyond-the-floor control for new cement kilns on activated carbon injection and proposed a standard of 50 μg/dscm. In the May 1997 NODA we considered a beyond-the-floor standard of 30 μg/dscm based on activated carbon injection as done for existing sources.

We identified two techniques for control of mercury as a basis to evaluate a beyond-the-floor standard for new sources: (1) Activated carbon injection; and (2) limiting the feedrate of mercury in the hazardous waste. The results of each analysis are discussed below.

i. Activated Carbon Injection. As discussed above, we conclude that flue gas temperature reduction to 400°F followed by activated carbon injection to remove mercury is an appropriate beyond-the-floor control option for improved mercury control at cement kilns. Based on the MACT floor emission level of 56 μg/dscm and assuming a carbon injection capture efficiency of 80 percent, we identified a beyond-the-floor emission level of 10 μg/dscm. We then determined the cost of achieving this reduction to determine if a beyond-the-floor standard of 10 μg/dscm would be appropriate. The incremental annualized compliance cost for one new large cement kiln to meet this beyond-the-floor level, rather than comply with floor controls, would be approximately $2.3 million and would provide an incremental reduction in mercury emissions beyond the MACT floor controls of approximately 0.17 Mg/yr. For a new small cement kiln, the

[124] We received many comments on the use of activated carbon injection as a beyond-the-floor control technique at cement kilns. Since we do not adopt a beyond-the-floor standard based on activated carbon injection in the final rule, these comments and our responses to them are only discussed in our document that responds to public comments.

[125] USEPA, ''Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies.'' July 1999.

[126] Given that the emission level is substantially higher than the feedrate level expressed as a maximum theoretical emission concentration, 56 vs 7 μg/dscm, the contributions of mercury from raw materials and coal for the floor-setting source must be substantial.

incremental annualized compliance cost would be approximately $0.9 million and would provide an incremental reduction in mercury emissions beyond the MACT floor controls of approximately 0.04 Mg/yr. Based on these costs of approximately $13–22 million per additional Mg of mercury removed, we concluded that a beyond-the-floor standard of 10 µg/dscm is not justified due to the high cost of compliance and relatively small mercury emissions reductions.

ii. Limiting the Feedrate of Mercury in Hazardous Waste. We also considered a beyond-the-floor standard based on limiting the feedrate of mercury in the hazardous waste. Considering that the floor emission level for new cement kilns is approximately half of the floor emission level for existing kilns (56 versus 120 µg/dscm), we conclude that a mercury beyond-the-floor standard for cement kilns is not warranted. This conclusion is based on the limited incremental emissions reductions achieved [127] and because the cost-effectiveness of beyond-the-floor controls for new cement kilns would be even higher than for existing sources, which we found unacceptable in paragraph (b) above. Therefore, we do not adopt a mercury beyond-the-floor standard based on limiting feedrate of mercury in hazardous waste.

Thus, the promulgated mercury standard for new hazardous waste burning cement kilns is the floor emissions level of 56 µg/dscm.

4. What Are the Particulate Matter Standards?

We establish standards for both existing and new cement kilns which limit particulate matter emissions to 0.15 kg/Mg dry feed.[128] In addition, opacity cannot exceed 20 percent. We chose the particulate matter standard as a surrogate control for the metals antimony, cobalt, manganese, nickel, and selenium. We refer to these five metals as ''nonenumerated metals'' because standards specific to each metal have not been established. The rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the April 1996 proposal, we discussed particulate matter floor control based upon the performance of a fabric filter with an air-to-cloth ratio of 2.3 acfm/f,[2] resulting in a nominal floor emission level of 0.065 gr/dscf. However, we believed it more appropriate to establish the floor standard based on the cement kiln 1971 New Source Performance Standard. (See discussion in 61 FR at 17392.) The 1971 New Source Performance Standard is 0.15 kg/Mg dry feed (0.30 lb/ton of dry feed). (see 40 CFR 60.60.) Cement kilns currently achieve this standard with well-designed and properly operated electrostatic precipitators and fabric filters.

In the May 1997 NODA, we considered two data analysis methods to identify the particulate matter floor emission level. The first method established and expressed the floor level equivalent to the existing New Source Performance Standard promulgated in 1971. We subsequently proposed and finalized this approach for nonhazardous waste burning cement kilns. See 63 FR at 14198–199 and 64 FR 31898, respectively. The second approach discussed expressed the New Source Performance Standard as a stack gas concentration limit, as opposed to a production-based emission limit format. The May 1997 reevaluation suggested that the 1971 New Source Performance Standard was approximately equivalent to a particulate matter concentration of 0.03 gr/dscf (69 mg/dscm).[129] We indicated a preference for expressing the particulate matter standard on a concentration basis because we also proposed that sources would comply with the particulate matter standard with a particulate matter continuous emissions monitoring system.

However, we now conclude that basing the floor on the 1971 New Source Performance Standard is the most appropriate approach. Cement kilns achieve the 1971 New Source Performance Standard with well-designed and properly operated fabric filters and electrostatic precipitators. Since approximately 20% of hazardous waste burning cement kilns now are subject to the 1971 New Source Performance Standard, consideration of this existing federal regulation as a floor is appropriate because greater than 12% of existing sources are achieving it. The available emissions test data show a wide range of particulate matter results—some emissions data are well below while other data are at the 1971 New Source Performance Standard level.[130] Even though the hazardous waste burning cement kiln particulate matter data span two orders of magnitude,[131] we have limited data on design parameters of the particulate matter control device and could not identify a cause (i.e., differentiate among control equipment) for the wide range in particulate matter emissions. We thus believe that the variation reflects normal operating variability. Therefore, the MACT floor emission level for existing cement kilns is the 1971 New Source Performance Standard.

The New Source Performance Standard at § 60.62 also specifies that opacity must be monitored continuously and establishes an opacity standard of 20 percent as a measure to ensure compliance with the particulate matter standard. We are therefore also adopting this opacity standard for today's rule.[132] We are adopting it for the final rule because: (1) We proposed to base the particulate matter standard for hazardous waste burning cement kilns on the New Source Performance Standard, and the opacity standard is an integral component of that standard; and (2) we proposed to base the MACT particulate matter standard for nonhazardous waste burning cement kilns on the New Source Performance Standard and explicitly identified both the particulate emission and opacity components of the standard. Hazardous waste burning cement kiln stakeholders have commented on both the nonhazardous waste and hazardous waste cement kiln proposed rules and suggest that there is little or no difference in emissions from the two classes of kilns and that they should be regulated the same. Although we do not agree that emissions of all hazardous pollutants are the same for both classes of kilns and should be regulated the same, we agree that particulate

[127] Achieving substantial additional mercury emissions reductions by further controls on hazardous waste feedrate may be problematic because the mercury contribution from raw materials and coal represents an even larger proportion of the total mercury fed to the kiln.

[128] Approximately equivalent to a particulate matter concentration of 0.03 gr/dscf (69 mg/dscm) as expressed in the April 1996 NPRM and May 1997 NODA. The calculation is approximate due to the different types of cement kilns and their associated flow rates.

[129] See USEPA, ''Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' July 1999 for a discussion of the approximate equivalency.

[130] The variation in the particulate matter data is consistent with data from nonhazardous waste burning cement kilns. We neither expect nor have any data indicating that waste-burning operations increase particulate matter emissions at a cement kiln. An estimated 30% of existing nonhazardous waste burning cement kilns are subject to the requirements of the new Source Performance Standard for cement plants. The particulate matter data for these kilns also exhibit a wide range in measurements. (63 FR at 14198.)

[131] USEPA, ''Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' July 1999.

[132] Given that we adopt the New Source Performance Standard for particulate matter and opacity for the MACT standards for hazardous waste burning cement kilns, we exempt these sources from the New Source Performance Standard to avoid duplicative regulation. See § 63.1204(h).

emissions are comprised largely of entrained raw material and are not significantly affected by burning hazardous waste. Thus, we concur that the standard for particulate matter should be the same for both classes of sources and are therefore adopting the New Source Performance Standard opacity standard for the final rule.[133] In the NPRM and the May 1997 NODA, we proposed to express the particulate matter standard on a concentration basis rather than express it as the same format as the 1971 New Source Performance Standard, which is a production-based emission limit format. However, because we are not yet requiring sources to document compliance with the particulate matter standard by using a particulate matter continuous emissions monitoring system in this final rule [134], we establish and express the floor emission level equivalent to the 1971 New Source Performance Standard. Thus, the particulate matter floor is 0.15 kg/Mg dry feed based on the performance of a well-designed and operated fabric filter or electrostatic precipitator.

Several commenters expressed concern in their comments to the NPRM that the Agency identified separate, different MACT pools and associated MACT controls for particulate matter, semivolatile metals, and low volatile metals, even though all three are controlled, at least in part, by a particulate matter control device. Commenters stated that our approach is likely to result in three different design specifications. We agree with the need to use the same pool for particulate matter, semivolatile metals, and low volatile metals and used the same initial MACT pool to establish the floor levels for these pollutants. See Part Four, Section V for a detailed discussion of our floor methodology.

We estimate that over 60 percent of cement kilns currently meet the floor emission level. The national annualized compliance cost for cement kilns to reduce particulate matter emissions to comply with the floor level is $6.2 million for the entire hazardous waste burning cement industry and will reduce nonenumerated metals and particulate matter emissions by 1.1 Mg/yr and 873 Mg/yr, respectively, or over 30 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the proposal and May 1997 NODA, we considered a beyond-the-floor level of 34 mg/dscm (0.015 gr/dscf) based on improved particulate matter control. However, after examining the costs of such control and the relatively low incremental reductions in air emissions that would result, we determined that a beyond-the-floor standard would not likely be cost-effective. (61 FR at 17393.)

Several commenters support a beyond-the-floor option for particulate matter because some cement kilns are readily achieving particulate matter levels well below the floor emission level based on the New Source Performance Standard. Other commenters oppose a beyond-the-floor option for cement kilns because of the high costs and anticipated poor cost-effectiveness. In the final rule, we evaluated a beyond-the-floor emission level for existing cement kilns to determine if such a level would be appropriate.

Improved particulate matter control for existing cement kilns would require the use of high efficiency electrostatic precipitators and fabric filters. These may include fabric filters with low air-to-cloth ratios, high performance fabrics, electrostatic precipitators with large specific collection areas, and advanced control systems. Currently, the majority of hazardous waste burning cement kilns use electrostatic precipitators for particulate matter control and usually achieve removal efficiencies greater than 99.8%. Cement kilns can meet the MACT floor with well designed and properly operated particulate matter control equipment that for many kilns may require only minor system upgrades from their current systems. A beyond-the-floor standard, however, would likely involve more than a minor system upgrade, and may require new control equipment or retrofitting a baghouse with new higher performance fabric materials. The total annualized costs associated with such major system upgrades would be significant, while only achieving modest incremental emissions reductions in particulate matter and nonenumerated metals.

In the final rule, we considered a beyond-the-floor level of 34 mg/dscm, approximately one-half the New Source Performance Standard, for existing cement kilns based on improved particulate matter control. For analysis purposes, improved particulate matter control entails the use of higher quality fabric filter bag material. We then determined the cost of achieving this level of particulate matter, with corresponding reductions in the nonenumerated metals for which particulate matter is a surrogate, to determine if this beyond-the-floor level would be appropriate. The national incremental annualized compliance cost for cement kilns to meet this beyond-the-floor level, rather than comply with the floor controls, would be approximately $7.4 million for the entire hazardous waste burning cement kiln industry and would provide an incremental reduction in nonenumerated metals emissions nationally beyond the MACT floor controls of 0.7 Mg/yr. Based on these costs of approximately $10.7 million per additional Mg of nonenumerated metals emissions removed, we conclude that this beyond-the-floor option for cement kilns is not acceptably cost-effective nor otherwise justified. Therefore, we do not adopt this beyond-the-floor standard. The promulgated particulate matter standard for existing hazardous waste burning cement kilns is the floor emission level of 0.15 kg/Mg dry feed and opacity not to exceed 20 percent.

c. What Is the MACT Floor for New Sources? In the proposal, we defined floor control based on the performance of a fabric filter with an air-to-cloth ratio of less than 1.8 acfm/ft2. As discussed for existing sources, we proposed the floor level based on the existing cement kiln New Source Performance Standard. 61 FR at 17400. In the May 1997 NODA, we again considered basing the floor emission level on the New Source Performance Standard and solicited comment on the two alternatives to express the standard identical to those discussed above for existing cement kilns. (62 FR at 24228.)

All cement kilns use fabric filters and electrostatic precipitators to control particulate matter. As discussed earlier, we have limited detailed information on the design and operation characteristics of existing control equipment currently used by cement kilns. As a result, we are unable to identify a specific design or technology that can consistently achieve lower emission levels than the controls used by cement kilns achieving the New Source Performance Standard. Cement kilns meet the New Source Performance Standard with well-

[133] We are not adopting the opacity standard component of the New Source Performance Standard for hazardous waste burning lightweight aggregate kilns, however. This is because that opacity standard (see § 60.732) is a measure to ensure compliance with the particulate emissions component of that standard, which is substantially higher than the MACT standard that we promulgate today. Thus, the NSPS opacity standard for lightweight aggregate kilns would not be a useful measure of compliance with today's particulate matter standard for lightweight aggregate kilns.

[134] We anticipate rulemaking on a particulate matter continuous emissions monitoring system requirement for hazardous waste combustors in the near future. Under this rulemaking, combustors would be required to document compliance with national emission standards by complying with continuous emissions monitoring system-based particulate matter levels that are being achieved by sources equipped with MACT controls. See Part Five, Section VII.C. for details.

designed and properly operated fabric filters and electrostatic precipitators. Thus, floor control for new cement kilns is also a well-designed and properly operated fabric filter and electrostatic precipitator. As discussed for existing sources, we conclude that expressing the floor based on the New Source Performance Standards is appropriate for the final rule. Therefore, the MACT floor level for new cement kilns is 0.15 kg/Mg dry feed and opacity not to exceed 20 percent.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 NPRM and May 1997 NODA, we considered a beyond-the-floor standard based on improved particulate matter control to be consistent with existing sources. However, we proposed that such a beyond-the-floor level was not likely cost-effective.

As discussed for existing sources, we considered a beyond-the-floor level of 34 mg/dscm, approximately one-half the New Source Performance Standard, for new cement kilns based on improved particulate matter control. For analysis purposes, improved particulate matter control entails the use of higher quality fabric filter bag material. We then determined the cost of achieving this level of particulate matter, with corresponding reductions in the nonenumerated metals for which particulate matter is a surrogate, to determine if this beyond-the-floor level would be appropriate. The incremental annualized compliance cost for one new large cement kiln to meet this beyond-the-floor level, rather than comply with floor controls, would be approximately $309,000 and would provide an incremental reduction in nonenumerated metals emissions of approximately 0.18 Mg/yr.[135] For a new small cement kiln, the incremental annualized compliance cost would be approximately $120,000 and would provide an incremental reduction in nonenumerated metals emissions of approximately 0.04 Mg/yr. Based on these costs of approximately $1.7–3.0 million per additional Mg of nonenumerated metals removed, we conclude that a beyond-the-floor standard of 0.015 gr/dscf is not justified due to the high cost of compliance and relatively small nonenumerated metals emission reductions. Thus, the particulate matter standard for new cement kilns is the floor level of 0.15 kg/Mg dry feed and opacity not to exceed 20 percent.

5. What Are the Semivolatile Metals Standards?

Today's rule establishes standards for existing and new cement kilns that limit semivolatile metals emissions to 240 and 180 μg/dscm, respectively. The rationale for these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the April 1996 proposal, we defined floor control as a fabric filter with an air-to-cloth ratio less than 2.1 acfm/ft^2 and a hazardous waste feedrate level of 84,000 μg/dscm, expressed as a maximum theoretical emission concentration. The proposed floor emission level was 57 μg/dscm, based on the level a source with properly designed and operated floor technology could achieve. In the proposed rule, we also solicited comment on an alternative floor approach whereby ''equivalent technology'' to MACT control is identified and evaluated. This approach resulted in an emission level of 160 μg/dscm (See 61 FR at 17395.) In the May 1997 NODA, we discussed a floor methodology where we used a breakpoint analysis to identify sources that were not using floor control with respect either to semivolatile metals hazardous waste feedrate or emissions control. Under this approach, we ranked semivolatile metals emissions data from sources that were using MACT floor particulate matter control, i.e., sources achieving the New Source Performance Standard or better. We identified the floor level as the test condition average associated with the breakpoint source. Thus, sources with atypically high emissions because of high semivolatile metals feedrates or poor semivolatile metals control even though they appeared to be using floor control for particulate matter were screened from the pool of sources used to define the floor emission level. Based on this analysis, we identified a floor level in the May 1997 NODA of 670 μg/dscm. (See 62 FR at 24228.)

As discussed previously in the methodology section, we use a revised engineering evaluation and data analysis method to establish the MACT floor for semivolatile metals based on the same underlying data previously noticed for comment. The aggregate feedrate approach, in conjunction with floor control for particulate matter, identified a semivolatile metals floor emission level of 650 μg/dscm.

In addition, several commenters stated strongly that the feedrate of semivolatile metals in hazardous waste cannot be considered MACT floor control in conjunction with particulate matter control. These commenters believe that floor control for semivolatile metals is control of particulate matter only. We disagree with these commenters for reasons we discuss in Part Four, Section V of the preamble, mainly that feedrate is currently control for hazardous waste combustors under RCRA regulations, and conclude that control of the feedrate of semivolatile metals in hazardous waste is floor control, in conjunction with particulate matter control.

We estimate that approximately 60 percent of cement kilns currently meet this floor level. The national annualized compliance cost for cement kilns to reduce semivolatile metal emissions to comply with the floor level is $1.3 million for the entire hazardous waste burning cement industry and will reduce semivolatile metal emissions by 19.5 Mg/yr or 65 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the proposal, we considered a beyond-the-floor standard for semivolatile metals based on improved particulate matter control below the New Source Performance Standard. However, we concluded that a beyond-the-floor standard would not be cost-effective, given that the semivolatile metal floor level of 57 μg/dscm alone resulted in an estimated 94 percent semivolatile metal reduction in emissions. (see 61 FR at 17396.) In the May 1997 NODA, we considered a lower particulate matter emissions level of 0.015 gr/dscf, based on improved particulate matter control, as a beyond-the-floor standard to further reduce semivolatile and low volatile metals. Even though we did not quantify cost-effectiveness values, we expressed concern that a beyond-the-floor standard would not likely be cost-effective. (see 62 FR at 24229.)

Commenters believed there were several control techniques that should be considered, therefore, we identified three potential beyond-the-floor control techniques in developing the final rule: (1) Limiting the feedrate of semivolatile metals in hazardous waste; (2) improved particulate matter control; and (3) limiting the feedrate of semivolatile metals in raw materials. We conclude that a beyond-the-floor standard is warranted based on limiting the feedrate of semivolatile metals in hazardous waste. The results of each analysis are discussed below.

i. Limiting the Feedrate of Semivolatile Metals in Hazardous Waste. Under this approach, we selected a beyond-the-floor emission level of 240

[135] Based on the data available, the average emissions in sum of the five nonenumerated metals from cement kilns using MACT particulate matter control is approximately 80 μg/dscm. To estimate emission reductions of the nonenumerated metals, we assume a linear relationship between a reduction in particulate matter and these metals.

µg/dscm from among the range of possible levels that reflect improved feedrate control. This emission level represents a significant increment of emission reduction from the floor of 650 µg/dscm, it is within the range of levels that are likely to be reasonably achievable using feedrate control, and it is consistent with the incinerator standard thereby advancing a potential policy objective of essentially common standards among combustors of hazardous waste.

The national incremental annualized compliance cost for the remaining cement kilns to meet this beyond-the-floor level, rather than comply with the floor controls, would be approximately $2.7 million for the entire hazardous waste burning cement kiln industry and would provide an incremental reduction, beyond emissions at the MACT floor, in semivolatile metal emissions nationally of 5.5 Mg/yr. The cost-effectiveness of this standard would be approximately $500,000 per additional Mg of semivolatile metals removed. Notwithstanding the relatively poor cost-effectiveness of this standard on a dollar per Mg removed basis, we conclude that additional beyond-the-floor control of the feedrate of semivolatile metals in hazardous waste to achieve an emission level of 240 µg/dscm is warranted because this standard would reduce lead and cadmium emissions which are particularly toxic hazardous air pollutants. See Health Human Effects discussion in USEPA, ''Technical Background Document for HWC MACT Standards: Health and Ecological Risk Assessment'', July 1999. Further, approximately 90% of the lead and cadmium fed to the cement kiln is from the hazardous waste,[136] not the raw material (about 9%) or coal (about 1%). We are willing to accept a more marginal cost-effectiveness to ensure that hazardous waste combustion sources are using the best controls for pollutants introduced almost exclusively for the burning of hazardous waste. We do so to provide a strong incentive for waste minimization of lead and cadmium sent for combustion. By providing stringent limits, we can help assure that hazardous waste with lead does not otherwise move from better controlled units in other subcategories to units in this subcategory because of a lesser degree of control. Moreover, this beyond-the-floor semivolatile metal standard supports our Children's Health Initiative in that lead emissions, which are of highest significance to children's health, will be reduced by another 20–25 percent from today's baseline. As part of this initiative, we are committed to reducing lead emissions wherever and whenever possible. Finally, this beyond-the-floor standard is consistent with European Union standards for hazardous waste incinerators of approximately 200 µg/dscm for lead and cadmium combined. For all these reasons, we accept the cost-effectiveness of this level of feedrate control and adopt a beyond-the-floor standard of 240 µg/dscm for existing cement kilns.

Additionally, we received comments shortly before promulgation from the cement kiln industry that expressed their achievability and economic concerns with a beyond-the-floor standard in the range of 240 µg/dscm based on limiting the feedrate of semivolatile metals in the hazardous waste. We considered their comments in adopting the 240 µg/dscm beyond-the-floor standard and included a copy of their November 18, 1998 presentation to the Office of Management and Budget in the docket along with our responses to their concerns, many of which are addressed above.

ii. Improved Particulate Matter Control. We also evaluated improved particulate matter control as a beyond-the-floor control option for improved semivolatile metals control. Cadmium and lead are volatile at the high temperatures within the cement kiln itself, but typically condense onto the fine particulate at control device temperatures, where they are collected. As a result, control of semivolatile metals emissions is closely associated with particulate matter control. Examples of improved particulate matter control include the use of more expensive fabric filter bags, optimizing the design and operation features of the existing control equipment, and the addition to or the replacement of control equipment with a new fabric filter.

We evaluated the costs to achieve a beyond-the-floor emission level of 240 µg/dscm based on improved particulate matter control. The national incremental annualized compliance cost for cement kilns to meet this beyond-the-floor level, rather the floor level, would be approximately $4.1 million for the entire hazardous waste burning cement kiln industry and would provide an incremental reduction in semivolatile metal emissions beyond the MACT floor controls of 5.5 Mg/yr. Because this beyond-the-floor control option would have a cost-effectiveness of approximately $800,00 per additional Mg of semivolatile metal removed, contrasted to a cost-effectiveness of approximately $500,000 using hazardous waste feedrate control and remove an identical amount of semivolatile metals, we conclude that basing the beyond-the-floor standard on improved particulate matter control is not warranted.

iii. Limiting the Feedrate of Semivolatile Metals in Raw Materials. A source can achieve a reduction in semivolatile metal emissions by substituting a feed material containing lower levels of lead and/or cadmium for a primary raw material with higher levels of these metals. We expect this beyond-the-floor option to be less cost-effective compared to either of the options evaluated above. Cement kilns are sited proximate to primary raw material supply and transporting large quantities of an alternative source of raw material(s) is likely to be cost-prohibitive. Therefore, we are not adopting a semivolatile metal beyond-the-floor standard based on limiting the feedrate of semivolatile metals in raw materials.[137]

Thus, the promulgated semivolatile metals standard for existing hazardous waste burning cement kilns is a beyond-the-floor standard of 240 µg/dscm based on limiting the feedrate of semivolatile metals in the hazardous waste.

c. What Is the MACT Floor for New Sources? In the proposal, we defined floor control as a fabric filter with an air-to-cloth ratio less than 2.1 acfm/ft^2 and a hazardous waste feedrate level of 36,000 µg/dscm, expressed as a maximum theoretical emission concentration. The proposed floor emission level for new cement kilns was 55 µg/dscm. (See 61 FR at 17400.) In the May 1997 NODA, we concluded that the floor control and emission level for existing sources for semivolatile metals also would be appropriate for new sources. Floor control was based on a combination of good particulate matter control *and* limiting hazardous waste feedrate of semivolatile metals. We used a breakpoint analysis of the semivolatile metal emissions data to exclude sources achieving substantially poorer semivolatile metal control than the majority of sources because of atypically high semivolatile metals feedrates or poor emission control. We established the floor level at the test condition average of the breakpoint source: 670 µg/dscm. (See 62 FR at 24229.)

As discussed above for existing sources, we developed the final rule

[136] USEPA, ''Final Technical Support document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies'', July 1999.

[137] We, however, reject the proposition in comments that we are without legal authority to regulate HAPs in raw materials processed in cement kilns based on legislative history to the 1990 amendments. This legislative history is not reflected in the statutory text, which unambiguously gives us that authority.

using the aggregate feedrate approach to identify MACT floors for the metals. See Methodology Section for detailed discussion of aggregate feedrate approach. Using this approach, we establish the semivolatile metal floor emission level for new sources at 180 µg/dscm.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 NPRM and May 1997 NODA, we considered a semivolatile metal beyond-the-floor emission level for new sources, but determined that it would not be cost-effective.

For the final rule, we do not consider a beyond-the-floor level for new cement kilns because the MACT floor for new cement kilns is already lower than the beyond-the-floor emission standard for existing sources. As a result, a beyond-the-floor standard for new cement kilns is not warranted due to the likely significant costs of control and the minimal incremental emissions reductions. In addition, our policy goal of state of the art control of lead is achieved at the floor standard for new sources. We, therefore, adopt a semivolatile metal floor standard of 180 µg/dscm for new hazardous waste burning cement kilns.

6. What Are the Low Volatile Metals Standards?

We establish standards for existing and new cement kilns in today's rule that limit low volatile metal emissions to 56 and 54 µg/dscm, respectively. The rationale for these standards is discussed below.

a. What Is the MACT Floor tor Existing Sources? In the April 1996 NPRM, we defined floor control as either: (1) A fabric filter with an air-to-cloth ratio less than 2.3 acfm/ft^2 and a hazardous waste feedrate level of 140,000 µg/dscm, expressed as a maximum theoretical emission concentration; or (2) an electrostatic precipitator with a specific collection area of 350 ft^2/kacfm and the same hazardous waste feedrate level of 140,000 µg/dscm. The proposed floor level was 130 µg/dscm. (See 61 FR at 17396.) In the May 1997 NODA, we used a breakpoint analysis to identify sources that were not using floor control with respect either to low volatile metals hazardous waste feedrate or emissions control. Under this approach, we ranked low volatile metals emissions data from sources that were achieving the particulate matter floor of 69 mg/dscm or better. We identified the floor level as the test condition average associated with the breakpoint source. Thus, sources with atypically high emissions because of high low volatile metals feedrates or poor low volatile metals control, even though they were using floor control for particulate matter, were screened from the pool of sources used to define the floor emission level. The May 1977 NODA MACT floor level was 63 µg/dscm. (See 62 FR at 24229.)

We received limited comments in response to the NPRM and May 1997 NODA concerning the low volatile metals floor standard. We received comments, however, on several overarching issues including the appropriateness of considering feedrate control of metals including low volatile metals in hazardous waste as a MACT floor control technique and the specific procedure of identifying breakpoints in arrayed emissions data. These issues and our responses to them are discussed in the floor methodology section in Part Four, Section V.

Today we use a revised engineering evaluation and data analysis method to establish the MACT floor for low volatile metals on the same underlying data previously noticed for comment. As explained earlier, the aggregate feedrate approach, in conjunction with floor control for particulate matter, replaces the breakpoint analysis for metals and results in a low volatile metal floor emission level of 56 µg/dscm.

We estimate that over 76 percent of cement kilns in our data base meet the floor level. The national annualized compliance cost for cement kilns to reduce low volatile metal emissions to comply with the floor level is $0.8 million for the entire hazardous waste burning cement industry, and will reduce low volatile metal emissions by 0.2 Mg/yr or approximately 25 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the proposal, we considered a beyond-the-floor standard for low volatile metals based on improved particulate matter control. However, we concluded that a beyond-the-floor standard would not likely be cost-effective based on the limited emissions reductions of low volatility metals. In the May 1997 NODA, we considered a lower particulate matter emissions level, based on improved particulate matter control, as a beyond-the-floor standard with corresponding beyond-the-floor reductions in low volatile and semivolatile metals. Even though we did not quantify cost-effectiveness values, we expressed concern that a beyond-the-floor standard would not likely be cost-effective. (62 FR at 24229.)

For today's final rule, we identified three potential beyond-the-floor techniques for control of low volatile metals: (1) Improved particulate matter control; (2) limiting the feedrate of low volatile metals in the hazardous waste; and (3) limiting the feedrate of low volatile metals in the raw materials. We discuss the results of our analysis of each option below.

Improved Particulate Matter Control. Our judgment is that a beyond-the-floor standard based on improved particulate matter control would be less cost-effective than a beyond-the-floor standard based on limiting the feedrate of low volatile metals in the hazardous waste. First, our data show that all cement kilns are already achieving greater than a 99% system removal efficiency for low volatile metals, with most attaining 99.99% removal. Thus, equipment retrofit costs for improved control would be significant and result in only a small increment in reduction of emissions. Our beyond-the-floor analysis for semivolatile metals supports this conclusion. There, the semivolatile metals analysis showed that the beyond-the-floor option based on limiting the feedrate of semivolatile metals was approximately 30% more cost-effective than a beyond-the-floor option based on improved particulate matter control. We believe the low volatile metals would require similar particulate matter control device retrofits at cement kilns as for semivolatile metals. However, the total emissions reduction achieved would be less because hazardous waste burning cement kilns emit less low volatile metals than semivolatile metals. We do not have any of the serious concerns present for semivolatile metals that suggest we should accept a more marginal cost-effectiveness. Thus, we conclude that a beyond-the-floor standard for low volatile metals based on improved particulate matter control is not warranted.

Limiting the Feedrate of Low Volatile Metals in the Hazardous Waste. We also considered a beyond-the-floor standard of 40 µg/dscm for low volatile metals based on additional feedrate control of low volatile metals in the hazardous waste. This would reduce the floor emission level by approximately 30 percent. Our investigation shows that this beyond-the-floor option would achieve an incremental reduction in low volatile metals of only 0.1 Mg/yr. Given that this beyond-the-floor level would not achieve appreciable emissions reductions, we conclude that cost-effectiveness considerations would likely come into play suggesting that this beyond-the-floor standard is not warranted.

Limiting the Feedrate of Low Volatile Metals in the Raw Materials. Sources can achieve a reduction in low volatile metal emissions by substituting a feed material containing lower levels of arsenic, beryllium, and/or chromium for a primary raw material with higher levels of these metals. We believe that this beyond-the-floor option would be even less cost-effective than either of the options evaluated above, however. Cement kilns are sited proximate to primary raw material supply and transporting large quantities of an alternative source of raw material(s) is likely to be cost-prohibitive. Therefore, we do not adopt a low volatile metal beyond-the-floor standard based on limiting the feedrate of low volatile metals in raw materials.

For the reasons discussed above, we do not adopt a beyond-the-floor level for low volatile metals and establish the emission standard for existing hazardous waste burning cement kilns at 56 µg/dscm.

c. What Is the MACT Floor for New Sources? In the proposal, we defined floor control as a fabric filter with an air-to-cloth ratio less than 2.3 acfm/ft^2 and a hazardous waste feedrate control level of 25,000 µg/dscm, expressed as a maximum theoretical emission concentration. The proposed floor for new cement kilns was 44 µg/dscm. (61 FR at 17400.) In the May 1997 NODA, we concluded that the floor control and emission level for existing sources for low volatile metals would also be appropriate for new sources. Floor control was based on a combination of good particulate matter control and limiting hazardous waste feedrate of low volatile metals. We used a breakpoint analysis of the low volatile metal emissions data to exclude sources achieving substantially poorer low volatile metal control than the majority of sources. We established the floor level at the test condition average of the breakpoint source. The NODA floor was 63 µg/dscm. (62 FR at 24230.)

As discussed above for existing sources, in developing the final rule we use the aggregate feedrate approach to identify MACT floors for the metals and hydrochloric acid/chlorine gas in combination with MACT floor control for particulate matter. Based on the low volatile metal feedrate in hazardous waste from the single best performing cement kiln using floor control for particulate matter, the MACT floor for new hazardous waste burning cement kilns is 54 µg/dscm.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the proposal and May 1997 NODA, we considered a low volatile metal beyond-the-floor level for new sources, but determined it would not be cost effective. For reasons similar to those discussed for existing sources, we do not believe that a beyond-the-floor standard is warranted for new cement kilns due to the high expected compliance cost and relatively low reductions in emissions of low volatile metals. Therefore, we adopt a low volatile metals standard of 54 µg/dscm for new hazardous waste burning cement kilns.

7. What Are the Hydrochloric Acid and Chlorine Gas Standards?

In today's rule, we establish standards for existing and new cement kilns that limit hydrochloric acid and chlorine gas emissions to 130 and 86 ppmv, respectively. The rationale for these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the proposal, we identified floor control for hydrochloric acid/chlorine gas as feedrate control of chlorine in the hazardous waste and proposed a floor standard of 630 ppmv. (61 FR at 17396.) In the May 1997 NODA, we used a data analysis method similar to that at proposal and discussed a floor emission level of 120 ppmv. (62 FR at 24230.)

Some commenters to the May 1997 NODA expressed concern that cement kilns may not be able to meet the hydrochloric acid/chlorine gas standard while making low alkali cement. Commenters noted that chlorine is sometimes added specifically to volatilize potassium and sodium compounds that must be removed to produce low alkali cement. One commenter manufacturing a low alkali cement submitted data showing a large range in hydrochloric acid/chlorine gas emissions while operating under varying conditions and production requirements. This commenter stated that they may not be able to meet the NODA hydrochloric acid/chlorine gas standard of 120 ppmv while making low alkali cement. We conclude, however, that the data they submitted do not adequately support this ultimate conclusion. The commenter's emissions data range from 6 ppmv to 83 ppmv while operating under RCRA compliance testing conditions. These emission levels are well below the final standard of 130 ppmv, and the expected operational range in this rule is 70% of the standard. We conclude that the hydrochloric acid/chlorine gas standard of 130 ppmv finalized today is readily achievable by all cement kilns irrespective of the type of cement manufactured.

For today's rule, we use a revised engineering evaluation and data analysis method to establish the MACT floor for hydrochloric acid and chlorine gas on the same underlying data previously noticed for comment. Using the aggregate feedrate approach discussed previously, we establish a hydrochloric acid/chlorine gas floor emission level of 130 ppmv.

We estimate that approximately 88 percent of cement kilns in our data base currently meet the floor level. The national annualized compliance cost for cement kilns to reduce hydrochloric acid/chlorine gas emissions to comply with the floor level is $1.4 million for the entire hazardous waste burning cement industry and will reduce hydrochloric acid/chlorine gas emissions by 383 Mg/yr or 12 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the proposal, we defined beyond-the-floor control as wet scrubbing with a 99 percent removal efficiency, but determined that a beyond-the-floor standard would not be cost-effective. (61 FR at 17397.) In the May 1997 NODA, we identified a more stringent floor standard and therefore reasoned that a beyond-the-floor standard based on wet scrubbing would likely also not be cost-effective. (62 FR at 24230.)

For today's rule, we identified three potential beyond-the-floor techniques for control of hydrochloric acid/chlorine gas emissions: (1) Scrubbing; (2) limiting the feedrate of chlorine in the hazardous waste; and (3) limiting the feedrate of chlorine in the raw materials. We discuss our analysis of each option below.

Scrubbing. We continue to believe that a beyond-the-floor standard based on dry or wet scrubbing is not likely to be cost-effective. Cement kilns achieve control of hydrochloric acid/chlorine gas emissions from alkaline raw materials in the kiln. Control effectiveness varies among kilns based on the alkalinity of the raw materials. Thus, the cement manufacturing process serves essentially as a dry scrubber. We conclude, therefore, that the addition of a dry scrubber will only marginally improve hydrochloric acid/chlorine gas removal and is not warranted as beyond-the-floor control.

It is also our judgment that a beyond-the-floor standard based on wet scrubbing is not warranted. The total estimated engineering retrofit costs would be approximately equivalent to those identified at proposal for this option. However, emissions reductions would be less given that the final MACT floor level is more stringent than the level proposed. Therefore, the cost-effectiveness of a beyond-the-floor standard would be less attractive than the number we rejected at proposal. As a result, we must reaffirm that conclusion here.

Limiting the Feedrate of Chlorine in the Hazardous Waste. We also considered a beyond-the-floor standard for hydrochloric acid/chlorine gas based on additional feedrate control of chlorine in the hazardous waste. We are concerned, however, that cement kilns making low alkali cement may not be able to achieve a beyond-the-floor standard by controlling feedrate of chlorine in the hazardous waste. As noted above, chlorine is sometimes added specifically to volatilize potassium and sodium compounds that must be removed from the clinker to produce low alkali cement. Based on limited data submitted by a cement facility manufacturing low alkali cement, achievability of a beyond-the-floor standard of 70 ppmv, representing a 45% reduction from the floor level, may not be feasible for this source using feedrate control and others by inference. Therefore, we conclude that a beyond-the-floor standard based on chlorine feedrate control in the hazardous waste is not appropriate.

Limiting the Feedrate of Chlorine in the Raw Materials. A source can achieve a reduction in hydrochloric acid/chlorine gas emissions by substituting a feed material containing lower levels of chlorine for a primary raw material with higher levels of chlorine. This beyond-the-floor option is less cost-effective compared to the scrubbing options evaluated above because cement kilns are sited proximate to the primary raw material supply and transporting large quantities of an alternative source of raw material(s) is not technically achievable. Therefore, we do not adopt a hydrochloric acid/chlorine gas beyond-the-floor standard based on limiting the feedrate of chlorine in raw materials.

In summary, we establish the hydrochloric acid/chlorine gas standard for existing hazardous waste burning cement kilns at the floor level of 130 ppmv.

c. What Is the MACT Floor for New Sources? At proposal, we defined floor control for new sources as hazardous waste feedrate control for chlorine and the proposed floor level was 630 ppmv. (See 61 FR at 17401.) In the May 1997 NODA, we concluded that the floor control and emission level for existing sources for hydrochloric acid/chlorine gas would also be appropriate for new sources. Floor control was based on limiting hazardous waste feedrates of chlorine. After screening out some data with anomalous system removal efficiencies compared to the majority of sources, we established the floor level at the test condition average of the breakpoint source. We identified a floor level for new kilns of 120 ppmv. (See 62 FR at 24230.)

As discussed above for existing sources, in developing the final rule, we use the aggregate feedrate approach to identify MACT floors for hydrochloric acid/chlorine gas. The resulting MACT emissions floor for new hazardous waste burning cement kilns is 86 ppmv.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the proposal, we considered a beyond-the-floor standard for new cement kilns of 67 ppmv based on wet scrubbing and concluded that it would not be cost-effective. In the May 1997 NODA, we also concluded that a beyond-the-floor standard based on wet scrubbing would likewise not be cost-effective. Considering the level of the floor standard for new kilns, we do not believe that a more stringent beyond-the-floor standard is warranted for the final rule, especially considering our concerns for cement kilns manufacturing low alkali cements.

In summary, we adopt the floor level of 86 ppmv as the standard for hydrochloric acid/chlorine gas for new sources.

8. What Are the Hydrocarbon and Carbon Monoxide Standards for Kilns Without By-Pass Sampling Systems? [138]

See § 63.1205(a)(5) and (b)(5).

In today's rule, we establish hydrocarbon and carbon monoxide standards for new and existing cement kilns without by-pass sampling systems as surrogates to control emissions of nondioxin organic hazardous air pollutants. The standards for existing sources limit hydrocarbon or carbon monoxide concentrations to 20 ppmv [139] or 100 ppmv, [140] respectively. The standards for new sources limit: (1) Hydrocarbons to 20 ppmv; or (2) carbon monoxide to 100. New, greenfield [141] kilns that elect to comply with the 100 ppmv carbon monoxide standard, however, must also comply with a 50 ppmv [142] hydrocarbon standard. New and existing sources that elect to comply with the 100 ppmv carbon monoxide standard, including new greenfield kilns that elect to comply with the carbon monoxide standard and 50 ppmv hydrocarbon standard, must also demonstrate compliance with the 20 ppmv hydrocarbon standard during the comprehensive performance test.[143] (See Part Four, Section IV.B of the preamble for the rationale for this requirement.) We discuss the rationale for these standards below.

a. What Is the MACT Floor for Existing Sources? As discussed in Part Four, Section II.B.2, we proposed limits on hydrocarbon emissions for kilns without by-pass sampling systems as a surrogate to control nondioxin organic hazardous air pollutants. In the April 1996 proposal (61 FR at 17397), we identified a hydrocarbon floor emission level of 20 ppmv for cement kilns not equipped with by-pass sampling systems, and proposed that floor control be based on the current federally-enforceable RCRA boiler and industrial furnace standards, control of organics in raw materials coupled with operating under good combustion practices to minimize fuel-related hydrocarbon. In the May 1997 NODA, we also indicated that this approach was appropriate.

Some commenters stated that a carbon monoxide limit of 100 ppmv was necessary for these cement kilns to better control organic hazardous air pollutants. Commenters also wrote that, alone, neither carbon monoxide nor hydrocarbons is an acceptable surrogate for organic hazardous air pollutant emissions. Additionally, commenters suggested that by requiring both carbon monoxide and hydrocarbon limits, we would further reduce emissions of organic hazardous air pollutants.

We conclude that continuous compliance with both a carbon monoxide and hydrocarbon standard is unwarranted for the following reasons. First, stack gas carbon monoxide levels are not a universally reliable indicator

[138] See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume I: Description of Source Categories,'' July 1999, for further explanation of by-pass and midkiln sampling systems. Hydrocarbon and carbon monoxide standards for kilns equipped with by-pass sampling systems are discussed in Section VI.D.9 f the text.

[139] Hourly rolling average, reported as propane, dry basis, and corrected to 7% oxygen.

[140] Hourly rolling average, dry basis, corrected to 7% oxygen.

[141] A greenfield cement kiln is a kiln that commenced construction or reconstruction after April 19, 1996 at a site where no cement kiln previously existed, irrespective of the class of kiln (i.e., nonhazardous waste or hazardous waste burning). A newly constructed or reconstructed cement kiln at an existing site would not be classified as a greenfield cement kiln, and would be subject to the same carbon monoxide and hydrocarbon standards as an existing cement kiln.

[142] Thirty day block average, reported as propane, dry basis, and corrected to 7 percent oxygen.

[143] As discussed in Part 5, Section X.F, sources that feed hazardous waste at a location other than the end where products are normally discharged and where fuels are normally fired must comply with the 20 ppmv hydrocarbon standard i.e., these sources do not have the option to comply with the carbon monoxide standard).

of combustion intensity and efficiency for kilns without by-pass sampling systems. This is due to carbon monoxide generation by disassociation of carbon dioxide to carbon monoxide at the high sintering zone temperatures and evolution of carbon monoxide from the trace organic constituents in raw material feedstock.[144] (See 56 FR at 7150, 7153–55). Thus, carbon monoxide can be a too conservative surrogate for this type of kiln for potential emissions of hazardous air pollutants from combustion of hazardous waste. There are other sources of carbon monoxide unrelated to combustion of hazardous waste.[145]

Second, requiring continuous compliance with both a carbon monoxide and hydrocarbon emission limitation in the stack can be redundant for control of organic emissions from combustion of hazardous waste because: (1) Hydrocarbon alone is a direct and reliable surrogate for organic hazardous air pollutants; and (2) in most cases carbon monoxide is a conservative indicator of good combustion conditions and thus good control of organic hazardous air pollutants. As discussed in the following paragraphs, however, we have concluded that a source must demonstrate compliance with the hydrocarbon standard during the comprehensive performance test if it elects to continuously comply with the carbon monoxide standard to ensure that carbon monoxide is an adequate continuously monitored indicator of combustion efficiency. See Part Four, Section IV of the preamble for a discussion of the merits of using limits on stack gas concentrations of carbon monoxide and hydrocarbon to control organic emissions.

One commenter suggested cement kilns be given the option to comply with a carbon monoxide limit of 100 ppmv instead of the 20 ppmv hydrocarbon limit. The commenter emphasized that this option is currently allowed under the RCRA boiler and industrial furnace regulations, and that it would be conservative because hydrocarbon levels would always be below 20 ppmv when carbon monoxide levels are below 100 ppmv. As discussed below, we agree that cement kilns should be given the option to comply with either standard, but do not agree that compliance with the carbon monoxide standard ensures compliance with the hydrocarbon standard.

We have determined that it is necessary to require a source that elects to continuously comply with the carbon monoxide standard to also demonstrate compliance with the 20 ppmv hydrocarbon standard during the comprehensive performance test. We concluded that this requirement is necessary because we have limited data that shows a source can produce high hydrocarbon emissions while simultaneously producing low carbon monoxide emissions. This requirement to demonstrate compliance with the hydrocarbon standard during the performance test is sufficient to ensure that carbon monoxide alone is an appropriate continuously monitored indicator of combustion efficiency. See Part 4, Section IV.B, for a more detailed discussion. Consistent with this principle, incinerators and lightweight aggregate kilns are also required to demonstrate compliance with hydrocarbon standard during the comprehensive performance test if they elect to comply with the carbon monoxide standard.

In today's final rule, we are identifying a carbon monoxide level of 100 ppmv and a hydrocarbon level of 20 ppmv as floor control for existing sources because they are currently enforceable Federal standards for hazardous waste burning cement kilns. See § 266.104(b) and (c). As current rules allow, sources would have the option of complying with either limit. However, sources that elect to comply with the carbon monoxide standard must also demonstrate compliance with the hydrocarbon standard during the comprehensive performance test.

Given that these are current RCRA rules, all cement kilns without by-pass sampling systems can currently achieve these emission levels. Thus, we estimate no emissions reductions (or new costs) for compliance with these floor levels.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 proposal, we identified beyond-the-floor control levels for carbon monoxide and hydrocarbon in the main stack of 50 ppmv and 6 ppmv, respectively. (See 61 FR at 17397.) These beyond-the-floor levels were based on the use of a combustion gas afterburner. We indicated in the proposal, however, that the beyond-the-floor control was not practical since no kilns currently achieved these emission levels, and because of the high costs to retrofit a kiln with an afterburner.

One commenter wrote that we rejected the 50 ppmv and 6 ppmv beyond-the-floor carbon monoxide and hydrocarbon standards, respectively, without providing any justification. In order to confirm the reasoning discussed above, we have now estimated that the annualized cost for an afterburner for cement kilns will range from $3–8 million dollars per facility.[146] As proposed, and as we reiterated in the May 1997 NODA a beyond-the-floor standard based on an afterburner would be not be cost-effective due to the high retrofit costs and minimal incremental emissions reductions, and we do not adopt a beyond-the-floor standard for existing cement kilns.

In summary, we adopt the floor emission levels as standards for carbon monoxide, 100 ppmv, and hydrocarbons, 20 ppmv.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal (see 61 FR at 17401) and the May 1997 NODA, we identified a new source hydrocarbon floor emission level of 20 ppmv for new cement kilns not equipped with by-pass sampling systems based on the current Federally-enforceable BIF standards. The hydrocarbon limit is based on control of organics in raw materials coupled with good combustion practices.

In developing the final rule, we considered the comment discussed above that the rule should allow compliance with either a carbon monoxide standard of 100 ppmv or a hydrocarbon standard of 20 ppmv. Given that this option is available under the current BIF rule for new and existing sources, we now conclude that it represents MACT floor for new sources, except as discussed below.

As discussed previously, we have also proposed MACT standards for nonhazardous waste burning cement kilns. See 63 FR 14182, March 24, 1998. In that proposal, we determined that some existing sources have used the combination of feed material selection, site location, and feed material blending to optimize operations. We then concluded that site selection based on availability of acceptable raw material hydrocarbon content is a feasible approach to control hydrocarbon emissions at new sources. See 63 FR at 14202–03. We proposed a new source

[144] Raw materials enter the upper end of the kiln and move counter-current to the combustion gas. Thus, as the raw materials are heated in the kiln, organic compounds can evolve from trace levels of organics in the raw materials. These organic compounds can be measured as hydrocarbons and, when only partially oxidized, carbon monoxide. This process is not related to combustion of hazardous waste or other fuels in the combustion zone at the other end of the kiln.

[145] Of course, if a source elects to comply with the carbon monoxide standard, then we are more assured of good combustion conditions in the combustion zone, and thus good control of organic hazardous air pollutants that could be potentially emitted from feeding hazardous waste in the combustion zone.

[146] See 'Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume V: Emission Estimates and Engineering Costs'', February, 1999.

floor hydrocarbon emission level of 50 ppmv at nonhazardous waste burning Portland cement kilns because it is being consistently achieved during thirty-day block averaging periods when high hydrocarbon content raw materials are avoided. We have since promulgated a standard of 50 ppmv for hydrocarbons for new nonhazardous waste burning cement kilns. 64 FR 31898.

We now conclude for the same reasons that site selection is floor control for new source, greenfield hazardous waste burning cement kilns [147] and that the floor hydrocarbon emission level is 50 ppmv.[148] Sources must document compliance with this standard for each thirty-day block period of operation. We reconcile this hydrocarbon floor level of 50 ppmv with the floor levels discussed above of 20 ppmv hydrocarbons or 100 ppmv carbon monoxide by establishing the floor as follows. For new source greenfield kilns, the floor is either: (1) 20 ppmv hydrocarbons; or (2) 100 ppmv carbon monoxide and 50 ppmv hydrocarbons. For other new sources not located at greenfield sites, the floor is either 20 ppmv hydrocarbons or 100 ppmv carbon monoxide, which is identical to the standards for existing sources.

The combined 20 ppmv hydrocarbon and 100 ppmv carbon monoxide standards control organic hazardous air pollutant emissions that originate from the incomplete combustion of hazardous waste. The 50 ppmv hydrocarbon standard for new greenfield kilns controls organic hazardous air pollutant emissions that originate from the raw material. We conclude that the 50 ppmv hydrocarbon standard is necessary to deter new kilns from siting at locations that have on-site raw material that is high in organic content, since siting a cement kiln at such a location could result in elevated hydrocarbon emissions.

We considered whether new greenfield kilns would be required to monitor hydrocarbons continuously, or just document compliance with the 50 ppmv limit during the comprehensive performance test. We determined that hydrocarbons must be continuously monitored because compliance with the 100 ppmv carbon monoxide limit may not always ensure compliance with the 50 ppmv hydrocarbon limit. This is because hydrocarbons could potentially evolve from raw materials in the upper drying zone end of the kiln under conditions that inhibit sufficient oxidation of the hydrocarbons to form carbon monoxide.

As with existing sources, we are requiring new sources that elect to continuously comply with the carbon monoxide standard, and new greenfield sources that elect to comply with the carbon monoxide and 50 ppmv hydrocarbon standard, to also demonstrate compliance with the 20 ppmv hydrocarbon standard during the comprehensive performance test. Consistent with this principle, incinerators and lightweight aggregate kilns are also required to demonstrate compliance with the hydrocarbon standard during the comprehensive performance test if they elect to comply with the carbon monoxide standard.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 proposal, we identified beyond-the-floor emission levels for carbon monoxide and hydrocarbon of 50 ppmv and 6 ppmv, respectively, for new sources. (See 61 FR at 17401.) These beyond-the-floor levels were based on the use of a combustion gas afterburner. We indicated in the proposal, however, that beyond-the-floor control was not practical since none of the kilns in our data base are achieving these emission levels, and because of the high costs to retrofit kilns with an afterburner. We reiterated in the May 1997 NODA that a beyond-the-floor standard based on use of an afterburner would not be cost-effective.

One commenter supported these beyond-the-floor standards for new sources, but did not explain why these were considered to be appropriate standards. As discussed above for existing sources, we continue to believe that a beyond-the-floor standard based on use of an afterburner would not be cost-effective.

In summary, we adopt the floor levels as standards for new sources. For new source greenfield kilns, the standard monitored continuously is either: (1) 20 ppmv hydrocarbons; or (2) 100 ppmv carbon monoxide and 50 ppmv hydrocarbons. For other new source kilns, the standard is either 20 ppmv hydrocarbons or 100 ppmv carbon monoxide monitored continuously. New sources that elect to comply with the carbon monoxide standard, and new greenfield sources that elect to comply with the carbon monoxide and 50 ppmv hydrocarbon standard, must also demonstrate compliance with the 20 ppmv hydrocarbon standard, but only during the comprehensive performance test.

9. What Are the Carbon Monoxide and Hydrocarbon Standards for Kilns With By-Pass Sampling Systems? [149]

See § 63.1204(a)(5) and (b)(5).

We establish carbon monoxide and hydrocarbon standards for existing and new cement kilns with by-pass sampling systems as surrogates to control emissions of nondioxin organic hazardous air pollutants.[150] Existing kilns are required to comply with either a carbon monoxide standard of 100 ppmv or a hydrocarbon standard of 10 ppmv on an hourly rolling average basis. Both standards apply to combustion gas sampled in the by-pass or a midkiln sampling port that samples representative kiln gas. Sources that elect to comply with the carbon monoxide standard, however, must also document compliance with the hydrocarbon standard during the comprehensive performance test.[151] See Part Four, Section IV.B of the preamble for the rationale for this requirement.

New kilns are subject to the same by-pass gas carbon monoxide and hydrocarbon standards as existing sources. But, new, greenfield [152] kilns must also comply with a 50 ppmv hydrocarbon standard continuously monitored in the main stack. Sources must document compliance with this standard for each thirty-day block period of operation.

We discuss the rationale for adopting these standards below.

[147] At least one hazardous waste burning cement kiln in our data base used raw material substitution to control hydrocarbon emissions.

[148] We concluded that this new source hydrocarbon standard of 50 ppms should not apply to new sources that are not located at greenfield sites since these kilns are not capable of using site-selection to control hydrocarbon emissions.

[149] This also includes cement kilns which have midkiln sampling systems. See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume I: Description of Source Categories,'' July 1999, for further explanation of by-pass and midkiln sampling systems.

[150] As discussed in Part 5, Section X.F, cement kilns equipped with bypass sampling systems that feed hazardous waste at a location other than the end where products are normally discharged and at a location downstream of the bypass sampling location (relative to the combustion gas flow direction) must comply with the 20 ppmv main stack hydrocarbon standard discussed in the previous section in lieu of the bypass gas hydrocarbon standard.

[151] As discussed in Part 5, Section X.F, cement kilns that feed hazardous waste at a location other than the end where products are normally discharged and where fuels are normally fired must comply wit the 10 ppmv hydrocarbon standard (i.e., these sources do not have the option to comply with the carbon monoxide standard).

[152] A greenfield cement kiln is a kiln that commenced construction or reconstruction after April 19, 1996 at a site where no cement kiln previously existed, irrespective of the class of kiln (i.e., nonhazardous waste or hazardous waste burning). A newly constructed or reconstructed cement kiln at an existing site would not be classified as a greenfield cement kiln, and would be subject to the same carbon monoxide and hydrocarbon standards as an existing cement kiln.

a. What Is the MACT Floor for Existing Sources? In the April 1996 proposal, we identified floor carbon monoxide and hydrocarbon emission standards for by-pass gas of 100 ppmv and 6.7 ppmv, respectively. Floor control was good combustion practices. (See 61 FR at 17397.) In the May 1997 NODA, we used an alternative data analysis method to identify a hydrocarbon floor level of 10 ppmv.[153] See 62 FR at 24230. Our decision to use engineering information and principles to set the proposed floor standard was based, in part, on the limited hydrocarbon data in our data base. In addition, we reasoned that the hydrocarbon levels being achieved in an incinerator, (*i.e.*, 10 ppmv) are also being achieved in a cement kiln's by-pass duct.[154]

Some commenters stated that we did not have sufficient hydrocarbon emissions data from cement kilns equipped with by-pass sampling systems to justify a by-pass duct hydrocarbon standard. We disagree and conclude that we have adequate data because the MACT data base includes seven cement kilns that monitored hydrocarbons at the bypass sampling location. These sources are achieving hydrocarbon levels of 10 ppmv or less.[155] The fact that these sources achieve hydrocarbon levels below 10 ppmv supports our use of engineering information and principles to set the floor limit at 10 ppmv.[156]

Many commenters questioned whether cement kilns with by-pass sampling systems should comply with both a hydrocarbon and carbon monoxide standard. Those in favor of requiring cement kilns to comply with both standards wrote that neither carbon monoxide nor hydrocarbons are sufficient surrogates for organic hazardous air pollutant emissions. Commenters also noted that by requiring both a carbon monoxide and hydrocarbon limit, we would achieve appropriate organic hazardous air pollutant emission reductions. Other commenters wrote that continuous compliance with both a hydrocarbon and a carbon monoxide standard would be redundant and unnecessarily costly. We agree with the latter view, in that requiring continuous compliance with both standards for bypass gas is redundant for control of organic emissions from combustion of hazardous waste because, as previously discussed: (1) Hydrocarbon alone is a direct and reliable surrogate for organic hazardous air pollutants; and (2) in most cases, carbon monoxide is a conservative indicator of good combustion conditions and thus good control of organic hazardous air pollutants. However, as discussed earlier, we have concluded that a source must demonstrate compliance with the hydrocarbon standard during the comprehensive performance test if it elects to continuously comply with the carbon monoxide standard to ensure that carbon monoxide is an adequate continuously monitored indicator of combustion efficiency. See discussion in Part Four, Section IV.B of the preamble for more discussion on this issue.

One commenter stated that due to some by-pass gas quenching methods, and the need to correct for moisture and oxygen, it may not be possible to accurately measure hydrocarbons to the level of the proposed standard, i.e., 6.7 ppmv. We disagree with this reasoning because, as explained in the technical support document, cement kiln by-pass hydrocarbon levels should be reasonably achievable and measurable by decreasing the span and increasing the calibration frequency of the hydrocarbon monitor.[157] We also note that a cement kiln has the option to petition the Administrator for alternative monitoring approaches under § 63.8(f) if the source has valid reasons why a total hydrocarbon monitor cannot be used to document compliance.

We conclude that floor control can achieve by-pass gas emission levels of 100 ppmv for carbon monoxide and 10 ppmv for hydrocarbons. As discussed in Part Four, Section IV.B, a source may comply with either standard. If the source elects to comply with the carbon monoxide standard, however, it must also demonstrate compliance with the hydrocarbon standard during comprehensive performance testing.

We estimate that all cement kilns with by-pass sampling systems can currently achieve the carbon monoxide floor of 100 ppmv. We also estimate that approximately 97 percent of cement kilns with by-pass sampling systems meet the hydrocarbon floor level of 10 ppmv. The national annualized compliance cost for cement kilns to comply with the floor level is $37K and hydrocarbon emissions will be reduced by 11 Mg/yr, two percent from current baseline emissions .

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 proposal, we identified a beyond-the-floor control level for carbon monoxide and hydrocarbons in the main stack of 50 ppmv and 6 ppmv, respectively, based on the use of a combustion gas afterburner. (See 61 FR at 17399.) We indicated in the proposal that this beyond-the-floor level was not practical, however, since none of the kilns currently achieve these emission levels and because of the high costs of retrofitting kilns with an afterburner. We estimate that the annualized cost for each cement kiln to operate afterburners range from three to eight million dollars.[158] We continue to believe that it is not cost-effective based on the high retrofit costs and minimal incremental emissions reductions to adopt these beyond-the-floor standards.

In the April 1996 NPRM, we also considered limiting main stack hydrocarbon emissions to a beyond-the-floor level of 20 ppmv based on the use of a low-organic raw material.[159] This was in addition to floor controls limiting carbon monoxide and/or hydrocarbon levels in the by-pass. See 61 FR at 17398. We considered this beyond-the-floor option to address concerns that: (1) organics desorbed from raw materials may contain hazardous air pollutants, even absent any influence from burning hazardous waste; and, (2) it is reasonable to hypothesize that the chlorine released from burning hazardous waste can react with the organics desorbed from the raw material to form generally more toxic chlorinated hazardous air pollutants. Many commenters supported this approach. For the reasons discussed below, however, we conclude it is not appropriate to adopt this beyond-the-

[153] The proposed hydrocarbon standard of 6.7 ppmv was based on a statistical and breakpoint analysis. Today's final rule, consistent with May 1997 NODA, instead uses engineering information and principles to identify the floor hydrocarbon level of 10 ppmv.

[154] See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' February, 1999.

[155] Four of these kilns have ceased hazardous waste operations, and one of the kilns collected that data during time periods other than Certification of Compliance testing.

[156] We note that we could have elected to establish this 10 ppmv hydrocarbon standard as a beyond-the-floor standard rather than a floor standard.

[157] See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' February, 1999.

[158] See ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume V: Emission Estimates and Engineering Costs'', February, 1999.

[159] The definition of floor control for existing cement kilns equipped with by-pass sampling systems does not include the use of low organic raw material. Although we have limited data indicating that some kilns used low organic raw material to control hydrocarbon emissions, there are enough facilities using this method of control to establish it as a floor control for existing sources.

floor hydrocarbon standard for existing sources.

Also, many commenters stated that we should establish a main stack hydrocarbon standard because, as stated above, hazardous waste combustion byproducts from cement kilns, particularly chlorine, can react with organic compounds desorbed from raw materials to form hazardous air pollutants. Commenters believe that an additional main stack hydrocarbon emission standard would limit the emissions of chlorinated organic hazardous air pollutants that are generated due to the interaction of the hazardous waste combustion byproducts and the organics desorbed from the raw material.

We disagree that a main stack hydrocarbon emission limit is an appropriate beyond-the-floor control for existing sources. First, we do not believe it is cost-effective to require an existing kiln to substitute its raw material with an off-site raw material.[160] Cement kilns are sited proximate to the primary raw material supply and transporting large quantities of an alternative source of raw material(s) is likely to be very costly. Second, establishing a main stack hydrocarbon limit for existing sources is likely to be counter-productive in controlling organic hazardous air pollutants. It may compel the operator to avoid the unacceptable costs of importing low organic raw material by increasing back-end kiln temperatures to oxidize organics desorbed from raw material, thus lowering hydrocarbon levels. This increase in temperature may result in increased dioxin formation and is counter to our dioxin control strategy. Third, it is debatable whether there is a strong relationship between chlorine feedrates and chlorinated organic hazardous air pollutant emissions, as is suggested by commenters.[161] Finally, we anticipate that any potential risks associated with the possible formation of these chlorinated hazardous air pollutants at high hydrocarbon emission levels can be adequately addressed in a site-specific risk assessment conducted as part of the RCRA permitting process. This increased potential for emissions of chlorinated hazardous air pollutants is not likely to warrant evaluation via a site-specific risk assessment under RCRA, however, unless main stack hydrocarbon levels are substantially higher than the 20 ppmv limit currently applicable under RCRA for cement kilns not equipped with by-pass systems.

In summary, we adopt the floor levels as standards for carbon monoxide, 100 ppmv, and hydrocarbons, 10 ppmv. As discussed above, a source may comply with either standard. If the source elects to comply with the carbon monoxide standard, however, it must also demonstrate compliance with the hydrocarbon standard during comprehensive performance testing.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, we identified new source floor standards for carbon monoxide and hydrocarbon emissions in the by-pass of 100 ppmv and 6.7 ppmv, respectively. We identified good combustion practices as floor control. (See 61 FR at 17401.) In the May 1997 NODA, we used an alternative data analyses method, in part, to identify an alternative new source hydrocarbon floor level. (See 62 FR at 24230.) As a result of this analysis and the use of engineering information and principles, we identified a floor hydrocarbon emission level of 10 ppmv in the by-pass for new cement kilns. We continue to believe that the new source hydrocarbon floor methodology discussed in the May 1997 NODA, and the new source carbon monoxide floor methodology discussed in the April 1996 proposal, are appropriate. Therefore, we adopt these floor emission levels for by-pass gas in today's final rule.

We also establish a 50 ppmv hydrocarbon floor level for the main stack of new greenfield kilns. As discussed above (Part Four, Section VII.8.c), we concluded during development of the final rule that some cement kilns are currently controlling their feed material selection, site location, and feed material blending to optimize operations. Because these controls can be used to control hydrocarbon content of the raw material and, thus, hydrocarbon emissions in the main stack, they represent floor control for main stack hydrocarbons for new sources.[162] We established a floor hydrocarbon emission level of 50 ppmv because it is being consistently achieved during thirty-day block averaging periods when high hydrocarbon content raw materials are avoided.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 proposal, we identified main stack beyond-the-floor emission levels for carbon monoxide and hydrocarbon of 50 ppmv and 6 ppmv, respectively, for new sources. (See 61 FR at 17401.) These beyond-the-floor levels were based on the use of a combustion gas afterburner. We indicated in the proposal, however, that beyond-the-floor control was not practical since none of the kilns in our data base are achieving these emission levels, and because of the high costs to retrofit kilns with an afterburner. We reiterated in the May 1997 NODA, that a beyond-the-floor standard based on use of an afterburner would not be cost-effective.

One commenter wrote that we rejected these beyond-the-floor carbon monoxide and hydrocarbon standards without providing any justification. Another commenter supported these beyond-the-floor standards for new sources. As discussed above (in greater detail) for existing sources, we continue to believe that a beyond-the-floor standard based on use of an afterburner would not be cost-effective.

In the April 1996 proposal, we considered limiting main stack hydrocarbon emissions at new sources equipped with by-pass sampling systems to a beyond-the-floor level of 20 ppmv.[163] This addressed concerns that: (1) Organics desorbed from raw materials contain hazardous air pollutants, even absent any influence from burning hazardous waste; and (2) it is reasonable to hypothesize that the chlorine released from burning hazardous waste can react with the organics desorbed from the raw material to form generally more toxic chlorinated hazardous air pollutants. Although not explicitly stated, beyond-the-floor control would have been control of feed material selection, site location, and feed material blending to control the hydrocarbon content of the raw material and, thus, hydrocarbon emissions in the main stack. As discussed above, however, we adopt today a main stack hydrocarbon floor standard of 50 ppmv for newly constructed greenfield cement kilns equipped with by-pass systems. We are not adopting a main stack beyond-the floor hydrocarbon standard of 20 ppmv for these kilns because we

[160] We did not quantify actual costs associated with raw material substitution due to the lack of information.

[161] It is true that some studies have shown a relationship between chlorine levels in the flue gas and the generation of chlorobenzene in cement kiln emissions: the more chlorine, the more chlorobenzene is generated. Some full-scale tests, however, have shown that there is no observable or consistent trend when comparing ''baseline'' (*i.e.,* nonhazardous waste operation) organic hazardous air pollutant emissions with organic hazardous air pollutant emissions associated with hazardous waste operations, as well as comparing hazardous waste conditions with varying levels of chlorine. See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' July 1999, for further discussion.

[162] At least one hazardous waste burning cement kiln in our data base used raw material substitution to control hydrocarbon emissions.

[163] This was in addition to limiting hydrocarbon and/or carbon monoxide at the by-pass sampling location.

are concerned that it may not be readily achievable using beyond-the-floor control.

In summary, we establish the following standards for new sources based on floor control: (1) By-pass gas emission standards for carbon monoxide and hydrocarbons of 100 ppmv and 10 ppmv, respectively;[164] and (2) a main stack hydrocarbon standard of 50 ppmv at greenfield sites.

10. What Are the Destruction and Removal Efficiency Standards?

We establish a destruction and removal efficiency (DRE) standard for existing and new cement kilns to control emissions of organic hazardous air pollutants other than dioxins and furans. Dioxins and furans are controlled by separate emission standards. See discussion in Part Four, Section IV.A. The DRE standard is necessary, as previously discussed, to complement the carbon monoxide and hydrocarbon emission standards, which also control these hazardous air pollutants.

The standard requires 99.99 percent DRE for each principal organic hazardous constituent (POHC), except that 99.9999 percent DRE is required if specified dioxin-listed hazardous wastes are burned. These wastes are listed as—F020, F021, F022, F023, F026, and F027—RCRA hazardous wastes under part 261 because they contain high concentrations of dioxins.

a. What Is the MACT Floor for Existing Sources? Existing sources are currently subject to DRE standards under § 266.104(a) that require 99.99 percent DRE for each POHC, except that 99.9999 percent DRE is required if specified dioxin-listed hazardous wastes are burned. Accordingly, these standards represent MACT floor. Since all hazardous waste cement kilns are currently subject to these DRE standards, they represent floor control, *i.e.*, greater than 12 percent of existing sources are achieving these controls.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? Beyond-the-floor control would be a requirement to achieve a higher percentage DRE, for example, 99.9999 percent DRE for POHCs for all hazardous wastes. A higher DRE could be achieved by improving the design, operation, or maintenance of the combustion system to achieve greater combustion efficiency.

Sources will not incur costs to achieve the 99.99% DRE floor because it is an existing RCRA standard . A substantial number of existing hazardous waste combustors are not likely to be routinely achieving 99.999% DRE, however, and most are not likely to be achieving 99.9999% DRE. Improvements in combustion efficiency will be required to meet these beyond-the-floor DREs. Improved combustion efficiency is accomplished through better mixing, higher temperatures, and longer residence times. As a practical matter, most combustors are mixing-limited. Thus, improved mixing is necessary for improved DREs. For a less-than-optimum burner, a certain amount of improvement may typically be accomplished by minor, relatively inexpensive combustor modifications—burner tuning operations such as a change in burner angle or an adjustment of swirl—to enhance mixing on the macro-scale. To achieve higher and higher DREs, however, improved mixing on the micro-scale may be necessary requiring significant, energy intensive and expensive modifications such as burner redesign and higher combustion air pressures. In addition, measurement of such DREs may require increased spiking of POHCs and more sensitive stack sampling and analysis methods at added expense.

Although we have not quantified the cost-effectiveness of a beyond-the-floor DRE standard, we do not believe that it would be cost-effective. For reasons discussed above, we believe that the cost of achieving each successive order-of-magnitude improvement in DRE will be at least constant, and more likely increasing. Emissions reductions diminish substantially, however, with each order of magnitude improvement in DRE. For example, if a source were to emit 100 gm/hr of organic hazardous air pollutants assuming zero DRE, it would emit 10 gm/hr at 90 percent DRE, 1 gm/hr at 99 percent DRE, 0.1 gm/hr at 99.9 percent DRE, 0.01 gm/hr at 99.99 percent DRE, and 0.001 gm/hr at 99.999 percent DRE. If the cost to achieve each order of magnitude improvement in DRE is roughly constant, the cost-effectiveness of DRE decreases with each order of magnitude improvement in DRE. Consequently, we conclude that this relationship between compliance cost and diminished emissions reductions associated with a more stringent DRE standard suggests that a beyond-the-floor standard is not warranted.

c. What Is the MACT Floor for New Sources? The single best controlled source, and all other hazardous waste cement kilns, are subject to the existing RCRA DRE standard under § 266.104(a). Accordingly, we adopt this standard as the MACT floor for new sources.

d. What Are Our Beyond-the-Floor Considerations for New Sources? As discussed above, although we have not quantified the cost-effectiveness of a more stringent DRE standard, diminishing emissions reductions with each order of magnitude improvement in DRE suggests that cost-effectiveness considerations would likely come into play. We conclude that a beyond-the-floor standard is not warranted.

VIII. What Are the Standards for Existing and New Hazardous Waste Burning Lightweight Aggregate Kilns?

A. To Which Lightweight Aggregate Kilns Do Today's Standards Apply?

The standards promulgated today apply to each existing, reconstructed, and newly constructed lightweight aggregate plant where hazardous waste is burned in the kiln. These standards apply to major source and area source lightweight aggregate facilities. Lightweight aggregate kilns that do not engage in hazardous waste burning operations are not subject to this NESHAP; however, these kilns will be subject to future MACT standards for the Clay Products source category.

B. What Are the Standards for New and Existing Hazardous Waste Burning Lightweight Aggregate Kilns?

1. What Are the Standards for Lightweight Aggregate Kilns?

In this section, the basis for the emissions standards for hazardous waste burning lightweight aggregate kilns is discussed. The kiln emission limits apply to the kiln stack gases from lightweight aggregate plants that burn hazardous waste. The emissions standards are summarized below:

[164] A source may comply with either bypass gas standard. If the source elects to comply with the carbon monoxide standard, however, it must also demonstrate compliance with the hydrocarbon standard during comprehensive performance testing.

STANDARDS FOR EXISTING AND NEW LIGHTWEIGHT AGGREGATE KILNS

Hazardous air pollutant or hazardous air pollutant surrogate	Emissions standard[1]	
	Existing sources	New sources
Dioxin/furan	0.20 ng TEQ/dscm; or 0.40 ng TEQ/dscm and rapid quench of the flue gas at the exit of the kiln to less than 400°F.	0.20 ng TEQ/dscm; or 0.40 ng TEQ/dscm and rapid quench of the flue gas at the exit of the kiln to less than 400°F.
Mercury	47 µg/dscm	43 µg/dscm.
Particulate matter	57 mg/dscm (0.025 gr/dscf)	57 mg/dscm (0.025 gr/dscf).
Semivolatile metals[2]	250 µg/dscm	43 µg/dscm.
Low volatile metals[3]	110 µg/dscm	110 µg/dscm.
Hydrochloric acid/chlorine gas	230 ppmv	41 ppmv.
Hydrocarbons[2,3]	20 ppmv (or 100 ppmv carbon monoxide)	20 ppmv (or 100 ppmv carbon monoxide).
Destruction and removal efficiency	For existing and new sources, 99.99% for each principal organic hazardous constituent (POHC) designated. For sources burning hazardous wastes F020, F021, F022, F023, F026, or F027, 99.9999% for each POHC designated.	

[1] All emission levels are corrected to 7% O_2, dry basis.
[2] Hourly rolling average. Hydrocarbons are reported as propane.
[3] Lightweight aggregate kilns that elect to continuously comply with the carbon monoxide standard must demonstrate compliance with the hydrocarbon standard of 20 ppmv during the comprehensive performance test.

2. What Are the Dioxin and Furan Standards?

In today's rule, we establish a standard for new and existing lightweight aggregate kilns that limits dioxin/furan emissions to either 0.20 ng TEQ/dscm; or 0.40 ng TEQ/dscm and rapid quench of the flue gas at the exit of the kiln to less than 400°F. Our rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the April 1996 proposal, we had dioxin/furan emissions data from only one lightweight aggregate kiln and pooled that data with the dioxin/furan data for hazardous waste burning cement kilns to identify the MACT floor emission level. We stated that it is appropriate to combine the two data sets because they are adequately representative of general dioxin/furan behavior and control in either type of kiln. Consequently, floor control and the floor emission level for lightweight aggregate kilns were the same as for cement kilns. We proposed a floor emission level of 0.20 ng TEQ/dscm, or temperature at the inlet to the fabric filter not to exceed 418°F. (61 FR at 17403.)

Several commenters opposed our proposed approach of pooling the lightweight aggregate kiln data with the cement kiln dioxin/furan data for the MACT floor analysis. In order to respond to commenter concerns, we obtained additional dioxin/furan emissions data from lightweight aggregate kiln sources. In a MACT reevaluation discussed in the May 1997 NODA, we presented an alternative data analysis method to identify floor control and the floor emission level. In that NODA, dioxin/furan floor control was defined as temperature control not to exceed 400°F at the inlet to the fabric filter. That analysis resulted in a floor emission level of 0.20 ng TEQ/dscm, or 4.1 ng TEQ/dscm and temperature at the inlet to the fabric filter not to exceed 400°F. (62 FR at 24231.) An emission level of 4.1 ng TEQ/dscm represents the highest single run from the test condition with the highest run average. We concluded that 4.1 ng TEQ/dscm was a reasonable floor level, from an engineering perspective, given our limited dioxin/furan data base for lightweight aggregate kilns. (We noted that if this were a large data set, we would have identified the floor emission level simply as the highest test condition average.) Due to variability among the runs of the test condition with the highest condition average and because a floor level of 4.1 ng TEQ/dscm is 40 percent higher than the highest test condition average of 2.9 ng TEQ/dscm lightweight aggregate kilns using floor control will be able to meet routinely a floor emission level of 4.1 ng TEQ/dscm.

We maintain that the floor methodology discussed in the May 1997 NODA is appropriate and we adopt this approach in today's rule. In that NODA we identified two technologies for control of dioxin/furan emissions from lightweight aggregate kilns. The first technology controls dioxin/furans by quenching kiln gas temperatures at the exit of the kiln so that gas temperatures at the inlet to the particulate matter control device are below the temperature range of optimum dioxin/furan formation. The other technology is activated carbon injected into the kiln exhaust gas. Because activated carbon injection is not currently used by any hazardous waste burning lightweight aggregate kilns, this technology was evaluated only as part of a beyond-the-floor analysis.

One commenter opposes our approach specifying a MACT floor control temperature limitation of 400°F at the particulate matter control device. Instead, the commenter supports a temperature limitation of 417°F, which is the highest temperature associated with any dioxin/furan test condition in our data base. Although only two of the three test conditions for which we have dioxin/furan emissions data operated the fabric filter at 400°F or lower (the third operated at 417°F), we do have other fabric filter operating temperatures from kilns performing RCRA compliance testing for other hazardous air pollutants that document fabric filter operations at 400°F or lower. From these data, we conclude that lightweight aggregate kilns can operate the fabric filter at temperatures of 400°F or lower. Thus, identifying floor control at a temperature limitation of 400°F ensures that all lightweight aggregate kilns will be operating consistent with sound operational practices for controlling dioxin/furan emissions.

As discussed in the May 1997 NODA, specifying a temperature limitation of 400°F or lower is appropriate for floor control because, from an engineering perspective, it is within the range of reasonable values that could have been selected considering that: (1) The optimum temperature window for surface-catalyzed dioxin/furan formation is approximately 450–750°F; and (2) temperature levels below 350°F can cause dew point condensation problems resulting in particulate matter control device corrosion. Further, lightweight aggregate kilns can operate at air pollution control device temperatures between 350 to 400°F. In fact, all lightweight aggregate kilns use (or have available) fabric filter ''tempering'' air dilution and water quench for cooling kiln exit gases prior to the fabric filter (some kilns also augment this with uninsulated duct radiation cooling). Thus, the capability of operating fabric filters at temperatures lower than 400°F currently exists and is practical. See the technical support document for further discussion.[165]

In summary, today's floor emission level for dioxin/furan emissions for existing lightweight kilns is 0.20 ng TEQ/dscm or 4.1 ng TEQ/dscm and control of temperature at the inlet to the fabric filter not to exceed 400°F. We estimate that all lightweight aggregate kiln sources currently are meeting the floor level.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? We considered in the April 1996 proposal a beyond-the-floor standard of 0.20 ng TEQ/dscm based on injection of activated carbon at a flue gas temperature of less than 400°F. (61 FR at 17403.) In the May 1997 NODA, we considered a beyond-the-floor standard of 0.20 ng TEQ/dscm standard based on rapidly quenching combustion gases at the exit of the kiln to 400°F, and insulating the duct-work between the kiln exit and the fabric filter to maintain gas temperatures high enough to avoid dew point problems. (62 FR at 24232.)

One commenter, however, disagrees that there is adequate evidence (test data) supporting rapid quench of kiln exit gases to less than 400°F can achieve a level of 0.20 ng TEQ/dscm. Based on these NODA comments and upon closer analysis of all available data, we find that a level of 0.20 ng TEQ/dscm has not been clearly demonstrated for lightweight aggregate kilns with rapid quench less than 400°F prior to the particulate matter control device. The data show that some lightweight aggregate kilns can achieve a level of 0.20 TEQ ng/dscm with rapid quench. In addition, one commenter, who operates two lightweight aggregate kilns with heat exchangers that cool the flue gas to a temperature of approximately 400°F at the fabric filter, stated that they achieve dioxin/furan emissions slightly below 0.20 ng TEQ/dscm. However, because of the small dioxin/furan data base we are concerned that these limited data may not show the full range of emissions. Due to the similarity of dioxin/furan control among cement kilns and lightweight aggregate kilns, we looked to the cement kiln data to complement our limited lightweight aggregate kiln dataset. As discussed earlier, cement kilns are able to control dioxin/furans to 0.40 ng TEQ/dscm with temperature control. Since we do not expect a lightweight aggregate kiln to achieve lower dioxin/furan emissions than a cement kiln with rapid quench, we agree with these commenters and conclude that lightweight aggregate kilns can control dioxin/furans to 0.40 ng TEQ/dscm with rapid quench of kiln exit gases to less than 400°F.

Thus, for the final rule, we considered two beyond-the-floor levels: (1) Either 0.20 ng TEQ/dscm; or 0.40 ng TEQ/dscm and rapid quench of the kiln exhaust gas to a temperature less than 400°F; and (2) a level of 0.20 ng TEQ/dscm based on activated carbon injection.

The first option is a beyond-the-floor standard of either 0.20 ng TEQ/dscm, or 0.40 ng TEQ/dscm and rapid quench of the kiln exhaust gas to less than 400°F. The national incremental annualized compliance cost for lightweight aggregate kilns to meet this beyond-the-floor level rather than comply with the floor controls would be approximately $50,000 for the entire hazardous waste burning lightweight aggregate kiln industry, and would provide an incremental reduction in dioxin/furan emissions beyond the MACT floor controls of nearly 2 g TEQ/yr.

Based on these costs of approximately $25 thousand per additional g of dioxin/furan removed and on the significant reduction in dioxin/furan emissions achieved, we have determined that this dioxin/furan beyond-the-floor option for lightweight aggregate kilns is justified, especially given our special concern about dioxin/furans. Dioxin/furans are some of the most toxic compounds known due to their bioaccumulation potential and wide range of health effects, including carcinogenesis, at exceedingly low doses. Exposure via indirect pathways is a chief reason that Congress singled out dioxin/furans for priority MACT control in section 112(c)(6) of the CAA. See S. Rep. No. 128, 101st Cong. 1st Sess. at 154–155.

We also evaluated, but rejected, activated carbon injection as a beyond-the-floor option. Carbon injection is routinely effective at removing 99 percent of dioxin/furans at numerous municipal waste combustor and medical waste combustor applications and one hazardous waste incinerator application. However, no hazardous waste burning lightweight aggregate kiln currently uses activated carbon injection for dioxin/furan removal. We believe that it is conservative to assume that only 95 percent is achievable given potential uncertainties in its application to lightweight aggregate kilns. In addition, we assumed for cost-effectiveness calculations that lightweight aggregate kilns needing activated carbon injection would install the activated carbon injection system after the existing fabric filter device and add a new smaller fabric filter to remove the injected carbon with the absorbed dioxin/furans and mercury. This costing approach addresses commenter's concerns that injected carbon may interfere with current dust recycling practices.

The national incremental annualized compliance cost for lightweight aggregate kilns to meet a beyond-the-floor level based on activated carbon injection rather than comply with the floor controls would be approximately $1.2 million for the entire hazardous waste burning lightweight aggregate kiln industry. This would provide an incremental reduction in dioxin/furan emissions beyond the MACT floor controls of 2.2 g TEQ/yr, or 90 percent. Based on these costs of approximately $0.53 million per additional g of dioxin/furan removed and the small incremental dioxin/furan emissions reduction beyond the dioxin/furan beyond-the-floor option discussed above (2.0 g TEQ/yr versus 2.2 g TEQ/ yr), we have determined that this second beyond-the-floor option for lightweight aggregate kilns is not justified. Therefore, we are not promulgating a beyond-the-floor standard of 0.20 ng TEQ/dscm for lightweight aggregate kilns based on activated carbon injection.

Thus, the promulgated dioxin/furan standard for existing lightweight aggregate kilns is a beyond-the-floor standard of 0.20 ng TEQ/dscm; or 0.40 ng TEQ/dscm and rapid quench to a temperature not to exceed 400°F based on rapid quench of flue gas at the exit of the kiln.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, the floor analysis for new lightweight aggregate kilns was the same as for existing kilns, and the proposed standard was the same. The proposed floor emission level was 0.20 ng TEQ/dscm, or temperature at the inlet to the particulate matter control device not to exceed 418°F. (61 FR at 17408.) In the May 1997 NODA, we used an alternative data analysis method to identify floor control and the floor emission level. As done for existing sources, floor control for new sources was defined as temperature control at the inlet to the particulate matter control device to less than 400°F. That

[165] USEPA, ''Final Technical Support document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' July 1999.

analysis resulted in a floor emission level of 0.20 ng TEQ/dscm, or 4.1 ng TEQ/dscm and temperature at the inlet to the fabric filter not to exceed 400°F. Our engineering evaluation indicated that the best controlled source is one that is controlling temperature control at the inlet to the fabric filter at 400°F. (62 FR at 24232.) We continue to believe that the floor methodology discussed in the May 1997 NODA is appropriate for new sources and we adopt this approach in the final rule. The floor level for new lightweight aggregate kilns is 0.20 ng TEQ/dscm, or 4.1 ng TEQ/dscm and temperature at the inlet to the particulate matter control device not to exceed 400°F.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 proposal, we proposed activated carbon injection as beyond-the-floor control and a beyond-the-floor standard of 0.20 ng TEQ/dscm. (61 FR at 17408.) In the May 1997 NODA, we identified a beyond-the-floor standard of 0.20 ng TEQ/dscm based on rapid quench of kiln gas to less than 400°F combined with duct insulation or activated carbon injection operated at less than 400°F. (62 FR at 24232.) These beyond-the-floor considerations are identical to those discussed above for existing sources.

The beyond-the-floor standard identified for existing sources continues to be appropriate for new sources for the same reasons. Thus, the promulgated dioxin/furan standard for new lightweight aggregate kilns is the same as the standard for existing standards, i.e., 0.20 ng TEQ/dscm or 0.40 ng TEQ/dscm and rapid quench of the kiln exhaust gas to less than 400°F.

3. What Are the Mercury Standards?

In the final rule, we establish a standard for existing and new lightweight aggregate kilns that limits mercury emissions to 47 and 33 µg/dscm, respectively. The rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? All lightweight aggregate kilns use fabric filters, and one source uses a venturi scrubber in addition to a fabric filter. However, since mercury is generally in the vapor form in and downstream of the combustion chamber, including in the air pollution control device, fabric filters alone do not achieve significant mercury control. Mercury emissions from lightweight aggregate kilns are currently controlled under existing regulations through limits on the maximum feedrate of mercury in total feedstreams (e.g., hazardous waste, raw materials). Thus, MACT floor control is based on limiting the feedrate of mercury in hazardous waste.

In the April 1996 proposal, we identified floor control as hazardous waste feedrate control not to exceed a feedrate level of 17 µg/dscm, expressed as a maximum theoretical emissions concentration, and proposed a floor emission level of 72 µg/dscm based on an analysis of data from all lightweight aggregate kilns with a hazardous waste feedrate of mercury of this level or lower. (61 FR at 17404.) In the May 1997 NODA, we conducted a breakpoint analysis on ranked mercury emissions data and established the floor emission level equal to the test condition average of the breakpoint source. (62 FR at 24232.) The breakpoint analysis was intended to reflect an engineering-based evaluation of the data whereby the few lightweight aggregate kilns spiking extra mercury during testing procedures did not drive the floor emission level to levels higher than the preponderance of the emission data. We reasoned that sources with emissions higher than the breakpoint source were not controlling the hazardous waste feedrate of mercury to levels representative of MACT. The May 1997 NODA analysis resulted in a MACT floor level of 47 µg/dscm.

One commenter states that the use of mercury stack gas measurements from RCRA compliance test reports is inappropriate for setting the MACT floor since they are based on feeding normal wastes. With the exception of one source, no mercury spiking was done during the RCRA compliance testing because lightweight aggregate kilns complied with Tier I levels allowable in the Boiler and Industrial Furnace rule. The commenter notes that the Tier I allowable levels are above, by orders of magnitude, the total mercury fed into lightweight aggregate kilns. Thus, to set the mercury MACT floor, the commenter states that we need to consider the potential range of mercury levels in the hazardous waste and raw materials, which may not represented by the RCRA compliance stack gas measurements.

We recognize that stack gas tests generating mercury emissions data were conducted with normal unspiked waste streams containing normal levels of mercury in hazardous waste. However, we concluded that it is appropriate in this particular circumstance to use unspiked data to define a MACT floor. See discussion in Part Four, Section V.D.1. It would hardly reflect MACT to base the floor emission level on a feedrate of mercury greater than that which actually occurs in hazardous waste fuels burned in these units. Furthermore, the final rule standard is projected to be achievable by lightweight aggregate kilns for the vast majority of the wastes they are currently handling. The standard would allow lightweight aggregate kilns to burn wastes with about 0.5 ppmw mercury, without use of add-on mercury control techniques such as carbon injection. Data provided by a commenter indicates that approximately 90% of the waste streams lightweight aggregate kilns currently burn do not contain mercury levels at 2 ppmw. Further, the commenter indicates that these wastes are typically less than 0.02 ppmw mercury when more refined and costly analysis techniques are used. Thus, the standard is consistent with the current practice of lightweight aggregate kilns burning low-mercury waste.

We received comments from the lightweight aggregate kiln industry expressing concern with the stringency of the mercury standard. These commenters oppose a mercury standard of 47 µg/dscm, in part, because of the difficulty and increased cost of demonstrating compliance with day-to-day mercury feedrate limits. One potential problem pertains to raw material mercury detection limits. The commenter states that mercury is generally not measured in the raw material at detectable levels at their facilities. The commenter points out that if a kiln assumes mercury is present in the raw material at the detection limit, the resulting calculated uncontrolled mercury emission concentration could exceed, or be a significant percentage of, the mercury emission standard. This may prevent a kiln from complying with the mercury emission standard even though MACT control is used. Further, the commenter anticipates that more frequent analysis, additional laboratory equipment and staff, and improved testing and analysis procedures will be required to show compliance with a standard of 47 µg/dscm. The commenter states that the costs of compliance will increase significantly at each facility to address this nondetect issue.

Four provisions in the final rule offer flexibility in complying with the mercury standard. For example, one provision allows sources to petition for an alternative mercury standard that only requires compliance with a hazardous waste mercury feedrate limitation, provided that mercury not been present historically in the raw material at detectable levels. This approach ensures that kilns using MACT controls can achieve the mercury standard. The details of this provision are discussed in Part Five, Section

X.A.2. Another provision allows kilns a waiver of performance testing requirements when the source feeds low levels of mercury. Under this provision, a kiln qualifies for a waiver of the performance testing requirements for mercury if all mercury from all feedstreams fed to the combustion unit does not exceed the mercury emission standard. For kilns using this waiver, we allow kilns to assume mercury in the raw material is present at one-half the detection limit whenever the raw materials feedstream analysis determines that mercury is not present at detectable levels. The details of this provision are presented in Part Five, Section X.B. For a discussion of the other two methods that can be used to comply with the mercury emission standard, see Part Five, Section VII.B.6.

For today's rule we use a revised engineering evaluation and data analysis method to establish the MACT floor emission level for mercury. The approach used to establish MACT floors for the three metal hazardous air pollutant groups and hydrochloric acid/chlorine gas is the aggregate feedrate approach. Using this approach, the resulting mercury floor emission level is 47 μg/dscm.

We estimate that approximately 75 percent of lightweight aggregate kiln sources currently are meeting the floor emission level. The national annualized compliance cost for lightweight aggregate kilns to reduce mercury emissions to comply with the floor emission level is $0.7 million for the entire hazardous waste burning lightweight aggregate kiln industry, and will reduce mercury emissions by approximately 0.03 Mg/yr or 47 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 NPRM, we considered a beyond-the-floor standard based on flue gas temperature reduction to 400°F or less followed by activated carbon injection, but determined that a beyond-the-floor level would not be cost-effective and therefore warranted. (61 FR at 17404.) In the May 1997 NODA, we considered a beyond-the-floor standard of 15 μg/dscm based on an activated carbon injection. However, we indicated in the NODA that a beyond-the-floor standard would not likely be justified given the high cost of treatment and the relatively small amount of mercury removed from air emissions. (62 FR at 24232.)

In developing the final rule, we identified three techniques for control of mercury as a basis to evaluate a beyond-the-floor standard: (1) Activated carbon injection; (2) limiting the feed of mercury in the hazardous waste; and (3) limiting the feed of mercury in the raw materials. The results of each analysis are discussed below.

Activated Carbon Injection. To investigate this beyond-the-floor control option, we applied a carbon injection capture efficiency of 80 percent to the floor emission level of 47 μg/dscm. The resulting beyond-the-floor emission level is 10 μg/dscm.

The national incremental annualized compliance cost for lightweight aggregate kilns to meet this beyond-the-floor level rather than comply with the floor controls would be approximately $0.6 million for the entire hazardous waste burning lightweight aggregate kiln industry and would provide an incremental reduction in mercury emissions beyond the MACT floor controls of 0.02 Mg/yr. Based on these costs of approximately $34 million per additional Mg of mercury removed and the small emissions reductions that would be realized, we conclude that this mercury beyond-the-floor option for hazardous waste burning lightweight aggregate kilns is not acceptably cost-effective nor otherwise justified. Therefore, we do not adopt this beyond-the-floor standard.

Limiting the Feedrate of Mercury in Hazardous Waste. We also considered, but rejected, a beyond-the-floor emission level based on limiting the feed of mercury in the hazardous waste. This mercury beyond-the-floor option for lightweight aggregate kilns is not warranted because data submitted by commenters indicate that approximately 90% of the hazardous waste burned by lightweight aggregate kilns contains mercury at levels below method detection limits. We conclude from these data that there are little additional mercury reductions possible by reducing the feed of mercury in the hazardous waste. Therefore, we are not adopting a beyond-the-floor emission level because it will not be cost-effective due to the relatively small amount of mercury removed from air emissions and likely problems with method detection limitations.

Limiting the Feedrate of Mercury in Raw Materials. A source can achieve a reduction in mercury emissions by substituting a feed material containing lower levels of mercury for a primary raw material higher mercury levels. This beyond-the-floor option appears to be less cost effective compared to either of the options evaluated above. Because lightweight aggregate kilns are sited proximate to primary raw material supply and transporting large quantities of an alternative source of raw material(s) is expected to be cost prohibitive. Therefore, we do not adopt this mercury beyond-the-floor standard.

Thus, the promulgated mercury standard for existing hazardous waste burning lightweight aggregate kilns is the floor emission level of 47 μg/dscm.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, we identified floor control for new sources as hazardous waste feedrate control of mercury not to exceed a feedrate level of 17 μg/dscm expressed as a maximum theoretical emissions concentration. We proposed a floor emission level of 72 μg/dscm. (61 FR at 17408.) In May 1997 NODA, we conducted a breakpoint analysis on ranked mercury emissions data from sources utilizing the MACT floor technology and established the floor emission level as the test condition average of the breakpoint source. The breakpoint analysis was intended to reflect an engineering-based evaluation of the data so that the one lightweight aggregate kiln spiking extra mercury during testing procedures did not drive the floor emission level to levels higher than the preponderance of the emissions data. This analysis resulted in a MACT floor level of 47 μg/dscm. (62 FR at 24233.)

For the final rule, we identify floor control for new lightweight aggregate kilns as feed control of mercury in the hazardous waste, based on the single source with the best aggregate feedrate of mercury in hazardous waste. Using the aggregate feedrate approach to establish this floor level of control and corresponding floor emission level, we identify a MACT floor emission level of 33 μg/dscm for new lightweight aggregate kilns.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In both the proposal and the NODA, we considered a beyond-the-floor standard for new sources based on activated carbon injection, but determined that it would not be cost-effective to adopt the beyond-the-floor standard given the high cost of treatment and the relatively small amount of mercury removed from air emissions. (61 FR at 17408 and 62 FR at 24233.)

In the final rule, we identified three techniques for control of mercury as a basis to evaluate a beyond-the-floor standard: (1) Activated carbon injection; and (2) limiting the feed of mercury in the hazardous waste. The results of each analysis are discussed below.

Activated Carbon Injection. As discussed above, we conclude that flue gas temperature reduction to 400 °F followed by activated carbon injection to remove mercury is an appropriate beyond-the-floor control option for improved mercury control at lightweight aggregate kilns. The control of flue gas temperature is necessary to ensure good collection efficiency. Based on the MACT floor emission level of 33 μg/dscm and assuming a carbon injection capture efficiency of 80 percent, we identified a beyond-the-floor emission level of 7 μg/dscm. As discussed above for existing sources, we do not believe that a beyond-the-floor standard of 7 μg/dscm is warranted for new lightweight aggregate kilns due to the high cost of treatment and relatively small amount of mercury removed from air emissions. The incremental annualized compliance cost for one new lightweight aggregate kiln to meet this beyond-the-floor level, rather than comply with floor controls, would be approximately $0.46 million and would provide an incremental reduction in mercury emissions beyond the MACT floor controls of approximately 0.008 Mg/yr. Based on these costs of approximately $58 million per additional Mg of mercury removed, a beyond-the-floor standard of 7 μg/dscm is not warranted due to the high cost of compliance and relatively small mercury emissions reductions. Notwithstanding our goal of reducing the loading to the environment by bioaccumulative pollutants such as mercury whenever possible, these costs are not justified.

Limiting the Feedrate of Mercury in Hazardous Waste. As discussed above for existing sources, we conclude that a beyond-the-floor based on limiting the feed of mercury in the hazardous waste is not justified. Considering that the floor emission level for new lightweight aggregate kilns is approximately one third lower than the floor emission level for existing kilns (33 versus 47 μg/dscm), we again conclude that a mercury beyond-the-floor standard is not warranted because emission reductions of mercury would be less than existing sources at comparable costs. Thus, the cost-effectiveness is higher for new kilns than for existing kilns. Further, achieving substantial additional mercury reductions by further controls on hazardous waste feedrate may be problematic because the mercury contribution from raw materials and coal represents an even larger proportion of the total mercury fed to the kiln. Therefore, we do not adopt a mercury beyond-the-floor standard based on limiting feed of mercury in hazardous waste for new sources.

Thus, the promulgated mercury standard for new hazardous waste burning lightweight aggregate kilns is the floor emission level of 33 μg/dscm.

4. What Are the Particulate Matter Standards?

We establish standards for both existing and new lightweight aggregate kilns that limit particulate matter emissions to 57 mg/dscm. The particulate matter standard is a surrogate control for the metals antimony, cobalt, manganese, nickel, and selenium. We refer to these five metals as ‘‘nonenumerated metals’’ because standards specific to each metal have not been established. The rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the April 1996 NPRM, we defined floor control based upon the performance of a fabric filter with an air-to-cloth ratio of 2.8 acfm/ft^2. The MACT floor was 110 mg/dscm (0.049 gr/dscf). (61 FR at 17403.) In the May 1997 NODA, we defined the technology basis as a fabric filter for a MACT floor, but did not characterize the design and operation characteristics of the particulate matter control equipment, air-to-cloth ratio of a fabric filter, because we had limited information on these parameters. (62 FR at 24233.) Instead, for each particulate matter test condition, we evaluated the corresponding semivolatile metal system removal efficiency and screened out sources with relatively poor system removal efficiencies as a means to identify and eliminate from consideration those sources not using MACT floor control. Our reevaluation of the lightweight aggregate kiln particulate matter data resulted in a MACT floor of 50 mg/dscm (0.022 gr/dscf).

Some commenters state that a floor emission level of 50 mg/dscm (0.022 gr/dscf) is too high and a particulate matter standard of 23 mg/dscm (0.010 gr/dscf) is more appropriate because it is consistent with the level of performance achieved by incinerators using fabric filters. Even though we agree that well designed and properly operated fabric filters in use at all lightweight aggregate kilns can achieve low levels, we are concerned that an emission level of 23 mg/dscm would not be appropriate given the high inlet grain loading inherent with the lightweight aggregate manufacturing process, typically much higher than the particulate loading to incinerators.

Commenters also express concern that the Agency identified separate, different MACT pools and associated MACT controls for particulate matter, semivolatile metals, and low volatile metals, even though all three are controlled, at least in part, by the particulate matter control device. These commenters stated that our approach is likely to result in three different design specifications. We agree with these commenters and, in the final rule, the same initial MACT pool is used to establish the floor levels for particulate matter, semivolatile metals, and low volatile metals. See discussion in Part Four, Section V.

For the final rule, we conclude that the general floor methodology discussed in the May 1997 NODA is appropriate. MACT control for particulate matter is based on the performance of fabric filters. Since we lack data to fully characterize control equipment from all sources and we lack information on the relationship between the design parameters and the system performance, we evaluated both low and semivolatile metal system removal efficiencies associated with the source's particulate matter emissions to identify those sources not using MACT floor control. Our data show that all lightweight aggregate kilns are achieving greater than 99 percent system removal efficiency for both low and semivolatile metals, with some attaining 99.99 percent removal. Since we found no sources with system removal efficiencies indicative of poor performance, we conclude that all lightweight aggregate kilns are using MACT controls and the floor emission limit is identified as 57 mg/dscm (0.025 gr/dscf).

The performance level of 57 mg/dscm is generally consistent with that expected from well designed and operated fabric filters, and that achieved by other similar types of combustion sources operating with high inlet grain loadings. We have particulate matter data from all lightweight aggregate kiln sources, and multiple test conditions, conducted at 3 year intervals, are available for many of the sources. We conclude that the number of test conditions available adequately covers the range of variability of well operated and designed fabric filters.[166]

We considered, but rejected, basing the particulate matter floor for lightweight aggregate kilns on the New Source Performance Standard. The New Source Performance Standard limits particulate matter emissions to 92 mg/dscm (0.040 gr/dscf), uncorrected for oxygen. (See 40 CFR 60.730, Standards of Performance for Calciners and Dryers in Mineral Industries.) We rejected the New Source Performance Standard as the basis for the floor emission level

[166] USEPA, ‘‘Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,’’ July 1999.

because our MACT analysis of data from existing sources indicates that a particulate matter floor level lower than the New Source Performance Standard is currently being achieved by existing hazardous waste burning lightweight aggregate kilns. Further, all available emission data for hazardous waste burning lightweight aggregate kilns are well below the New Source Performance Standard particulate matter standard. Thus, the particulate matter floor emission level is 57 mg/dscm based on an analysis of existing emissions data.

We estimate that, based on a design level of 70 percent of the standard, over 90 percent of lightweight aggregate kiln sources currently are meeting the floor level. The national annualized compliance cost for lightweight aggregate kilns to reduce particulate matter emissions to comply with the floor emission level is $18,000 for the entire hazardous waste burning lightweight aggregate kiln industry, and our floor will reduce nonenumerated metals and particulate matter emissions by 0.01 Mg/yr and 2.7 Mg/yr, respectively, or 7 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the NPRM, we proposed a beyond-the-floor emission level of 69 mg/dscm (0.030 gr/dscf) and solicited comment on an alternative beyond-the-floor emission level of 34 mg/dscm (0.015 gr/dscf) based on improved particulate matter control. (61 FR at 17403.) In the May 1997 NODA, we concluded that a beyond-the-floor standard may not be warranted given a reduced particulate matter floor level compared to the proposed floor emission level. (62 FR at 24233.)

In the final rule, we considered a beyond-the-floor level of 34 mg/dscm for existing lightweight aggregate kilns based on improved particulate matter control. For analysis purposes, improved particulate matter control entails the use of higher quality fabric filter bag material. We then determined the cost of achieving this level of particulate matter, with corresponding reductions in the nonenumerated metals for which particulate matter is a surrogate, to determine if this beyond-the-floor level would be appropriate. The national incremental annualized compliance cost for lightweight aggregate kilns to meet this beyond-the-floor level, rather than comply with the floor controls, would be approximately $110,000 for the entire hazardous waste burning lightweight aggregate kiln industry and would provide an incremental reduction in nonenumerated metals emissions nationally beyond the MACT floor controls of 0.03 Mg/yr. Based on these costs of approximately $3.7 million per additional Mg of nonenumerated metals emissions removed, we conclude that this beyond-the-floor option for lightweight aggregate kilns is not acceptably cost-effective nor otherwise justified. Therefore, we do not adopt this beyond-the-floor standard. Thus, the promulgated particulate matter standard for existing hazardous waste burning lightweight aggregate kilns is the floor emission level of 57 mg/dscm.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, we defined floor control for new sources based on the level of performance of a fabric filter with an air-to-cloth ratio of 1.5 acfm/ft2. The MACT floor emission level was 120 mg/dscm (0.054 gr/dscf). (61 FR at 17408.) In the May 1997 NODA, MACT control was defined as a well-designed and properly operated fabric filter, and the floor emission level for new lightweight aggregate kilns was 50 mg/dscm (0.022 gr/dscf). (62 FR at 24233.)

All lightweight aggregate kilns use fabric filters to control particulate matter. As discussed earlier, we have limited information on the design and operation characteristics of existing control equipment currently used by lightweight aggregate kilns. As a result, we are unable to identify a specific technology that can consistently achieve lower emission levels than the controls used by lightweight aggregate kilns achieving the MACT floor level for existing sources. Lightweight aggregate kilns achieve the floor emission level with well-designed and properly operated fabric filters. Thus, floor control for new kilns is likewise a well-designed and properly operated fabric filter. Therefore, as discussed for existing sources, the MACT floor level for new lightweight aggregate kilns is 57 mg/dscm (0.025 gr/dscf).

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 NPRM, we proposed a beyond-the-floor standard of 69 mg/dscm (0.030 gr/dscf) based on improved particulate matter control, which was consistent with existing sources. (61 FR at 17408.) In the May 1997 NODA, we concluded, as we did for existing sources, that a beyond-the-floor level for particulate matter may not be warranted due to the high costs of control and relatively small amount of particulate matter removed from air emissions. (62 FR at 24233.)

As discussed for existing sources, we considered a beyond-the-floor level of 34 mg/dscm for new lightweight aggregate kilns based on improved particulate matter control. For analysis purposes, improved particulate matter control entails the use of higher quality fabric filter bag material. We then determined the cost of achieving this level of particulate matter, with corresponding reductions in the nonenumerated metals for which particulate matter is a surrogate, to determine if this beyond-the-floor level would be appropriate. The incremental annualized compliance cost for one new lightweight aggregate kiln to meet this beyond-the-floor level, rather than comply with floor controls, would be approximately $38 thousand and would provide an incremental reduction in nonenumerated metals emissions of approximately 0.012 Mg/yr.[167] Based on these costs of approximately $3.1 million per additional Mg of nonenumerated metals removed, we conclude that a beyond-the-floor standard of 34 mg/dscm is not justified due to the high cost of compliance and relatively small nonenumerated metals emission reductions. Further, a standard of 57 mg/dscm would adequately control the unregulated hazardous air pollutant metals for which it is being used as a surrogate. Thus, the particulate matter standard for new lightweight aggregate kilns is the floor level of 57 mg/dscm.

5. What Are the Semivolatile Metals Standards?

In the final rule, we establish a standard for existing and new lightweight aggregate kilns that limits semivolatile metal emissions to 250 and 43 μg/dscm, respectively. The rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? All lightweight aggregate kilns use a combination of particulate matter control, *i.e.*, a fabric filter, and hazardous waste feedrate to control emissions of semivolatile metals. Current RCRA regulations establish limits on the maximum feedrate of lead and cadmium in all feedstreams. Thus, hazardous waste feedrate control is part of MACT floor control.

In the April 1996 proposal, we defined floor control as either (1) a fabric filter with an air-to-cloth ratio of 1.5 acfm/ft^2 and a hazardous waste feedrate level of 270,000 μg/dscm,

[167] Based on the data available, the average emissions in sum of the five nonenumerated metal from lightweight aggregate kilns using MACT particulate matter control is approximately 83 μg/dscm. To estimate emission reductions of the nonenumerated metals, we assume a linear relationship between a reduction in particulate matter and these metals.

expressed as a maximum theoretical emissions concentration; or (2) a combination of a fabric filter and venturi scrubber with an air-to-cloth ratio of 4.2 acfm/ft^2 and a hazardous waste feedrate level of 54,000 µg/dscm. The proposed floor emission level was 12 µg/dscm. (61 FR at 17405.) In the May 1997 NODA, we discussed a floor methodology where we used a breakpoint analysis to identify sources that were not using floor control with respect either to semivolatile metals hazardous waste feedrate or emissions control. Under this approach, we ranked semivolatile metal emissions data from sources that were achieving the particulate matter floor level of 50 mg/dscm or better. We identified the floor level as the test condition average associated with the breakpoint source. Thus, sources with atypically high emissions because of high semivolatile feedrate levels or poor semivolatile metals control were screened from the pool of sources used to define the floor emission level. Based on this analysis, we identified a floor emission level of 76 µg/dscm. (62 FR at 24234.)

We received few public comments in response to the proposal and May 1997 NODA concerning the lightweight aggregate kiln semivolatile metals floor emission level. We did receive comments on the application of techniques to identify breakpoints in the arrayed emissions data. This issue and our response to it are discussed in the floor methodology section in Part Four, Section V. We also received comments that our semivolatile metals analysis in the proposal and May 1997 NODA included several data base inaccuracies that, when corrected, would result in a higher floor level. We agree with the commenters and we revised the data base as necessary for the final rule analysis.

In the final rule, in general response to these comments, we use a revised engineering evaluation and data analysis method to establish the floor emission level for semivolatile metals. We use the aggregate feedrate approach in conjunction with floor control for particulate matter of 57 mg/dscm to identify a semivolatile metal floor emission level of 1,700 µg/dscm. We estimate that all lightweight aggregate kiln sources currently are meeting the floor level.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 NPRM, we considered a beyond-the-floor emission level for semivolatile metals based on improved particulate matter control. We concluded that a beyond-the-floor emission level would not be cost-effective given that the proposed semivolatile metal floor level of 12 µg/dscm alone would result in an estimated 97 percent reduction in semivolatile metal emissions. (61 FR at 17405.) In the May 1997 NODA, we considered a beyond-the-floor emission level based on improved particulate matter control, but indicated that such a standard was not likely to be cost-effective due to the high costs of control. (62 FR at 24234.)

In developing the final rule, we identified three techniques for control of semivolatile metals as a basis to evaluate a beyond-the-floor standard: (1) Limiting the feed of semivolatile metals in the hazardous waste; (2) improved particulate matter control; and (3) limiting the feed of semivolatile metals in the raw materials. The results of each analysis are discussed below.

Limiting the Feedrate of Semivolatile Metals in Hazardous Waste. Under this option, as with cement kilns, we selected for evaluation a beyond-the-floor emission level of 240 µg/dscm to evaluate from among the range of possible levels that reflect improved feedrate control of semivolatile metals in hazardous waste. This emission level represents a significant increment of emission reduction from the floor level of 1700 µg/dscm, it is within the range of levels that are likely to be reasonably achievable using feedrate control, and it is generally consistent with the incinerator and cement kiln standards, thereby advancing a policy objective of essentially common standards among combustors of hazardous waste.

In performing an analysis of the 240 µg/dscm beyond-the-floor limit, we found that additional reductions beyond 250 µg/dscm represent a significant reduction in cost-effectiveness of incremental beyond-the-floor levels. A beyond-the-floor standard of 250 µg/dscm achieves the same goals as a beyond-the-floor standard of 240 µg/dscm in a more cost-effective manner. The national incremental annualized compliance cost for the lightweight aggregate kilns to meet this 250 µg/dscm beyond-the-floor level, rather than comply with the floor controls, would be approximately $88,000 and would provide an incremental reduction beyond emissions at the MACT floor in semivolatile metal emissions of an additional 0.17 Mg/yr. The cost-effectiveness of this emission level is approximately $530,000 per additional Mg of semivolatile metal removed.

We conclude that additional control of the feedrate of semivolatile metals in hazardous waste to achieve an emission level of 250 µg/dscm is warranted because this standard would reduce lead and cadmium emissions, which are particularly toxic hazardous air pollutants. In addition, Solite Corporation, which operates the majority of the hazardous waste burning lightweight aggregate kilns, stated in their public comments that a standard of 213 µg/dscm is achievable and adequately reflects the variability of lead and cadmium in raw material for their kilns. Further, the vast majority of the lead and cadmium fed to the lightweight aggregate kiln is from the hazardous waste,[168] not from the raw material or coal. We are willing to accept a more marginal cost-effectiveness for sources voluntarily burning hazardous waste in lieu of other fuels to ensure that sources are using best controls.

Moreover, this beyond-the-floor semivolatile metal standard better supports our Children's Health Initiative in that lead emissions, which are of highest significance to children's health, will be reduced by another 60 percent from today's baseline. We are committed to reducing lead emissions wherever and whenever possible. Finally, we note that this beyond-the-floor standard is also consistent with European Union standards for hazardous waste incinerators of approximately 200 µg/dscm for lead and cadmium combined. Therefore, we are adopting today a beyond-the-floor standard of 250 µg/dscm for existing lightweight aggregate kilns.

Improved Particulate Matter Control. We also evaluated improved particulate matter control as another beyond-the-floor control option for improved semivolatile metals control. We investigated a beyond-the-floor standard of 250 µg/dscm, an emission level consistent with the preferred option based on limiting the feedrate of semivolatile metals in hazardous waste. The national incremental annualized compliance cost for lightweight aggregate kilns to meet this beyond-the-floor level, rather than comply with the floor controls, would be approximately $88,000 thousand for all lightweight aggregate kilns and would provide an incremental reduction in semivolatile metal emissions beyond the MACT floor controls of 0.17 Mg/yr. Based on these costs of approximately $530,000 per additional Mg of semivolatile metal removed, we determined that this beyond-the-floor option may be warranted. However, as discussed below, the cost-effectiveness for this beyond-the-floor option is approximately equivalent to the costs

[168] USEPA, "Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies", July 1999.

estimated for a beyond-the-floor option based on limiting the feed of semivolatile metals in the hazardous waste. We decided to base the beyond-the-floor standard for semivolatile metals on the feedrate option to be consistent with the cement kiln approach. Of course light-weight aggregate kilns are free to choose to improve particulate matter control in lieu of feedrate controls as their vehicle to achieve compliance with 250 ug/dscm.

Limiting the Feedrate of Semivolatile Metals in Raw Materials. A source can achieve a reduction in semivolatile metals emissions by substituting a feed material containing lower levels of lead and/or cadmium for a primary raw material higher in lead and/or cadmium levels. This beyond-the-floor option appears to be less cost effective compared to either of the options evaluated above because lightweight aggregate kilns are sited proximate to primary raw material supply. Transporting large quantities of an alternative source of raw material(s) is expected to be cost prohibitive. Therefore, we do not adopt this semivolatile metal beyond-the-floor standard.

Thus, the promulgated semivolatile metals standard for existing hazardous waste burning lightweight aggregate kilns is a beyond-the-floor standard of 250 µg/dscm based on limiting the feedrate of semivolatile metals in the hazardous waste.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, we defined floor control as a fabric filter with an air-to-cloth ratio of 1.5 acfm/ft^2 and a hazardous waste feedrate level of 270,000 µg/dscm, expressed as a maximum theoretical emissions concentration. The proposed floor emission level was 5.2 µg/dscm. (61 FR at 17408.) In the May 1997 NODA, we concluded that the floor control and emission level for existing sources for semivolatile metals would also be appropriate for new sources. Floor control was based on a combination of good particulate matter control and limiting hazardous waste feedrates of semivolatile metals to control emissions. We used a breakpoint analysis of the semivolatile metal emissions data to exclude sources achieving substantially poorer semivolatile metal control than the majority of sources. The NODA floor emission level was 76 µg/dscm for new sources. (62 FR at 24234.)

In the final rule, as discussed previously, we use a revised engineering evaluation and data analysis method to establish the floor emission level for semivolatile metals. We use the aggregate feedrate approach in conjunction with floor control for particulate matter of 57 mg/dscm to identify a semivolatile metal floor emission level of 43 µg/dscm.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 NPRM and May 1997 NODA, we considered a semivolatile metal beyond-the-floor emission level for new sources, but determined that the standard would not be cost-effective because the floor emission levels already achieved significant reductions in semivolatile metals emissions. (61 FR at 17408 and 62 FR at 24234.)

For the final rule, we do not adopt a beyond-the-floor emission level because the MACT floor for new sources is already substantially lower than the beyond-the-floor emission standard for existing sources. As a result, a beyond-the-floor standard for new lightweight aggregate kilns is not warranted due to the high costs of control versus the minimal emissions reductions that would be achieved. Therefore, we adopt the semivolatile metal MACT floor standard of 43 µg/dscm for new hazardous waste burning lightweight aggregate kilns.

6. What Are the Low Volatile Metals Standards?

In the final rule, we establish a standard for both existing and new lightweight aggregate kilns that limits low volatile metal emissions to 110 µg/dscm. The rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the April 1996 proposal, we defined floor control based on the performance of a fabric filter with an air-to-cloth ratio of 1.8 acfm/ft^2 and a hazardous waste feedrate level of 46,000 µg/dscm, expressed as a maximum theoretical emissions concentration. The proposed floor emission level was 340 µg/dscm. (61 FR at 17405.) In the May 1997 NODA, we discussed a floor methodology where we used a breakpoint analysis to identify sources that were not using floor control with respect either to low volatile metals hazardous waste feedrate or emissions control. Under this approach, we ranked low volatile metal emissions data from sources that were achieving the particulate matter floor level of 50 mg/dscm or better. We identified the floor level as the test condition average associated with the breakpoint source. Thus, sources with atypically high emissions because of high low volatile feedrate levels or poor low volatile metals control were screened from the pool of sources used to define the floor emission level. Based on this analysis, we identified a floor emission level of 37 µg/dscm. (62 FR at 24234.)

We received few comments, in response to the April 1996 NPRM and May 1997 NODA, concerning the low volatile metals floor emission level. We received comments, however, on several overarching issues including the appropriateness of considering feedrate control of metals (including low volatile metals) in hazardous waste as a MACT floor control technique and the specific procedure of identifying breakpoints of arrayed emissions data. These issues and our responses to them are discussed in the floor methodology section in Part Four, Section V.

For today's rule, we use a revised engineering evaluation and data analysis method to establish the MACT floor level for low volatile metals. The aggregate feedrate approach in conjunction with MACT particulate matter control to 57 mg/dscm results in a low volatile metal floor emission level of 110 µg/dscm.

We estimate that over 80 percent of existing lightweight aggregate kiln sources in our data base meet the floor level. The national annualized compliance cost for lightweight aggregate kilns to reduce low volatile metal emissions to comply with the floor emission level is $52,000 for the entire hazardous waste burning lightweight aggregate kiln industry, and will reduce low volatile metal emissions by 0.04 Mg/yr or 40 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 NPRM and May 1997 NODA, we considered a beyond-the-floor standard for low volatile metals based on improved particulate matter control. However, we concluded that a beyond-the-floor standard would not be cost-effective due to the high cost of emissions control and relatively small amount of low volatile metals removed from air emissions. (61 FR at 17406 and 62 FR at 24235.)

For today's rule, we identified three potential beyond-the-floor techniques for control of low volatile metals: (1) Improved particulate matter control; (2) limiting the feed of low volatile metals in the hazardous waste; and (3) limiting the feed of low volatile metals in the raw materials. The results of each analysis are discussed below.

Improved Particulate Matter Control. Our judgment is that a beyond-the-floor standard based on improved particulate matter control would be less cost-effective that a beyond-the-floor option based on limiting the feedrate of low volatile metals in the hazardous waste. Our data show that lightweight aggregate kilns are already achieving a 99.9% system removal efficiency of low volatile metals and some sources are even attaining 99.99%. Thus, pollution control equipment retrofit costs for improved control would be significant. Thus, we conclude a beyond-the-floor emission level for low volatile metals based on improved particulate matter control for lightweight aggregate kilns is not warranted.

Limiting the Feedrate of Low Volatile Metals in the Hazardous Waste. We also considered a beyond-the-floor level of 70 µg/dscm based on additional feedrate control of low volatile metals in the hazardous waste. Our investigation shows that this beyond-the-floor option would achieve an incremental reduction in low volatile metals of only 0.01 Mg/yr. Given that this beyond-the-floor level would not achieve appreciable emissions reductions, significant cost-effectiveness considerations would likely arise, thus suggesting that this beyond-the-floor standard is not warranted.

Limiting the Feedrate of Low Volatile Metals in Raw Materials. A source can achieve a reduction in low volatile metal emissions by substituting a feed material containing lower levels of these metals for a primary raw material higher low volatile metal levels. This beyond-the-floor option appears to be less cost-effective compared to either of the options evaluated above because lightweight aggregate kilns are sited proximate to primary raw material supply. Transporting large quantities of an alternative source of raw material(s) is expected to be very costly and not cost-effective considering the limited emissions reductions that would be achieved. Therefore, we do not adopt this low volatile metals beyond-the-floor standard.

For reasons discussed above, we do not adopt a beyond-the-floor level for low volatile metals, and establish the emissions standard for existing hazardous waste burning lightweight aggregate kilns at 110 µg/dscm.

c. What Is the MACT Floor for New Sources? At proposal, we defined floor control based on the performance of a fabric filter with an air-to-cloth ratio of 1.3 acfm/ft^2 a hazardous waste feedrate level of 37,000 µg/dscm, expressed as a maximum theoretical emissions concentration. The proposed floor level was 55 µg/dscm. (61 FR at 17408.) In the May 1997 NODA, we concluded that the floor control and emission level for existing sources for low volatile metals would also be appropriate for new sources. Floor control was based on a combination of good particulate matter control and limiting hazardous waste feedrate of low volatile metals to control emissions. We used a breakpoint analysis of the low volatile metal emissions data to exclude sources achieving substantially poorer low volatile metal control than the majority of sources. The NODA floor was 37 µg/dscm. (62 FR at 24235.)

In the final rule, in response to general comments on the May 1997 NODA, we use a revised engineering evaluation and data analysis method to establish the floor emission level for low volatile metals. We use the aggregate feedrate approach in conjunction with floor control for particulate matter of 57 mg/dscm to identify a low volatile metal floor emission level of 110 µg/dscm.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 NPRM and May 1997 NODA, we considered a low volatile metal beyond-the-floor level, but determined that a beyond-the-floor standard would not be cost-effective due to the high cost of treatment and relatively small amount of low volatile metals removed from air emissions. We received no comments to the contrary.

For the final rule, as discussed for existing sources, we do not adopt a beyond-the-floor level for new sources, and conclude that the floor emission level is appropriate. Therefore, we adopt the low volatile metal floor level of 110 µg/dscm as the emission standard for new hazardous waste burning lightweight aggregate kilns.

7. What Are the Hydrochloric Acid and Chlorine Gas Standards?

In the final rule, we establish a standard for existing and new lightweight aggregate kilns that limits hydrochloric acid and chlorine gas emissions to 230 and 41 ppmv, respectively. The rationale for adopting these standards is discussed below.

a. What Is the MACT Floor for Existing Sources? In the April 1996 proposal, we identified floor control for hydrochloric acid/chlorine gas as either: (1) Hazardous waste feedrate control of chlorine to 1.5 g/dscm, expressed as a maximum theoretical emissions concentration; or (2) a combination of a venturi scrubber and hazardous waste feedrate level of 14 g/dscm, expressed as a maximum theoretical emissions concentration. The proposed floor emission level was 2100 ppmv. (61 FR at 17406.) In the May 1997 NODA, we used the same data analysis method as proposed, except that a computed emissions variability factor was no longer added. The floor emission level was 1300 ppmv. (62 FR at 24235.)

We received few comments concerning the hydrochloric acid/chlorine gas floor methodology and emission level. One commenter supports the use of a variability factor in calculating the floor emission level. Generally, the final emission standards, including hydrochloric acid/chlorine gas, already accounts for emissions variability without adding a statistically-derived emissions variability factor. This issue and our response to it are discussed in detail in the floor methodology section in Part Four, Section V.

For today's rule, we use a revised engineering evaluation and data analysis method to establish the MACT floor level for hydrochloric acid and chlorine gas. The aggregate feedrate approach results in a floor emission level of 1500 ppmv.

We estimate that approximately 31 percent of lightweight aggregate kilns in our data base currently meet the floor emission level. The national annualized compliance cost for sources to reduce hydrochloric acid and chlorine gas emissions to comply with the floor level is $350,000 for the entire hazardous waste burning lightweight aggregate kiln industry, and will reduce hydrochloric acid and chlorine gas emissions by 182 Mg/yr or 10 percent from current baseline emissions.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 proposal, we defined beyond-the-floor control as wet or dry lime scrubbing with a control efficiency of 90 percent. We proposed a beyond-the-floor standard of 450 ppmv, which included a statistical variability factor. (61 FR at 17406.) In the May 1997 NODA, the beyond-the-floor standard was 130 ppmv based on wet or dry scrubbing with a control efficiency of 90 percent. (62 FR at 24235.)

We identified three potential beyond-the-floor techniques for control of hydrochloric acid and chlorine gas emissions: (1) Dry lime scrubbing; (2) limiting the feed of chlorine in the hazardous waste; and (3) limiting the feed of chlorine in the raw materials. The result of each analysis is discussed below.

Dry Lime Scrubbing. Based on a joint emissions testing program with Solite Corporation in 1997, dry lime scrubbing at a stoichiometric lime ratio of 3:1 achieved greater than 85 percent removal of hydrochloric acid and chlorine gas. For the final rule, we considered a beyond-the-floor emission level of 230 ppmv based on a 85 percent removal efficiency from the floor level of 1500 ppmv.

The national incremental annualized compliance cost for all lightweight aggregate kilns to meet this beyond-the-floor level is approximately $1.5 million. This would provide an incremental reduction in hydrochloric acid/chlorine gas emissions beyond the MACT floor controls of an additional 1320 Mg/yr, or 80 percent. Based on these costs of approximately $1,100 per additional Mg hydrochloric acid/ chlorine gas removed, this hydrochloric acid/chlorine gas beyond-the-floor option for lightweight aggregate kilns is justified. Therefore, we are adopting a beyond-the-floor standard of 230 ppmv for existing lightweight aggregate kilns.

One commenter disagreed with our proposal to base the beyond-the-floor standard on dry lime scrubbing achieving 90% removal. The commenter states that dry lime scrubbing cannot cost-effectively achieve 90 percent control of hydrochloric acid and chlorine gas emissions. To achieve a 90 percent capture efficiency at a stoichiometric ratio of 3:1, the commenter maintains that a source would need to install special equipment and make operational modifications that are less cost-effective than simple dry lime scrubbing at a lower removal efficiency. The commenter identifies this lower level of control at 80 percent based on the joint emissions testing program.[169] The commenter does agree, however, that dry lime scrubbing can achieve 90 percent capture without the installation of special equipment by operating at a stoichiometric lime ratio greater than 3:1. One significant consequence of operating at higher stoichiometric lime ratios, the commenter states, is the adverse impact to the collected particulate matter. Currently, the collected particulate matter is recycled into the lightweight aggregate product. At higher stoichiometric lime ratios, unreacted lime and collected chloride and sulfur salts would prevent this recycling practice and would require the disposal of all the collected particulate matter at significant and unjustified costs.

We agree with the commenter that data from the joint emissions testing program does not support a 90 percent capture efficiency by simple dry lime scrubbing at a stoichiometric lime ratio of 3:1. We disagree with the commenter that the data support an efficiency no greater than 80 percent. In the testing program, we evaluated the capture efficiency of lime during four runs at a stoichiometric lime ratio of approximately 3:1. The results show that hydrochloric acid was removed at rates ranging from 86 to 91 percent with one exception. For that one run, the removal was calculated as 81 percent. For reasons detailed in the Comment Response Document and in the technical support document,[170] we conclude that the data from this run should not be considered because the calculated stoichiometric lime ratio is suspect. When we remove this data point from consideration, the available information clearly indicates that dry lime scrubbing at a stoichiometric ratio of 3:1 can achieve greater than 85 percent removal. Therefore, in the final rule, we base the beyond-the-floor standard of 230 ppmv on 85 percent removal.

Limiting the Feedrate of Chlorine in the Hazardous Waste. We also considered a beyond-the-floor standard for hydrochloric acid/chlorine gas based on additional feedrate control of chlorine in the hazardous waste. This option achieves lower emission reductions and is less cost-effective than the dry lime scrubbing option discussed above. Therefore, we are not adopting a hydrochloric acid/chlorine gas beyond-the-floor standard based on limiting the feed of chlorine in the hazardous waste.

Limiting the Feedrate of Chlorine in the Raw Materials. A source can achieve a reduction in hydrochloric acid/ chlorine gas emissions by substituting a feed material containing lower levels of chlorine for a primary raw material higher chlorine levels. This beyond-the-floor option appears to be less cost effective compared to either of the options evaluated above because lightweight aggregate kilns are sited proximate to primary raw material supply. Transporting large quantities of an alternative source of raw material(s) is expected to be very costly and not cost-effective considering the limited emissions reductions that would be achieved. Therefore, we do not adopt this hydrochloric acid/chlorine gas beyond-the-floor standard.

In summary, we establish the hydrochloric acid/chlorine gas standard for existing lightweight aggregate kilns at 230 ppmv based on scrubbing.

c. What Is the MACT Floor for New Sources? In the April 1996 proposal, we defined MACT floor control for new sources as a venturi scrubber with a hazardous waste feedrate level of 14 g/ dscm, expressed as a maximum theoretical emissions concentration. We proposed a floor emission level of 62 ppmv. (61 FR at 17409.) In the May 1997 NODA, we concluded that the floor control and emission level for existing sources for hydrochloric acid/ chlorine gas would also be appropriate for new sources. Floor control was based on limiting hazardous waste feedrates of chlorine to control hydrochloric acid/chlorine gas emissions. We screened out some data with anomalous system removal efficiencies compared to the majority of sources. The floor emission level for new lightweight aggregate kilns was 43 ppmv. (62 FR at 24235.)

In the final rule, we use a similar engineering evaluation and data analysis method as discussed in the May 1997 NODA to establish the floor emission level for hydrochloric acid/ chlorine gas. We identified MACT floor control as wet scrubbing since the best controlled source is using this control technology. One lightweight aggregate facility uses venturi-type wet scrubbers for the control of hydrochloric acid/ chlorine gas. We evaluated the chlorine system removal efficiencies achieved by wet scrubbing at this facility. Our data show that this facility is consistently achieving greater than 99 percent control of hydrochloric acid/chlorine gas. Because we have no data with system removal efficiencies indicative of poor performance, we conclude that all data from this facility are reflective of MACT control (wet scrubbers), and, therefore, the floor emission limit for new sources is set equal to the highest test condition average of these data. Thus, the MACT floor emission limit for new lightweight aggregate kilns is identified as 41 ppmv.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 proposal and May 1997 NODA, we did not propose a beyond-the-floor standard for new sources because the floor emission level was based on wet scrubbing, which is the best available control technology for hydrochloric acid/chlorine gas. (61 FR at 17409 and 62 FR at 24235.) We continue to believe that a beyond-the-floor emission level for new sources is not warranted due to the high costs of treatment and the small additional amount of chlorine that would be removed. Therefore, the MACT standard for new lightweight aggregate kilns is identified as 41 ppmv.

8. What Are the Hydrocarbon and Carbon Monoxide Standards?

In the final rule, we establish hydrocarbon and carbon monoxide standards as surrogates to control emissions of nondioxin organic hazardous air pollutants for existing and

[169] See ''Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' July 1999.

[170] See ''Final Technical Support Document for HWC MACT Standards, Volume III: Selection of MACT Standards and Technologies,'' July 1999.

new lightweight aggregate kilns. The standards limit hydrocarbon and carbon monoxide concentrations to 20 ppmv [171] or 100 ppmv, [172] respectively. Existing and new lightweight aggregate kilns can elect to comply with either the hydrocarbon limit or the carbon monoxide limit on a continuous basis. Lightweight aggregate kilns that choose to comply with the carbon monoxide limit on a continuous basis must also demonstrate compliance with the hydrocarbon standard during the comprehensive performance test. However, continuous hydrocarbon monitoring following the performance test is not required.[173] We discuss the rationale for establishing these standards below.

a. What Is the MACT Floor for Existing Sources? As discussed in Part Four, Section II.A.2, we proposed limits on hydrocarbon and carbon monoxide emissions as surrogates to control nondioxin organic hazardous air pollutants. In the April 1996 NPRM, we identified floor control as combustion of hazardous waste under good combustion practices to minimize the generation of fuel-related hydrocarbons. We proposed a hydrocarbon emission level of 14 ppmv and a carbon monoxide level of 100 ppmv. The hydrocarbon level was based on an analysis of the available emissions data, while the basis of the carbon monoxide level was existing federal regulations (see § 266.104(b)). (61 FR at 17407.) In the May 1997 NODA, we solicited comment a hydrocarbon emission level of 10 ppmv. The hydrocarbon floor level was changed to 10 ppmv from 14 ppmv because of a change in the lightweight aggregate kiln universe of facilities. The lightweight aggregate kiln with the highest hydrocarbon emissions stopped burning hazardous waste. With the exclusion of the hydrocarbon data from this one source, the remaining lightweight aggregate kilns appeared to be able to meet a hydrocarbon standard on the order of 6 ppmv. However, since we were unable to identify an engineering reason why lightweight aggregate kilns using good combustion practices should be able to achieve lower hydrocarbon emissions than incinerators, we indicated that it may be more appropriate to establish the hydrocarbon standard at 10 ppmv, which was equal to the incinerator emission level discussed in that NODA. In the NODA, we also continued to indicate our preference for a carbon monoxide emission level of 100 ppmv. (62 FR at 24235.)

One commenter states that some lightweight aggregate kilns may not be able to meet a 10 ppmv hydrocarbon standard due to organics in raw materials. Notwithstanding our data base of short-term data indicating the achievability of a hydrocarbon standard of 10 ppmv, the commenter states that this standard may be unachievable over the long-term because trace levels of organic matter in the raw materials vary significantly. Hydrocarbon emissions could increase as the source uses raw materials from different on-site quarry locations. Thus, the commenter supports a hydrocarbon emission level consistent with cement kilns (*i.e.*, 20 ppmv), and opposes a floor emission level that is comparable to incinerators for which low temperature organics desorption from raw materials is not a complicating issue.

Our limited hydrocarbon data, as discussed above, indicates that a hydrocarbon level of 10 ppmv is achievable for lightweight aggregate kilns.[174] However, we agree that over long-term operations, lightweight aggregate kilns may encounter variations in the level of trace organics in raw materials, similar to cement kilns, that may preclude some kilns from achieving a hydrocarbon limit of 10 ppmv. Thus, we conclude that a hydrocarbon emission level of 20 ppmv, the same floor level for cement kilns, is also appropriate for lightweight aggregate kilns. A hydrocarbon standard of 20 ppmv also is based on existing federally-enforceable RCRA regulations, to which lightweight aggregate kilns are currently subject. (See § 266.104(c).)

Some commenters also support a requirement for both a carbon monoxide and hydrocarbon limit for lightweight aggregate kilns. These commenters state that requiring both hydrocarbon and carbon monoxide limits would further reduce emissions of organic hazardous air pollutants. One commenter notes that 83 percent of existing lightweight aggregate kilns are currently achieving both a hydrocarbon level of 20 ppmv and a carbon monoxide standard of 100 ppmv.

We carefully considered the merits and drawbacks to requiring both a hydrocarbon and carbon monoxide standard. First, stack gas carbon monoxide levels may not be a universally reliable indicator of combustion intensity and efficiency for some lightweight aggregate kilns due, first, to carbon monoxide generation by disassociation of carbon dioxide to carbon monoxide at high temperatures and, second, to evolution of carbon monoxide from the trace organic constituents in raw material feedstock.[175] One commenter supports our view by citing normal variability in carbon monoxide levels at their kiln with no apparent relationship to combustion conditions, such as temperature, residence time, excess oxygen levels. Thus, carbon monoxide can be overly conservative surrogate for some kilns.[176]

Second, requiring both continuous monitoring of carbon monoxide and hydrocarbon in the stack is at least somewhat redundant for control of organic emissions from combustion of hazardous waste because: (1) Hydrocarbons alone are a direct and reliable surrogate for measuring the destruction of organic hazardous air pollutants; and (2) carbon monoxide is generally a conservative indicator of good combustion conditions and thus good control of organic hazardous air pollutants. See Part Four, Section IV.B of the preamble for a discussion of our approach to using carbon monoxide or hydrocarbons to control organic emissions.

We identify a carbon monoxide level of 100 ppmv and a hydrocarbon level of 20 ppmv as floor control for existing sources because they are existing federally enforceable standards for hazardous waste burning lightweight aggregate kilns. See § 266.104(b) and (c). As current rules allow, sources would have the option of complying with either limit. Given that these are current rules, all lightweight aggregate kilns can currently achieve these emission levels. Thus, we estimate no emissions reductions or costs for these floor levels.

Lightweight aggregate kilns that choose to continuously monitor and

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[171] Hourly rolling average, reported as propane, dry basis and corrected to 7 percent oxygen.

[172] Hourly rolling average, dry basis, corrected to 7 percent oxygen.

[173] As discussed in Part 5, Section X.F, lightweight aggregate kilns that feed hazardous waste at a location other than the end where products are normally discharged and where fuels are normally fired must comply with the 20 ppmv hydrocarbon standards (*i.e.*, these sources do not have the option to comply with the carbon monoxide standard).

[174] Our data base for hydrocarbons consists of short-term emissions data.

[175] Raw materials enter the upper end of the kiln and move counter-current to the combustion gas. Thus, as the raw materials are convectively heated in the upper end kiln above the flame zone, organic compounds can evolve from trace levels of organics in the raw materials. These organic compounds can be measured as hydrocarbons, and when only partially oxidized, carbon monoxide. This process is not related to combustion of hazardous waste or other fuels in the combustion zone at the other end of the kiln.

[176] Of course, if a source elects to comply with the carbon monoxide standard, then we are sure that it is achieving good combustion conditions and good control of organic hazardous air pollutants that could be potentially emitted from hazardous waste fed into the combustion zone.

comply with the carbon monoxide standard must demonstrate during the performance test that they are also in compliance with the hydrocarbon emission standard. In addition, kilns that monitor carbon monoxide alone must also set operating limits on key parameters that affect combustion conditions to ensure continued compliance with the hydrocarbon emission standard. We developed this modification because of some limited data that show a source can produce high hydrocarbon emissions while simultaneously producing low carbon monoxide emissions. We conclude from this information that it is necessary to confirm the carbon monoxide-hydrocarbon emissions relationship for every source that selects to monitor carbon monoxide emissions alone. See discussion in Part Four, Section IV.B.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? In the April 1996 proposal, we identified beyond-the-floor control levels for carbon monoxide and hydrocarbon in the main stack of 50 ppmv and 6 ppmv, respectively. (61 FR at 17407.) These beyond-the-floor levels were based on the use of a combustion gas afterburner. We indicated in the proposal, however, that this type of beyond-the-floor control would be cost prohibitive. Our preliminary estimates suggested that going beyond-the-floor for carbon monoxide and hydrocarbons would more than double the national costs of complying with the proposed standards. We continue to believe that a beyond-the-floor standard for carbon monoxide and hydrocarbons based on an afterburner is not justified and do not adopt a beyond-the-floor standard for existing lightweight aggregate kilns.

In summary, we adopt the floor emission levels for hydrocarbons, 20 ppmv, or carbon monoxide, 100 ppmv, as standards in the final rule.

c. What Is the MACT Floor for New Sources? In the April 1996 NPRM, we identified MACT floor control as operating the kiln under good combustion practices. Because we were unable to quantify good combustion practices, floor control for the single best controlled source was the same as for existing sources. We proposed, therefore, a floor emission level of 14 ppmv for hydrocarbons and a 100 ppmv limit for carbon monoxide. (61 FR at 17409.) In the May 1997 NODA, we continued to identify MACT floor control as good combustion practices and we took comment on the same emission levels as existing sources: 20 ppmv for hydrocarbons and 100 ppmv for carbon monoxide. (62 FR at 24235.)

In developing the final rule, we considered the comment that the rule should allow compliance with either a carbon monoxide standard of 100 ppmv or a hydrocarbon standard of 20 ppmv. Given that this option is available under the existing regulations for new and existing sources, we conclude that this represents MACT floor for new sources. These emission levels are achieved by operating the kiln under good combustion practices to minimize fuel-related hydrocarbons and carbon monoxide emissions. As current rules allow, sources would have the option of complying with either limit. See § 266.104(b) and (c).

We also considered site selection based on availability of acceptable raw material hydrocarbon content as an approach to establish a hydrocarbon emission level at new lightweight aggregate kilns. This approach is similar to that done for new hazardous waste burning cement kilns at greenfield sites (see discussion above). For cement kilns, we finalize a new source floor hydrocarbon emission standard at a level consistent with the proposed standard for nonhazardous waste burning cement kilns. Because we are planning to issue MACT emission standards for nonhazardous waste lightweight aggregate kiln sources, we will revisit establishing a hydrocarbon standard at new lightweight aggregate kilns at that time so that a hydrocarbon standard, if determined appropriate, is consistent for these sources. We are deferring this decision to a later date to ensure that hazardous waste sources are regulated no less stringently than nonhazardous waste lightweight aggregate kilns.

In summary, we are identifying a carbon monoxide level of 100 ppmv and a hydrocarbon level of 20 ppmv as floor control for new sources because they are existing federally enforceable standards for hazardous waste burning lightweight aggregate kilns. As discussed for existing sources above, lightweight aggregate kilns that choose to continuously monitor and comply with the carbon monoxide standard must demonstrate during the performance test that they are also in compliance with the hydrocarbon emission standard.

d. What Are Our Beyond-the-Floor Considerations for New Sources? In the April 1996 proposal, we identified beyond-the-floor emission levels for hydrocarbons and carbon monoxide of 6 ppmv and 50 ppmv, respectively for new sources. These beyond-the-floor levels were based on the use of a combustion gas afterburner. (61 FR at 17409.) We indicated in the proposal, however, that beyond-the-floor control was not justified due to the significant costs to retrofit kilns with afterburner controls. We estimated that going beyond-the-floor for hydrocarbons and carbon monoxide would more than double the national costs of complying with the proposed standards. We concluded that beyond-the-floor standards were not warranted. In the May 1996 NODA, we again indicated that a beyond-the-floor standard based on use of an afterburner would not be cost-effective and, therefore, justified. As discussed above for existing sources, we conclude that a beyond-the-floor standard for carbon monoxide and hydrocarbons based on use of an afterburner would not be justified and do not adopt a beyond-the-floor standard for new lightweight aggregate kilns. (62 FR 24235.)

In summary, we adopt the floor emission levels for hydrocarbons, 20 ppmv, or carbon monoxide, 100 ppmv, as standards in the final rule.

9. What Are the Standards for Destruction and Removal Efficiency?

We establish a destruction and removal efficiency (DRE) standard for existing and new lightweight aggregate kilns to control emissions of organic hazardous air pollutants other than dioxins and furans. Dioxins and furans are controlled by separate emission standards. See discussion in Part Four, Section IV.A. The DRE standard is necessary, as previously discussed, to complement the carbon monoxide and hydrocarbon emission standards, which also control these hazardous air pollutants.

The standard requires 99.99 percent DRE for each principal organic hazardous constituent (POHC), except that 99.9999 percent DRE is required if specified dioxin-listed hazardous wastes are burned. These wastes—F020, F021, F022, F023, F026, and F027—are listed as RCRA hazardous wastes under part 261 because they contain high concentrations of dioxins.

a. What Is the MACT Floor for Existing Sources? Existing sources are currently subject to DRE standards under § 266.104(a) that require 99.99 percent DRE for each POHC, except that 99.9999 percent DRE is required if specified dioxin-listed hazardous wastes are burned. Accordingly, these standards represent MACT floor. Since all hazardous waste lightweight aggregate kilns must currently achieve these DRE standards, they represent floor control.

b. What Are Our Beyond-the-Floor Considerations for Existing Sources? Beyond-the-floor control would be a requirement to achieve a higher percentage DRE, for example, 99.9999 percent DRE for POHCs for all hazardous wastes. A higher DRE could be achieved by improving the design, operation, or maintenance of the combustion system to achieve greater combustion efficiency.

Even though the 99.99 percent DRE floor is an existing RCRA standard, a substantial number of existing hazardous waste combustors are not likely to be routinely achieving 99.999 percent DRE, however, and most are not likely to be achieving 99.9999 percent DRE. Improvements in combustion efficiency will be required to meet these beyond-the-floor DREs. Improved combustion efficiency is accomplished through better mixing, higher temperatures, and longer residence times. As a practical matter, most combustors are mixing-limited and may not easily achieve 99.9999 percent DRE. For a less-than-optimum burner, a certain amount of improvement may typically be accomplished by minor, relatively inexpensive combustor modifications—burner tuning operations such as a change in burner angle or an adjustment of swirl—to enhance mixing on the macro-scale. To achieve higher DREs, however, improved mixing on the micro-scale may be necessary. This involves significant, energy intensive and expensive modifications such as burner redesign and higher combustion air pressures. In addition, measurement of such DREs may require increased spiking of POHCs and more sensitive stack sampling and analysis methods at added expense.

Although we have not quantified the cost-effectiveness of a beyond-the-floor DRE standard, it would not appear to be cost-effective. For reasons discussed above, the cost of achieving each successive order-of-magnitude improvement in DRE will be at least constant, and more likely increasing. Emissions reductions diminish substantially, however, with each order of magnitude improvement in DRE. For example, if a source were to emit 100 gm/hr of organic hazardous air pollutants assuming zero DRE, it would emit 10 gm/hr at 90 percent DRE, 1 gm/hr at 99 percent DRE, 0.1 gm/hr at 99.9 percent DRE, 0.01 gm/hr at 99.99 percent DRE, and 0.001 gm/hr at 99.999 percent DRE. If the cost to achieve each order of magnitude improvement in DRE is roughly constant, the cost-effectiveness of DRE decreases with each order of magnitude improvement in DRE. Consequently, we conclude that this relationship between compliance cost and diminished emissions reductions suggests that a beyond-the-floor standard is not warranted in light of the resulting, poor cost-effectiveness.

c. What Is the MACT Floor for New Sources? The single best controlled source, and all other hazardous waste lightweight aggregate kilns, are subject to the existing RCRA DRE standard under § 266.104(a). Accordingly, we adopt this standard of 99.99% DRE for most wastes and 99.9999% DRE for dioxin listed wastes as the MACT floor for new sources.

d. What Are Our Beyond-the-Floor Considerations for New Sources? As discussed above, although we have not quantified the cost-effectiveness of a more stringent DRE standard, diminishing emissions reductions with each order of magnitude improvement in DRE suggests that cost-effectiveness considerations would likely come into play. We conclude that a beyond-the-floor standard is not warranted.

Part Five: Implementation

I. How Do I Demonstrate Compliance with Today's Requirements?

If you operate a hazardous waste burning incinerator, cement kiln, or lightweight aggregate kiln, you are required to comply with the standards and requirements in today's rule at all times, with one exception. If you are not feeding hazardous waste to the combustion device and if hazardous waste does not remain in the combustion chamber, these rules do not apply under certain conditions discussed below. You must comply with all of the notification requirements, emission standards, and compliance and monitoring provisions of today's rule by the compliance date, which is three years after September 30, 1999. As referenced later, the effective date of today's rule is September 30, 1999. The compliance and general requirements of this rule are discussed in detail in the follow sections. Also, we have included the following time line that will assist you in determining when many of the notifications and procedures, discussed in the later sections of this part, are required to be submitted or accomplished.

A. What Sources Are Subject to Today's Rules?

Sources affected by today's rule are defined as all incinerators, cement kilns and lightweight aggregate kilns burning hazardous waste on, or following September 30, 1999. This definition is essentially the same as we proposed in the April 1996 NPRM. Comments, regarding this definition, suggested that there was confusion as to when and under what conditions you would be subject to today's hazardous waste MACT regulations. In this rule, we specify that once you are subject to today's regulations, you remain subject to these regulations until you comply with the requirements for sources that permanently suspend hazardous waste burning operations, as discussed later.

However, just because you are subject to today's regulations does not mean that you must comply with the emission standards or operating limits at all times. In later sections of today's rule, we identify those limited periods and situations in which compliance with today's emission standards and operating limits may not be required.

1. What Is an Existing Source?

Today's rule clarifies that existing sources are sources that were constructed or under construction on the publication date for our NPRM—-April 19, 1996. This is consistent with the current regulatory definition of existing sources, but is different from the definition in our April 1996 NPRM. In the April 1996 NPRM, we defined existing sources as those burning hazardous waste on the proposal date (April 19, 1996) and defined new sources as sources that begin burning hazardous waste after the proposal date. Commenters note that the proposed definition of new sources is not consistent with current regulations found in 40 CFR part 63 or the Clean Air Act. Commenters also believe that our definition does not consider the intent of Congress, i.e., to require only those sources that incur significant costs during upgrade or modification to meet the most stringent new source emission standards. Commenters note that a large number of sources that are currently not burning hazardous waste could modify their combustion units to burn hazardous waste at a cost that would not surpass the reconstruction threshold and therefore they should not be required to meet the new source emission standards. Commenters suggest we use the statutory definition of an existing source found at section 112(a)(4) of the CAA and codified at 40 CFR 63.2. We agree with commenters and therefore adopt the definition of an existing source found at 40 CFR 63.2.

2. What Is a New Source?

Today's rule clarifies that new sources are those that commence construction or meet the definition of a reconstructed source following the proposal date of April 19, 1996. In the proposal, we define new sources as those that newly begin to burn hazardous waste after the proposal date. However, as noted earlier, commenters object to the proposed definition because of conflicts with the statutory language of the CAA and the current definition found in MACT regulations. In the CAA regulations, we define new sources as those that are newly constructed or reconstructed after a rule is proposed. Here again, we agree with commenters and adopt the current regulatory definition of new sources. We also adopt the CAA definition of reconstruction. This definition also is generally consistent with the RCRA definition of reconstruction and should avoid any confusion regarding what standards apply to reconstructed sources.

B. How Do I Cease Being Subject to Today's Rule?

Once you become an affected source as defined in § 63.2, you remain an affected source until you: (1) Cease hazardous waste burning operations, (*i.e.*, hazardous waste is not in the combustion chamber); (2) notify the Administrator, and other appropriate regulatory authorities, that you have ceased hazardous waste burning operations; and (3) begin complying with other applicable MACT standards and regulations, if any, including notifications, monitoring and performance tests requirements.

If you permanently stop burning hazardous waste, the RCRA regulations require you to initiate closure procedures within three months of the date you received your last shipment of hazardous waste, unless you have obtained an extension from the Administrator. The requirement to initiate closure pertains to your RCRA status and should not be a barrier to operational changes that affect your regulatory status under today's MACT requirements. This approach is a departure from the requirements proposed in the April 1996 NPRM, but is consistent with the approach we identified in the May 1997 NODA.

Once you permanently stop burning hazardous waste, you may only begin burning hazardous waste under the procedures outlined for new or existing sources that become affected sources following September 30, 1999. See later discussion.

C. What Requirements Apply If I Temporarily Cease Burning Hazardous Waste?

Under today's rule, if you temporarily cease burning hazardous waste for any reason, you remain subject to today's requirements as an affected source. However, even as an affected source, you may not have to comply with the emission standards or operating limits of today's rule when hazardous waste is not in the combustion chamber. Today's standards, associated operating parameter limits, and monitoring requirements are applicable at all times unless hazardous waste is not in the combustion chamber and either: (1) You elect to comply with other MACT standards that would be applicable if you were not burning hazardous waste (e.g. the nonhazardous waste burning Portland Cement Kiln MACT, the nonhazardous waste burning lightweight aggregate kiln MACT (Clay Products Manufacturing), or the Industrial Incinerator MACT); or (2) you are in a startup, shutdown, or malfunction mode of operation. We note that until these alternative MACT standards are promulgated, you need to comply only with other existing applicable air requirements if any. This approach is consistent with the current RCRA regulatory approach for hazardous waste combustion sources, but differs from our April 1996 proposed approach.

In our April 1996 NPRM, we proposed that sources always be subject to all of the proposed regulatory requirements, regardless of whether hazardous waste was in the combustion chamber. Commenters question the legitimacy of this requirement because the requirement was: (1) more stringent than current requirements; (2) not based on CAA statutory authority; and (3) contrary to current allowances under current MACT general provisions.

In response, we agree with commenters on issues (1) and (3) above. However, we disagree with commenters on issue number (2). The CAA does not allow sources to be subject to multiple MACT standards simultaneously. Because current CAA regulations also allow sources to modify their operations such that they can become subject to different MACT rules so long as they provide notification to the Administrator, our proposed approach appears to further complicate a situation that it was intended to resolve. One of the main reasons we proposed to subject hazardous waste burning sources to the final standards at all times was to eliminate the ability of sources to arbitrarily switch between regulation as a hazardous waste burning source and regulation as a nonhazardous waste burning source. We were concerned about the compliance implications associated with numerous notifications to the permitting authority to govern operations that may only occur for a short period of time. However, our concern appears unfounded because the MACT general provisions currently allow sources to change their regulatory status following notification, and we cannot achieve this goal without restructuring the entire MACT program. Therefore, consistent with the current program, we adopt an approach that allows a source to comply with alternative compliance requirements, while remaining subject to today's rule. This regulatory approach eliminates the reporting requirements and compliance determinations we intended to avoid with our proposed approach, while preserving the essence of the current RCRA approach, which applies more stringent emissions standards when hazardous waste is in the combustor.

1. What Must I Do to Comply with Alternative Compliance Requirements?

If you wish to comply with alternative compliance requirements, you must: (1) Comply with all of the applicable notification requirements of the alternative regulation; (2) comply with all the monitoring, record keeping and testing requirements of the alternative regulation; (3) modify your Notice Of Compliance (or Documentation of Compliance) to include the alternative mode(s) of operation; and (4) note in your operating record the beginning and end of each period when complying with the alternative regulation.

If you intend to comply with an alternative regulation for longer than three months, then you also must comply with the RCRA requirements to initiate RCRA closure. You may be able to obtain an extension of the date you are required to begin RCRA closure by submitting a request to the Administrator.

2. What Requirements Apply If I Do Not Use Alternative Compliance Requirements?

If you elect not to use the alternative requirements for compliance during periods when you are not feeding hazardous waste, you must comply with all of the operating limits, monitoring requirements, and emission standards of this rule at all times.[177] However, if you are a kiln operator, you also may be able to obtain and comply with the raw material variance discussed later.

D. What Are the Requirements for Startup, Shutdown and Malfunction Plans?

Sources affected by today's rule are subject to the provisions of 40 CFR 63.6 with regard to startup, shutdown and malfunction plans. However, the plan applies only when hazardous waste is

[177] The operating requirements do not apply during startup, shutdown, or malfunction provided that hazardous waste is not in the combustion chamber. See the discussion below in the text.

not in the combustion chamber. If you exceed an operating requirement during startup, shutdown, or malfunction when hazardous waste is in the combustion chamber, your exceedance is not excused by following your plan. If you exceed an operating requirement during startup, shutdown, or malfunction when hazardous waste is not in the combustion chamber, you must follow your startup, shutdown, and malfunction plan to come back into compliance as quickly as possibly, unless you have elected to comply with the requirements of alternative section 112 or 129 regulations that would apply if you did not burn hazardous waste. Failure to comply with the operating requirements to follow your startup, shutdown, and malfunction plan during the applicable periods is representative of a violation and may subject you to appropriate enforcement action.

In the April 1996 NPRM (see 63 FR at 17449), we proposed that startup, shutdown, and malfunction plans would not be applicable to sources affected by the proposed rule because affected sources must be in compliance with the standards at all times hazardous waste is in the combustion chamber. We reasoned that hazardous waste could not be fired unless you were in compliance with the emission standards and operating requirements, and stated that the information contained in the plan and the purpose of the plan was not intended to apply to sources affected by this rule.

In response, commenters state that startup, shutdown, and malfunction plans are appropriate for hazardous waste burning sources because malfunctioning operations are going to occur, and these plans are designed to reestablish compliant or steady state operations as quickly as possible. Furthermore, commenters maintain that because sources must prepare and follow facility-specific plans to address situations that could lead to increased emissions, rather than just note such an occurrence in the operating record, the public and we are better assured that the noncompliant operations are being remedied rather than awaiting for an after-the-fact enforcement action. Commenters also note that hazardous waste burning sources are no different than other MACT sources who are required to use such plans.

After considering comments, we agree with commenters that startup, shutdown, and malfunction plans are valuable compliance tools and should be applicable to hazardous waste burning sources. However, we are concerned that some sources may attempt to use startup, shutdown, and malfunction plans to circumvent enforcement actions by claiming they were never out of compliance if they followed their plan. Therefore, we restrict the applicability of startup, shutdown, and malfunction plans to periods when hazardous waste is not in the combustion chamber. This restriction addresses the concern that operations under startup, shutdown, and malfunction could lead to increased emissions of hazardous air pollutants.

We considered whether to specifically prohibit sources from feeding hazardous waste during periods of startup and shutdown. However, we decided not to adopt this requirement because of a potential regulatory problem. The requirement could have inadvertently subjected sources that experience unscheduled shutdowns to enforcement action if hazardous waste remained in the combustion chamber during the shutdown process even if operating requirements were not exceeded. Additionally, we decided that the prohibition was unnecessary because performance test protocols restrict the operations of all sources when determining operating parameter limits. The following factors are pertinent in this regard: (1) Sources are required to be in compliance with their operating parameter limits at all times hazardous waste is in the combustion chamber; (2) operating parameter limits are determined through a performance test which must be performed under steady-state conditions (see § 63.1207(g)(1)(iii)); and (3) periods of startup and shutdown are not steady state conditions and therefore operating parameter limits determined through performance testing would not be indicative of those periods. Accordingly, burning hazardous waste during startup or shutdown would significantly increase the potential for a source to exceed an operating parameter limit, and we expect that sources would be unwilling to take that chance as a practical matter.

E. What Are the Requirements for Automatic Waste Feed Cutoffs?

As proposed, you must operate an automatic waste feed cutoff system that immediately and automatically cuts off hazardous waste feed to the combustion device when:

(1) Any of the following are exceeded: Operating parameter limits specified in § 63.1209; an emission standard monitored by a continuous emissions monitoring system; and the allowable combustion chamber pressure; (2) The span value of any continuous monitoring system, except a continuous emissions monitoring system, is met or exceeded; (3) A continuous monitoring system monitoring an operating parameter limit under § 63.1209 or emission level malfunctions; or (4) Any component of the automatic waste feed cutoff system fails.

These requirements are provided at § 63.1206(c)(3). The system must be fully functional on the compliance date and interlocked with the operating parameter limits you specify in the Document of Compliance (as discussed later) as well as the other parameters listed above.

Also as proposed, after an automatic waste feed cutoff, you must continue to route combustion gases through the air pollution control system and maintain minimum combustion chamber temperature as long as hazardous waste remains in the combustion chamber. These requirements minimize emissions of regulated pollutants, including organic hazardous air pollutants, that could result from a perturbation caused by the waste feed cutoff. Additionally, you must continue to calculate all rolling averages and cannot restart feeding hazardous waste until all operating limits are within allowable levels.

Additionally, as currently required for BIFs, we proposed that the automatic waste feed cutoff system and associated alarms must be tested at least once every seven days. This must be done when hazardous waste is burned to verify operability, unless you document in the operating record that weekly inspections will unduly restrict or upset operations and that less frequent inspections will be adequate. At a minimum, you must conduct operational testing at least once every 30 days.

Commenters express the following concerns with the proposed automatic waste feed cutoff requirements: (1) Violations of the automatic waste feed cutoff linked operating parameters should not constitute a violation of the associated emission standard; (2) apparent redundancy exists between the proposed MACT requirements with the current RCRA requirements; (3) the proposed automatic waste feed cutoff requirements are inappropriate for all sources; and (4) uncertainty exists about how ‘‘instantaneous’’ is defined with regard to the nature of the automatic waste feed cutoff requirement.

We address issue (1) later in this section. With respect to issue (2), our permitting approach (*i.e.*, a single CAA title V permit to control all stack emissions) minimizes the potential redundancy of two permitting programs.

In response to issue (3), we acknowledge that not all sources may be capable of setting operating limits or continuously monitoring all of the prescribed operating parameters due to unique design characteristics inherent to individual units. However, you may take advantage of the provisions found in § 63.8(f) which allow you to request the use of alternative monitoring techniques. See also § 63.1209(g)(1).

For issue (4), commenters express concern that requiring an immediate, instantaneous, and abrupt cutoff of the entire waste feed can cause perturbations in the combustion system that could result in exceedances of additional operating limits. We agree with commenters that a ramping down of the waste feedrate could preclude this problem in many cases and in the final rule allow a one-minute ramp down for pumpable wastes. To ensure that your ramp down procedures are bona fide and not simply a one-minute delay ending in an abrupt cutoff, you must document your ramp down procedures in the operating and maintenance plan. The procedures must specify that the ramp down begins immediately upon initiation of automatic waste feed cutoff and provides for a gradual ramp down of the hazardous waste feed. Note that if an emission standard or operating limit is exceeded during the ramp down, you nonetheless have failed to comply with the emission standards or operating requirements. The ramp down is not applicable, however, if the automatic waste feed cutoff is triggered by an exceedance of any of the following operating limits: minimum combustion chamber temperature; maximum hazardous waste feedrate; or any hazardous waste firing system operating limits that may be established for your combustor on a site-specific basis. This is because these operating conditions are fundamental to proper combustion of hazardous waste and an exceedance could quickly result in an exceedance of an emission standard. We restrict the ramp down to pumpable wastes because: (1) Solids are often fed in batches where ramp down is not relevant (*i.e.*, ramp down is only relevant to continuously fed wastes); and (2) incinerators burning solids also generally burn pumpable wastes and ramping down on pumpables only should preclude the combustion perturbations that could occur if all wastes were abruptly cutoff.

Finally, with respect to issue number (1), if you exceed an operating parameter limit while hazardous waste is in the combustion chamber, then you have failed to ensure compliance with the associated emission standard. Accordingly, appropriate enforcement action on the exceedance can be initiated to address the exceedance. This enforcement process is consistent with current RCRA enforcement procedures regarding exceedances of operating parameter limits. However, as commenters note, we acknowledge that an exceedance of an operating parameter limit does not necessarily demonstrate that an associated emissions standard is exceeded. Nevertheless, in general, an exceedance of an operating parameter limit in a permit or otherwise required is an actionable event for enforcement purposes.

Operating parameter limits are developed through performance tests that successfully demonstrate compliance with the standards. If a source exceeds an operating limit set during the performance test to show compliance with the standard, the source can no longer assure compliance with the associated standard. Furthermore, these operating parameter limits appear in enforceable documents, such as your NOC or your title V permit.

F. What Are the Requirements of the Excess Exceedance Report?

In today's rule, we finalize the requirement to report to the Administrator when you incur 10 exceedances of operating parameter limits or emissions standards monitored with a continuous emissions monitoring system within a 60 day period. See § 63.1206(c)(3)(vi). If a source has 10 exceedances within the 60 day period, the 60 day period restarts after the notification of the 10th exceedance. This provision is intended to identify sources that have excess exceedances due to system malfunction or performance irregularities. This notification requirement both highlights the source to regulatory officials and provides an added impetus to the facility to correct the problem(s) that may exist to limit future exceedances. For example, a source that must submit an excess exceedance report may be unable to operate under its current operating limits, which suggests that the source may need to perform a new comprehensive performance test to establish more appropriate operating limits.

We discussed this provision in the April 1996 NPRM. Some commenters may have misunderstood our proposal while others felt that 10 exceedances in sixty days was not a feasible number to set the reporting limit. Other commenters state that an industry wide MACT-like analysis is necessary to identify an achievable or appropriate number of exceedances upon which to set the reporting limit.

We disagree with such comments. A MACT-like analysis is not called for in this case because this requirement is not an emission standard. This is a notification procedure that is a compliance tool to identify sources that cannot operate routinely in compliance with their operating parameter limits and emissions standards monitored with a continuous emissions monitoring system. Ideally, all sources should operate in compliance with all the standards and operating parameter limits at all times. Because, in the past, sources have been able to exceed their operating limits without having to notify the Agency, this does not mean that we condone, expect, or are unconcerned with such activity. In fact, the main reason we require this notification is because such activity exists to the current extent and because the Regions and States have identified it as a problem. We select 10 exceedances in sixty days as the value that triggers reporting after discussions with Regional and State permit writers. Our discussions revealed that many hazardous waste combustion sources are required to notify regulatory officials following a single exceedance of an operating limit, while others don't have any reporting requirements linked to exceedances. Regions and States noted that because there is no current regulatory requirement for exceedance notifications, it is very difficult to require such notifications on a site-specific basis. Following these discussions, we contemplated requiring a notification following a single exceedance, but decided that the such a reporting limit might unnecessarily burden regulatory officials with reports from facilities that have infrequent exceedances. Therefore, our approach of 10 exceedances in a 60 day period is a reasonably implementable limit and is not overly burdensome. Adopting this approach achieves an appropriate balance between burden on facilities and regulators and the need to identify underlying operational problems that may present unacceptable risks to the public and environment.

To reiterate, this provision applies to any 10 exceedances of operating parameter limits or emission standards monitored with a continuous emissions monitoring system.

G. What Are the Requirements for Emergency Safety Vent Openings?

In today's rule, we finalize requirements that govern the operation of emergency safety vents. See § 63.1206(c)(4). These requirements: clarify the regulatory status of emergency safety vent events; require development of an emergency safety vent operating plan that specifies procedures to minimize the frequency and duration of emergency safety vent openings; and specify procedures to follow when an emergency safety vent opening occurs.

Key requirements regarding emergency safety vent openings include:

(1) Treatment of combustion gases—As proposed, you must route combustion system off-gases through the same emission control system used during the comprehensive performance test. Any bypass of the pollution control system is considered an exceedance of operating limits defined in the Documentation of Compliance (DOC) or Notification of Compliance (NOC);

(2) Emergency safety vent operating plan—As proposed, if you use an emergency safety vent in your system design, you must develop and submit with the DOC and NOC an emergency safety vent operating plan that outlines the procedures you will take to minimize the frequency and duration of emergency safety vent openings and details the procedure you will follow during and after an emergency safety vent opening; and

(3) Emergency safety vent reporting requirements—As proposed, if you operate an emergency safety vent, you must submit a report to the appropriate regulatory officials within five days of an emergency safety vent opening. In that report, you must detail the cause of the emergency safety vent opening and provide information regarding corrective measures you will institute to minimize such events in the future.

Commenters on the April 1996 NPRM (61 FR at 17440) state that emergency safety vent openings are safety devices designed to prevent catastrophic failures, safeguard the unit and operating personnel from pressure excursions and protect the air pollution control train from high temperatures and pressures. They suggest that restricting these operations is contrary to common sense. Furthermore, they state that emergency safety vent openings are most often due to local power outages and fluctuations in water flows going to the air pollution equipment. Commenters believe that emergency safety vent openings should not be considered violations and that not every emergency safety vent opening should be reportable for a variety of reasons including:

—Emergency safety vent openings have not been shown to be acutely hazardous. A study finds that they will not have any short-term impact on the health of workers on-site or residents of the nearby off-site community.
—Proper use of emergency safety vent systems minimizes the potential for impacts on operators and the neighboring public.
—Many emergency safety vents are downstream of the secondary combustion chamber and thus have low organic emissions.
—Some facilities have emergency safety vents connected to the air pollution control system and should be considered in compliance as long as the continuous emissions monitoring systems monitoring data does not indicate an exceedance.

Commenters propose several alternatives:

—Recording emergency safety vent openings (including the time, duration and cause of each event) in the operating record, available to the Administrator, or any authorized representative, upon request.
—Making emergency safety vent openings a part of startup, shutdown, malfunction and abatement plans.
—Reporting openings that occurs more frequently than once in any 90 day period, whereupon the Administrator may require corrective measures.
—Reporting only emergency safety vent openings in excess of 10 in a 60 day period.
—Conditions relating to an emergency safety vent operation should be a part of the site-specific permit.
—Rely on the present RCRA permit process which provides the opportunity for permit writers and hazardous waste combustion device owner/operators to review emergency safety vent system designs.

We agree that emergency safety vents are necessary safety devices for some incinerator designs that are intended to safeguard employees and protect the equipment from the dangers associated with system over-pressures or explosions. However, simply because emergency safety vents are necessary safety devices for some incinerator designs in the event of a major malfunction does not mean that their routine use is acceptable. We cannot overlook an event when combustion gases are emitted into the environment prior to proper treatment by the pollution control system. Therefore, an emergency safety vent opening is evidence that compliance is not being achieved. Nonetheless, we expect sources to continue to use safety vents when the alternative could be a catastrophic failure and substantial liability even though opening the vent is evidence of failure to comply with the emission standards.

Today's requirements are based on the fundamental need to ensure protection of human health and the environment against unquantified and uncontrolled hazardous air pollutant emissions. We do not agree that a change in the proposed emergency safety vent reporting requirement is warranted. These events are indicative of serious operational problems, and each event should be reported and investigated to reduce the potential of future similar events. As for including the emergency safety vent operating plan in the source-specific startup, shutdown, and malfunction plan, we see no reason to discourage that practice provided that a combined plan specifically addresses the events preceding and following an emergency safety vent opening.

H. What Are the Requirements for Combustion System Leaks?

You must prevent leaks of gaseous, liquid or solid materials from the combustion system when hazardous waste is being fed to or remains in the combustion chamber. To demonstrate compliance with this requirement you must either: (1) Maintain the combustion system pressure lower than ambient pressure at all times; (2) totally enclose the system; or (3) gain approval from the Administrator to use an alternative approach that provides the same level of control achieved by options 1 and 2.

Currently, these requirements exist for all sources under RCRA regulations. Many commenters question whether they were capable of meeting this requirement for various technical reasons. We acknowledge that certain situations may exist that prevent or limit a source from instantaneously monitoring pressure inside the combustion system, but in such situations, we can approve alternative techniques (under § 63.1209(g)(1)) that allow sources to achieve the objectives of the requirements. Because this requirement is identical to the current RCRA requirements, and because we have specifically provided alternative techniques to demonstrate compliance, modifications to this provision are not warranted.

I. What Are the Requirements for an Operation and Maintenance Plan?

You must prepare and at all times operate according to a operation and maintenance plan that describes in detail procedures for operation, inspection, maintenance, and corrective measures for all components of the combustor, including associated pollution control equipment, that could affect emissions of regulated hazardous air pollutants. The plan must prescribe how you will operate and maintain the combustor in a manner consistent with good air pollution control practices for minimizing emissions at least to the levels achieved during the comprehensive performance test. You must record the plan in the operating record. See § 63.1206(c)(7)(i).

In addition, if you own or operate a hazardous waste incinerator or hazardous waste burning lightweight aggregate kiln equipped with a baghouse, your operation and maintenance plan for the baghouse must include a prescribed inspection schedule for baghouse components and use of a bag leak detection system to identify malfunctions. This baghouse operation and maintenance plan must be submitted to the Administrator with the initial comprehensive performance test for review and approval. See § 63.1206(c)(7)(ii).

We require an operation and maintenance plan to implement the provisions of § 63.6(e). That paragraph requires you to operate and maintain your source in a manner consistent with good air pollution control practices for minimizing emissions. That paragraph, as all Subpart A requirements, applies to all MACT sources unless requirements in the subpart for a source category state otherwise. In addition, § 63.6(e)(2) states that the Administrator will determine whether acceptable operation and maintenance procedures are used by reviewing information including operation and maintenance procedures and records. Thus, paragraph (e)(2) effectively requires you to develop operation and maintenance procedures. Consequently, explicitly requiring you to develop an operation and maintenance plan is a logical outgrowth of the proposed rule.

Similarly, although we did not prescribe baghouse inspection requirements or require a bag leak detection system at proposal for incinerators and lightweight aggregate kilns, this is a logical outgrowth of the proposed rule. Section 63.6(e) requires sources to operate and maintain emission control equipment in a manner consistent with good air pollution control practices for minimizing emissions. Inspection of baghouse components is required to provide adequate maintenance, and a bag leak detection system is a state-of-the-art monitoring system that identifies major baghouse malfunctions. Absent use of a particulate matter CEMS or opacity monitor, use of a bag leak detection system is an essential monitoring approach to ensure that the baghouse continues to operate in a manner consistent with good air pollution control practices. Bag leak detection systems are required under the MACT standards for secondary lead smelters. See § 63.548. We have also proposed to require them as MACT requirements for several other source categories including primary lead smelters (see 63 FR 19200 (April 17, 1998)) and primary copper smelters (see 63 FR 19581 (April 20, 1998)). In addition, we have published a guidance document on the installation and use of bag leak detection systems: USEPA, ''Fabric Filter Bag Leak Detection,'' September 1997, EPA–454/R–98–015. Thus, although not explicitly required at proposal, a requirement to use bag leak detection systems is a logical outgrowth of the (proposed) requirements of § 63.6(e).

We are not prescribing a schedule for inspection of baghouse components or requiring a bag leak detection system for cement kilns because cement kilns must use a continuous opacity monitoring system (COMS) to demonstrate compliance with an opacity standard. A COMS is a better indicator of baghouse performance than a bag leak detection system. We could not use COMS for incinerators and lightweight aggregate kilns, however, because we do not have data to identify an opacity standard that is achievable by MACT sources (i.e., sources using MACT control and achieving the particulate matter standard).

We are not specifying the type of sensor that must be used other than: (1) The system must be certified by the manufacturer to be capable of detecting particulate matter emissions at concentrations of 1.0 milligram per actual cubic meter; and (2) the sensor must provide output of relative particulate matter loadings. Several types of instruments are available to monitor changes in particulate emission rates for the purpose of detecting fabric filter bag leaks or similar failures. The principles of operation of these instruments include electrical charge transfer and light scattering. The guidance document cited above applies to charge transfer monitors that use triboelectricity to detect changes in particle mass loading, but other types of monitors may be used. Specifically, opacity monitors may be used.

The economic impacts of requiring fabric filter bag leak detection systems are minimal. These systems are relatively inexpensive. They cost less than $11,000 to purchase and install. Further, we understand that most hazardous waste burning lightweight aggregate kilns are already equipped with triboelectric sensors. Finally, there are few hazardous waste incinerators that are currently equipped with fabric filters.

II. What Are the Compliance Dates for this Rule?

A. How Are Compliance Dates Determined?

In today's rule, as with other MACT rules, we specify the compliance date and then provide you additional time to demonstrate compliance through performance testing. Generally, you must be in compliance with the emission standards on September 30, 2002 unless you are granted a site-specific extension of the compliance date of up to one year. By September 30, 2002, you must complete modifications to your unit and establish preliminary operating limits, which must be included in the Documentation of Compliance (DOC) and recorded in the operating record. Following the compliance date you have up to 180 days to complete the initial comprehensive performance test and an additional 90 days to submit the results of the performance test in the Notification of Compliance (NOC). In the NOC, you also must certify compliance with applicable emission standards and define the operating limits that ensure continued compliance with the emission standards.

In the April 1996 NPRM, we proposed that sources comply with all the substantive requirements of the rule on the compliance date. This required sources to conduct their performance test as well as submit results in the NOC by the compliance date. The compliance date discussed in the April 1996 NPRM contained a statutory limitation of three years following the effective date of the final rule (*i.e.,* the publication date of the final rule) with the possibility of a site-specific extension of up to one year for the installation of controls to comply with the final standards, or to allow for waste minimization reductions.

In the May 1997 NODA, we acknowledged that the April 1996 NPRM definition of compliance date and our approach to implementation created a number of unforseen difficulties (see 63 FR at 24236). Commenters note that the proposed compliance date definition and the ramifications of noncompliance create the potential for an unnecessarily large number of source shut-downs due to an insufficient period to perform all the required tasks. Commenters recommend we follow the general provisions applicable to all MACT regulated sources, which allow sources to demonstrate compliance through performance testing and submission of emission test results up to 270 days following the compliance date.

In the May 1997 NODA, we outlined an approach that allowed facilities to use the Part 63 general approach, which requires sources to complete performance testing within 180 days of the compliance date and submit test results 90 days after completing the performance test.[178] Today, we adopt this approach to foster consistent implementation of this rule as a CAA regulation.

Your individual dates for: (1) Compliance; (2) comprehensive performance testing; (3) submittal of test results; and (4) submittal of your NOC and title V permit requests depend on whether you were an existing source on April 19, 1996. Compliance dates for existing and new sources are discussed in the following two subsections.

B. What Is the Compliance Date for Sources Affected on April 19, 1996?

The compliance date for all affected sources constructed, or commencing construction or reconstruction before April 19, 1996 is September 30, 2002.

C. What Is the Compliance Date for Sources That Become Affected After April 19, 1996?

If you began construction or reconstruction after April 19, 1996, your compliance date is the latter of September 30, 1999 or the date you commence operations. If today's final emission standards are less stringent or as stringent as the standards proposed on April 19, 1996, you must be in compliance with the 1996 proposed standards upon startup. If today's final standards are more stringent than the proposed standards, you must be in compliance with the more stringent standards by September 30, 2002.

III. What Are the Requirements for the Notification of Intent to Comply?

For the reader's convenience, we summarize here the Notice of Intent to Comply (NIC) requirements finalized in the ''fast-track'' rule of June 19, 1998. (See 63 FR at 33782.)

The NIC requires you to prepare an implementation plan that identifies your intent to comply with the final rule and the basic means by which you intend to do so. That plan must be released to the public in a public forum and formally submitted to the Agency. The notice of intent certifies your intentions—either to comply or not to comply—and identifies milestone dates that measure your progress toward compliance with the final emission standards or your progress toward closure, if you choose not to comply. Prior to submitting the NIC to the regulatory Agency, you must provide notice of a public meeting and conduct an informal public meeting with your community to discuss the draft NIC and your plans for achieving compliance with the new standards.

We have redesignated the existing NIC provisions to meld them into the appropriate sections of subpart EEE. We have also revised the regulatory language to include references to the new provisions promulgated today. See Part Six, Section IX of today's preamble.

IV. What Are the Requirements for Documentation of Compliance?

A. What Is the Purpose of the Documentation of Compliance?

The purpose of the Documentation of Compliance[179] (DOC) is for you to certify by the compliance date that: (1) You have made a good faith effort to establish limits on the operating parameters specified in § 63.1209 that you believe ensure compliance with the emissions standards; (2) required continuous monitoring systems are operational and meet specifications; and (3) you are in compliance with the other operating requirements. See § 63.1211(d). This is necessary because all sources must be in compliance by the compliance date even though they are not required to demonstrate compliance, through performance testing, until 180 days after the compliance date. To fulfill the requirements of the DOC, you must place it in the operating record by the compliance date, September 30, 2002. (See compliance dates in Section II above.) Information that must be in the DOC includes all information necessary to determine your compliance status (e.g., operating parameter limits; functioning automatic waste feed cutoff system). All operating limits identified in the DOC are enforceable limits. However, if these limits are determined, after the initial comprehensive performance test, to have been inadequate to ensure compliance with the MACT standards, you will not be deemed to be out of compliance with the MACT emissions standards, if you complied with the DOC limits.[180]

B. What Is the Rationale for the DOC?

In the May 1997 NODA, we discussed the concept of the precertification of compliance (Pre-COC). The discussion required sources to precertify their compliance status on the compliance date by requiring them to submit a notification to the appropriate regulatory agency. This notification would detail the operating limits under which a source would operate during the period following the compliance date, but before submittal of the initial comprehensive performance test results in the Notification of Compliance.

Commenters question this provision since the Pre-COC operating limits would be effective only for the 270 days following the compliance date. Other commenters support the Pre-COC requirements provided the process is focused, straightforward, and limited to the minimum operating parameters necessary to document compliance. Commenters also stress that the Agency needed to specify the requirements of the prenotification, using appropriate sections of 40 CFR 266.103(b) and Section 63.9 when developing the specific regulatory requirements. In addition, commenters suggest that the Agency clarify the relationship between the Pre-COC and the title V permit, and indicate how or if the Pre-COC operating limits would be placed in the title V permit.

Other commenters state that the rationale underlying the Pre-COC is faulty because sources would remain subject to the RCRA permit conditions until the NOC is submitted or until the title V permit is issued, which was our proposed approach to permitting at that time. Therefore, the Agency's concern that sources could be between regulatory regimes is not relevant. Commenters also state that Pre-COC requirements would be resource intensive and a needless exercise that diverted time and attention from preparing to come into compliance with MACT standards.

The DOC requirements and process adopted today provide the Agency and public a sound measure of assurance

[178] The general provisions of part 63 allow for 180 days after the compliance date to conduct a performance test and 60 days to submit its results to the appropriate regulatory agency. However, as commenters note, dioxin/furan analyses can require 90 days to complete. Therefore, the time allowed for submission of test results should be extended to 90 days, increasing the total time following the compliance date to 270 days. We agree with commenters and increase the time allowed for submission of test results from 60 to 90 days.

[179] We renamed the proposed Precertification of Compliance as the Documentation of Compliance to avoid any confusion with the RCRA requirement of similar name.

[180] Once you determine that you failed to demonstrate compliance during the performance test, all monitoring data is subject to potential case-by-case use as credible evidence to show noncompliance following that determination. Therefore, you could potentially find yourself in noncompliance for the period which the DOC limits were in effect following that determination, but before submission of the NOC.

that, on the compliance date, combustion sources are operated within limits that should ensure compliance with the MACT standards and protection to human health and the environment. We agree that operating limits in the DOC will be in effect only for a short period of time and that affected sources will not be between regulatory regimes at any time. Given the relatively short period of time the DOC conditions will be in effect, however, we chose for the final rule not to specify whether the conditions need to be incorporated into a title V permit and do not require the permitting authority to do so. We provide flexibility for agencies implementing title V programs to determine the appropriate level of detail to include in the permit, thereby allowing them to minimize the potential need for permit revisions. In addition, we do not require that the DOC be submitted to the permitting authority, to avoid burdening the permitting agency with unnecessary paper work during the period that they are reviewing site-specific performance test plans. In today's rule, we better define the period during which the DOC applies by specifying that the DOC is superseded by the NOC upon the postmark date for submittal of the NOC. Once you mail the NOC, its contents become enforceable unless and until superseded by test results submitted within 270 days following subsequent performance testing. This approach provides clarity on when the NOC supersedes the DOC.

C. What Must Be in the DOC?

You must complete your site-specific DOC and place it in your operating record by the compliance date. The DOC must contain all of the information necessary to determine your compliance status during periods of operation including all operating parameter limits. You must identify the DOC operating limits through the use of available data and information. If your unit requires modification or upgrades to achieve compliance with the emission standards, you can base this judgment on results of shakedown tests and/or manufacturers assertions or specifications. If your unit does not require modifications or upgrades to meet the emission standards of today's rule, you can develop the operating limits through analysis of previous performance tests or knowledge of the performance capabilities of your control equipment.

Your limitations on operating parameters must be based on an engineering evaluation prepared under your direction or supervision in accordance with a system designed. This evaluation must ensure that qualified personnel properly gathered and evaluated the information and supporting documentation, and considering at a minimum the design, operation, and maintenance characteristics of the combustor and emissions control equipment, the types, quantities, and characteristics of feedstreams, and available emissions data.

This requirement should not involve a significant effort because your decisions on whether to upgrade and modify your units will be based on the current performance of your control equipment and the performance capabilities of new equipment you purchase. We expect that, by the compliance date, you will have an adequate understanding of your unit's capabilities, given the three years to develop this expertise. Therefore, by the compliance date, you are expected to identify operating limits that are based on technical or engineering judgment that should ensure compliance with the emission standards.

V. What Are the Requirements for MACT Performance Testing?

A. What Are the Compliance Testing Requirements?

Today's final rule requires two types of performance testing to demonstrate compliance with the MACT emission standards: Comprehensive and confirmatory performance testing. See § 63.1207. The purpose of comprehensive performance testing is to demonstrate compliance and establish operating parameter limits. You must conduct your initial comprehensive performance tests by 180 days (i.e., approximately six months) after your compliance date. You must submit results within 90 days (i.e., approximately 3 months) of completing your comprehensive performance test. If you fail a comprehensive performance test, you must stop burning hazardous waste until you can demonstrate compliance with today's MACT standards. Comprehensive performance testing must be repeated at least every five years, but may be required more frequently if you change operations or fail a confirmatory performance test.

The purpose of confirmatory performance tests is to confirm compliance with the dioxin/furan emission standard during normal operations. You must conduct confirmatory performance tests midway between comprehensive performance tests. Confirmatory performance tests may be conducted under normal operating conditions. If you fail a confirmatory performance test, you must stop burning hazardous waste until you demonstrate compliance with the dioxin/furan standard by conducting a comprehensive performance test to establish revised operating parameter limits.

The specific requirements and procedures for these two performance tests are discussed later in this section. In addition, this section discusses the interaction between the RCRA permitting process and the MACT performance test.

1. What Are the Testing and Notification of Compliance Schedules?

Section 63.7 of the CAA regulations contains the general requirements for testing and notification of compliance. In today's rule, we adopt some § 63.7 requirements without change and adopt others with modifications. As summarized earlier, you must commence your initial comprehensive performance test within 180 days after your compliance date, consistent with the general § 63.7 requirements. You must complete testing within 60 days of commencement, unless a time extension is granted. This requirement is necessary because testing and notification of compliance deadlines are based on the date of commencement or completion of testing. Those deadlines could be meaningless if a source had unlimited time to complete testing. Although we propose to require testing to be completed within 30 days of commencement, commenters state that unforeseen events could occur (e.g., system breakdown causing extensive repairs; loss of samples from breakage of equipment or other causes requiring additional test runs) that could extend the testing period beyond normal time frames. We concur, and provide for a 60-day test period as well as a case-by-case time extension that may be granted by permit officials if warranted because of problems beyond our control.

Additionally, you must submit comprehensive performance test results to the Administrator within 90 days of test completion, unless a time extension is granted. We are allowing an additional 30 days for result submittal beyond the §§ 63.7(g) and 63.8(e)(5) 60-day deadlines because the dioxin/furan analyses required in today's rule may take this additional time to complete. We also are including a provision for a case-by-case time extension in the final rule because commenters express concern that the limited laboratory facilities nationwide may be taxed by the need to handle analyses simultaneously for many hazardous waste combustors. The available analytical services may not be able to handle the workload, that could cause some sources to miss the proposed 90-day deadline. We concur with commenters' concerns and have added a provision to allow permit officials to grant a case-by-case time extension, if warranted.

Test results must be submitted as part of the notification of compliance (NOC) submitted to the Administrator under §§ 63.1207(j) and 63.1210(d) documenting compliance with the emission standards and continuous monitoring system requirements, and identifying applicable operating parameter limits. These provisions are similar to §§ 63.7(g) and 63.8(e)(5), except that the NOC must be postmarked by the 90th day following the completion of performance testing and the continuous monitoring system performance evaluation.

Overall, the initial NOC must be postmarked within 270 days (i.e., approximately nine months) after your compliance date. You must initiate subsequent comprehensive performance tests within 60 months (i.e., five years) of initiating your initial comprehensive performance test. You must submit subsequent NOCs, containing test results, within 90 days after the completion of subsequent tests.

The rule allows you to initiate subsequent tests any time up to 30 days after the deadline for the subsequent performance test. Thus, you can modify the combustor or add new emission control equipment at any time and conduct new performance testing to document compliance with the emission standards. In addition, this testing window allows you to plan to commence testing well in advance of the deadline to address unforseen events that could delay testing.[181] This testing window applies to both comprehensive performance tests and confirmatory performance tests. For example, if the deadline for your second comprehensive performance test is January 10, 2008, you may commence the test at any time after completing the initial comprehensive performance test but not later than February 10, 2008. The deadline for subsequent comprehensive and confirmatory performance tests are based on the commencement date of the previous comprehensive performance test.

[181] We note that a case-by-case time extension for commencement of subsequent performance testing is also provided under § 63.1207(i).

2. What Are the Procedures for Review and Approval of Test Plans and Requirements for Notification of Testing?

In the April 1996 NPRM, we proposed in § 63.7(b)(1) to require submittal of a ''notification of performance test'' to the Administrator 60 days prior to the planned test date. This notification included the site-specific test plan itself for review and approval by the Administrator (§ 63.8(e)(3)). In the May 1997 NODA, to ensure coordination of destruction removal efficiency (DRE) and MACT performance testing, we considered requiring you to submit the test plan one year rather than 60 days prior to the scheduled test date to allow the regulatory official additional time to consider DRE testing in context with MACT comprehensive performance testing. This one-year test review period would only have applied to sources required to perform a DRE test.

In today's final rule, we maintain the requirement for you to submit the test plan one year prior to the scheduled test date, but apply that requirement to all sources, not just those performing a DRE test. After consideration of comments (described below), we determined that this one-year period is needed to provide regulatory officials sufficient time (i.e., nine months) to review and approve or notify you of intent to disapprove the plan. Nine months is needed for the review for all sources given the amount of technical information that would be included in the test plan, and would also allow time to assess whether a source is required to perform a DRE test (see Part IV, Section IV, for discussion of DRE testing requirements; see also § 63.1206(b)(8)). During this nine-month period, the regulatory officials will review your test plan and determine if it is adequate to demonstrate compliance with the emission standards and establish operating requirements.

After submittal of the test plan, review and approval or notification of intent to deny approval of the test plan will follow the requirements of § 63.7(c)(3). That section provides procedures for you to provide additional information before final action on the plan. It also requires you to comply with the testing schedule even if permit officials have not approved your test plan. The only exception to this requirement is if you proposed to use alternative test methods to those specified in the rule. In that case, you may not conduct the performance test until the test plan is approved, and you have 60 days after approval to conduct the test.

Several commenters suggest that it would be difficult for permit officials to review and approve test plans within the nine-month window given that many test plans may be submitted at about the same time. They cite experiences under RCRA trial burn plan approvals where permit officials have taken much longer than nine months to approve a plan, and have requested that the final rule allow for a longer review period. Commenters are concerned with the consequences of being required to conduct the performance test even though permit officials may not have had time to approve the test plan. They recite various concerns that permit officials may at a later date determine that the performance test was inadequate and require retesting. Commenters suggest that the rule establish the date for the initial comprehensive performance test as 60 days following approval of the test plan, whenever that may occur, thus extending the deadline for the performance test indefinitely from the current requirement of six months after the compliance date.

We maintain that the nine-month review period is appropriate for several reasons. First, we are unwilling to build into the regulations an indefinite period for review. This would have the potential to delay implementation of the MACT emission standards without any clear and compelling reason to do so.

Second, the RCRA experience with protracted approval schedules, sometimes over a decade ago, is not applicable or analogous to the MACT situation. Under the RCRA regulatory regime, particularly at the early stages, there were few incentives for either permit officials or owners or operators to expeditiously negotiate acceptable test plans. No statutory deadlines existed for a compliance date, and existing facilities operated under interim status (a type of grand fathering tantamount to a permit). This interim status scheme placed at least some controls on hazardous waste combustors during the permit application and trial burn test plan review periods. As a result, regulatory officials could take significant amounts of time to address what was then a new type of approval, that for trial burn testing to meet RCRA final permit standards.

Under MACT, the situation today is quite different. In light of the statutory compliance date of 3 years and the existing regulatory framework, sources know as of today's final rule that they need to respond promptly and effectively to permit officials' concerns about the test plan because the performance test must be conducted within six months after the compliance date whether or not the test plan is approved. And they have at least two years to prepare and submit these plans, and to work with regulatory officials even before doing so. For their part, permit officials recognize that they have the responsibility to review and approve the plan or notify the source of their intent to deny approval within the nine-month window given that the source must proceed with expensive testing on a fixed deadline whether or not the plan is approved. To the extent regulatory officials anticipate that many test plans will be submitted at about the same time, the agencies have at least two years to figure out ways to accommodate this scenario from a resource and a prioritization standpoint. If permit officials nevertheless fail to act within the nine-month review and approval period, a source could argue that this failure is tacit approval of the plan and that later ''second-guessing'' is not allowable. This should be a very strong incentive for regulatory officials to act within the nine months, especially with a two-year lead time to avoid this type of situation

In addition, the RCRA experience is not a particularly good harbinger of the future MACT test plan approval, as commenters suggest, because most sources will have already completed trial burn testing under RCRA. Thus, both the regulatory agencies and the facilities have been through one round of test plan submittal, review, and approval for their combustion units. Given that MACT testing is very similar to RCRA testing, approved RCRA test protocols can likely be modified as necessary to accommodate any changes required under the MACT rule. Although some of these changes may be significant, we expect that many will not be. For example, RCRA trial burn testing always included DRE testing. Under the MACT rule, DRE testing will not be required for most sources. And for sources where DRE testing is required under MACT, most will have already been through a RCRA approval of the DRE test protocol, which should substantially simplify the process under MACT.

The third reason that we maintain the nine-month review and approval window is appropriate is that discussions with several states leads us to conclude that they are prepared to meet their obligations under this provision. This is a highly significant indicator that the nine-month review and approval period is a reasonable period of time, particularly since all permitting agencies have at least two years to plan for submittal of test plans from the existing facilities in their jurisdictions.

In summary, sound reasons exist to expect that today's final rule provides sufficient time for the submittal, review, and approval of test plans. Furthermore, clear incentives exist for both owners and operators and permit officials to work together expeditiously to ensure that an approval or notice of intent to disapprove the test plan can be provided within the nine-months allotted.

On a separate issue, we also retain, in today's final rule, the 60-day time frame and requirements of § 63.7(b)(1) for submittal of the notification of performance test. Additionally, the final rule continues to provide an opportunity for, but does not require, the regulatory agency to review and oversee testing.

3. What Is the Provision for Time Extensions for Subsequent Performance Tests?

The Administrator may grant up to a one year time extension for any performance test subsequent to the initial comprehensive performance test. This enables you to consolidate MACT performance testing and any other emission testing required for issuance or reissuance of Federal/State permits.[182]

At the time of proposal, we were concerned about how to allow coordination of MACT performance tests and RCRA trial burns. As discussed elsewhere, the RCRA trial burn is superseded by MACT performance testing. However, a one-year time extension may still be necessary for you to coordinate performance of a RCRA risk burn. In addition, commenters state that there may be additional reasons to grant extension requests (*e.g.* some TSCA-regulated hazardous waste combustors may be required to perform stack tests beyond those required by MACT). Furthermore, some sources may have to comply with state programs requiring RCRA trial burn testing. To address these situations, to promote coordinated testing, and to avoid unnecessary source costs, the final rule allows up to a one-year time extension for the performance test.

When performance tests and other emission tests are consolidated, the deadline dates for subsequent comprehensive performance tests are adjusted correspondingly. For example, if the deadline for your confirmatory performance test is January 1 and your state-required trial burn is scheduled for September 1 of the same year, you can apply to adjust the deadline for the confirmatory performance test to September 1. If granted, this also would delay by a corresponding time period the deadline dates for subsequent comprehensive performance tests.

The procedures for granting or denying a time extension for subsequent performance tests are the same as those found in § 63.6(i), which allow the Administrator to grant sources up to one additional year to comply with standards.[183] These are also the same procedures apply to a request for a time extension for the initial NOC.

4. What Are the Provisions for Waiving Operating Parameter Limits During Subsequent Performance Tests?

Operating parameter limits are automatically waived during subsequent comprehensive performance tests under an approved performance test plan. See § 63.1207(h). This waiver applies only for the duration of the comprehensive performance test and during pretesting for an aggregate period up to 720 hours of operation. You are still required to be in compliance with MACT emissions standards at all times during these tests, however.

In the April 1996 NPRM, we proposed to allow the burning of hazardous waste only under the operating limits established during the previous comprehensive performance test (to ensure compliance with emission standards not monitored with a continuous emissions monitoring system). Two types of waivers from this requirement would have been provided during subsequent comprehensive performance tests: (1) An automatic waiver to exceed current operating limits up to 5 percent; and (2) a waiver that the Administrator may grant if warranted to allow the source to exceed the current operating limits without restriction. We proposed an automatic waiver because, without the waiver, the operating limits would become more and more stringent with subsequent comprehensive performance tests. This is because sources would be required to operate within the more stringent conditions to ensure that they did not exceed a current operating limit. This would result in a shrinking operating envelope over time.

A number of commenters question the comprehensive performance test's 5%

[182] In addition, this provision also may assist you when unforseen events beyond your control (*e.g.*, power outage, natural disaster) prevent you from meeting the testing deadline.

[183] Note, however, that § 63.6(i) applies to an entirely different situation: extension of time for initial compliance with the standards, not subsequent performance testing.

limit over existing permit conditions. Some commenters state that the EPA should not limit a facility's operating envelope from test to test based on operating conditions established during the previous test. The operator should be free to set any conditions for the comprehensive performance test, short of what the regulator deems to pose a short-term environmental or health threat or inadequate to ensure compliance with an emission standard. Commenters also state that the requirement that the facility accept the more stringent of the existing 5% limit or the test result will inevitably result in the ratcheting down of limits over time. Since certain conditions have much greater variation than 5% over a limit, sufficient variability must be allowed so the operator can run a test under the conditions it wishes to use as the basis for worst case operation.

We agree that a waiver is necessary to avoid ratcheting down the operating limits in subsequent tests. Further, in view of the natural variability in hazardous waste combustor operations, a 5% waiver may be insufficient. Because you are required to comply with the emission standards, there does not appear to be any reason to establish national restrictions on operations during subsequent performance tests. Therefore, the final rule allows a waiver from previously established operating parameter limits, as long as you comply with MACT emission standards and are operating under an approved comprehensive performance test plan. Operating parameter limits will be reset based on the new tests. Furthermore, the permitting authority will review and has the opportunity to disapprove any proposed test conditions which may result in an exceedance of an emission standard.

B. What Is the Purpose of Comprehensive Performance Testing?

The purposes of the comprehensive performance test are to: (1) Demonstrate compliance with the continuous emissions monitoring systems-monitored emission standards for carbon monoxide and hydrocarbons; (2) conduct manual stack sampling to demonstrate compliance with the emission standards for pollutants that are not monitored with a continuous emissions monitoring system (e.g., dioxin/furan, particulate matter, DRE, mercury, semivolatile metal, low volatile metal, hydrochloric acid/chlorine gas); (3) establish limits on the operating parameters required by § 63.1209 (Monitoring Requirements) to ensure compliance is maintained with those emission standards for which a continuous emissions monitoring system is not used for compliance monitoring; and (4) demonstrate that performance of each continuous monitoring system is consistent with applicable requirements and the quality assurance plan. In general, the comprehensive performance test is similar in purpose to the RCRA trial burn and BIF interim status compliance test, but with relatively less Agency oversight and a higher degree of self-implementation, as discussed below.

The basic framework for comprehensive performance testing is set forth in the existing general requirements of subpart A, part 63. Therefore, for convenience of the reader, we will review key elements of those regulations and highlight any modifications made specifically for hazardous waste combustors.

1. What Is the Rationale for the Five Year Testing Frequency?

As discussed earlier, you must perform comprehensive performance testing every five years. We require periodic comprehensive performance testing because we are concerned that long-term stress to the critical components of a source (e.g., firing systems, emission control equipment) could adversely affect emissions.

In the April 1996 NPRM, we proposed that large sources (i.e., those with a stack gas flow rate greater than 23,127 acfm) and sources that accept off-site wastes would be required to perform comprehensive performance testing every three years. We also proposed that small, on-site sources perform comprehensive performance testing every five years unless the Administrator determined otherwise on a case-specific basis. Commenters suggest that the proposed three year testing frequency is too restrictive. They said that test plan approval time, bad weather, mechanical failure, and the testing itself combine to make the proposed test frequency too tight for tests of this magnitude.

We agree that, due to the magnitude of the comprehensive performance test, a more appropriate testing schedule is required. Therefore, we adopt a comprehensive performance testing frequency of every five years for small and large sources. In addition, this comprehensive performance testing schedule should correspond to the renewal of the title V permit. More frequent comprehensive performance testing is required, however, if there is a change in design, operation, or maintenance that may adversely affect compliance. See § 63.1206(b)(6).

2. What Operations Are Allowed During a Comprehensive Performance Test?

Because day-to-day limits are established for operating parameters during the comprehensive performance test, we allow operation during the performance test as necessary provided the unit complies with the emission standards. Accordingly, you can spike feedstreams with metals or chlorine, for example, to ensure that the feedrate limits are sufficient to accommodate normal operations while allowing some flexibility to feed higher rates. See Part Four, Section I. B. above for further discussion of normal operations. We note that this differs from § 63.7(e) which requires performance testing under "normal" operating conditions. See § 63.1207(g).

Most commenters agree that the comprehensive performance test should be conducted under extreme conditions at the edge of the operating envelope. Commenters point out that they needed to operate in this mode to establish operating parameter limits to cover all possible normal operating emissions values. Commenters also state that feedstreams may need to be spiked with metals or chlorine to ensure limits high enough to allow operational flexibility. We agree that these modes of operation are needed to establish operating parameter limits that cover all possible normal operating emissions values.[184] There is precedent for this approach in current rules regulating hazardous waste combustors (e.g., the RCRA incinerator and BIF rules).

In addition, two or more modes of operation may be identified, for which separate performance tests must be conducted and separate limits on operating conditions must be established. If you identify two modes of operation for your source, you must note in the operating record which mode you are operating under at all times. For example, two modes of operation must be identified for a cement kiln that routes kiln off-gas through the raw meal mill to help dry the raw meal. When the raw meal mill is not operating (perhaps 15% of the time), the kiln gas bypasses the raw meal mill. Emissions of particulate matter and other hazardous air

[184] Allowing sources to operate during MACT comprehensive performance testing under the worst-case conditions, as allowed during RCRA compliance testing, rather than under normal conditions as provided by § 63.7(e) for other MACT sources, ensures that the emissions standards do not restrict hazardous waste combustors using MACT control to operations resulting in emissions that are lower than normal. Therefore, allowing performance testing on a worst-case basis provides that the MACT emission standards are achievable in practice by sources using MACT control.

pollutants or surrogates may vary substantially depending on whether the kiln gas bypasses the raw meal mill.

As discussed below for confirmatory testing, when conducting the comprehensive performance test, you also must operate under representative conditions for specified parameters that may affect dioxin/furan emissions. These conditions must ensure that emissions are representative of normal operating conditions. Also, when demonstrating compliance with the particulate matter, semivolatile metal, and low volatile metal emission standards, when using manual stack sampling, and when demonstrating compliance with the dioxin/furan and mercury emission standards using carbon injection or carbon bed, you must operate under representative conditions for the cleaning cycle of the particulate matter control device. This is because particulate matter emissions increase momentarily during cleaning cycles and can affect emissions of these pollutants.

3. What Is the Consequence of Failing a Comprehensive Performance Test?

If you determine that you failed any emission standard during the performance test based on: (1) Continuous emissions monitoring systems recordings; (2) results of analysis of samples taken during manual stack sampling; or (3) results of the continuous emissions monitoring systems performance evaluation, you must immediately stop burning hazardous waste. However, if you conduct the comprehensive performance test under two or more modes of operation, and you meet the emission standards when operating under one or more modes of operation, you are allowed to continue burning under the mode of operation for which the standards were met.

If you fail one or more emission standards during all modes of operation tested, you may burn hazardous waste only for a total of 720 hours and only for the purposes of pretesting (i.e., informal testing to determine if the combustor can meet the standards operating under modified conditions) or comprehensive performance testing under modified conditions. The same standards apply for the retest as applied for the original test. These conditions apply when you fail the initial or subsequent comprehensive performance test.

A number of commenters suggest that the 720 operating hours allowed after a failed performance test should be renewable, as they are under existing incinerator and BIF rules. We are persuaded by the commenters' rationale and will adopt this practice in today's rule. The final rule allows the 720 hours of operation following a failed performance test to be renewed as often as the Administrator deems reasonable. We note that hazardous waste combustors are currently subject to virtually these same requirements under RCRA rules.

If you fail a comprehensive performance test, you must still submit a NOC as required indicating the failure. We want to ensure that the regulatory authorities are fully aware of a failure and the need for the facility to initiate retesting.

We do not specifically address other consequences of failing the comprehensive performance test in the regulatory language. We will instead rely on the regulating agency's enforcement policy to govern the type of enforcement response at a facility that exceeds an emission standard, fails to ensure compliance with the standards, or fails to meet a compliance deadline.

C. What Is the Rationale for Confirmatory Performance Testing?

Confirmatory performance testing for dioxin/furan is required midway between the cycle required for comprehensive performance testing to ensure continued compliance with the emission standard. We require such testing only for dioxin/furan given: (1) The health risks potentially posed by dioxin/furan emissions; (2) the lack of a continuous emissions monitoring system for dioxin/furan; (3) the lack of a material that directly and unambiguously relates to dioxin/furan emissions which could be monitored continuously by means of feedrate control (as opposed to, for example, metals feedrates, which directly relate to metals emissions); and (4) wear and tear on the equipment, including any emission control equipment, which over time could result in an increase in dioxin/furan emissions even though the source stays in compliance with applicable operating limits.

Although emissions of dioxins/furans appear to be primarily a function of whether particulate matter is retained in post-combustion regions of the combustor (e.g., in an electrostatic precipitator or fabric filter, or on boiler tubes) in the temperature range that enhances dioxin/furan formation, the factors that affect dioxin/furan formation are imperfectly understood. Certain materials seem to inhibit formation while others seem to enhance formation. Some materials seem to be precursors (e.g., PCBs). Changes in the residence time of particulate matter in a control device may affect the degree of chlorination of dioxins/furans, and thus the toxicity equivalents of the dioxins/furans. Given these uncertainties, the health risks posed by dioxins/furans, and the relatively low cost of dioxin/furan testing, it appears prudent to require confirmatory testing to determine if changes in feedstocks or operations that are not limited by the MACT rule may have increased dioxin/furan emissions to levels exceeding the standard. We also note that confirmatory dioxin/furan testing is required for municipal waste combustors (60 FR at 65402 (December 19, 1995)).

Confirmatory testing differs from comprehensive testing, however, in that you are required to operate under normal, representative conditions during confirmatory testing. This will reduce the cost of the test, while providing the essential information, because you will not have to establish new operating limits based on the confirmatory test.

1. Do the Comprehensive Testing Requirements Apply to Confirmatory Testing?

The following comprehensive performance testing requirements discussed above also apply to confirmatory testing: Agency oversight, notification of performance test, notification of compliance, time extensions, and failure to submit a timely notice of compliance. However, we modify some of the comprehensive test requirement for confirmatory tests, as discussed below.

2. What Is the Testing Frequency for Confirmatory Testing?

You are required to conduct confirmatory performance testing 30 months (i.e., 2.5 years) after the previous comprehensive performance test. The same two-month testing window, applicable for comprehensive tests, also applies to confirmatory tests.

Several commenters state that the proposed schedule for confirmatory tests is too frequent. The April 1996 NPRM would have required large and off-site sources to conduct confirmatory performance testing 18 months after the previous comprehensive performance test. Small, on-site sources would have been required to conduct the testing 30 months after the previous comprehensive performance test. One commenter suggests that the frequency should be at multiples of 12 months to avoid seasonal weather problems in many locations. Other commenters state that EPA's justification for confirmatory tests is not supported by evidence showing increased emissions due to equipment aging and that the performance of combustion practice parameters is already assured through continuous monitoring systems.

We agree that due to the magnitude and expense of the test, a more appropriate testing schedule would be every 2.5 years, mid-way between the comprehensive performance test cycle. In addition, we agree that testing in certain locations at certain times of the year (e.g., northern states in the winter) can be undesirable. Although possible, it would add to the difficulty and expense of the testing. As previously discussed, sources can request a time extension to allow for a more appropriate testing season. However, the regulatory date for confirmatory testing remains midcycle to the comprehensive performance testing.

3. What Operations Are Allowed During Confirmatory Performance Testing?

As proposed, you are required to operate under normal conditions during confirmatory performance testing. Normal operating conditions are defined as operations during which: (1) The continuous emissions monitoring systems that measure parameters that could relate to dioxin/furan emissions—carbon monoxide or hydrocarbons—are recording emission levels within the range of the average value for each continuous emissions monitoring system (the sum of all one-minute averages, divided by the number of one minute averages) over the previous 12 months to the maximum allowed; (2) each operating parameter limit established to maintain compliance with the dioxin/furan emission standard (see discussion in Part Five, Section VI.D.1 below and § 63.1209(k)) is held within the range of the average values over the previous 12 months and the maximum or minimums, as appropriate, that are allowed; (3) chlorine feedrates are set at normal or greater; and (4) when using carbon injection or carbon bed, the test is conducted under representative conditions for the cleaning cycle of the particulate matter control device. See § 63.1207(g)(2).

We define normal operating conditions in this manner because, otherwise, sources could elect to limit levels of the regulated dioxin/furan operating parameters (e.g., hazardous waste feedrate, combustion chamber temperature, temperature at the inlet to the dry particulate matter control device) to ensure minimum emissions. Thus, without specifying what constitutes normal conditions, the confirmatory test could be meaningless. On the other hand, the definition of normal conditions is broad enough to allow adequate flexibility in operations during the test. The confirmatory test confirms that your under day-to-day operations are meeting the dioxin/furan standard. Thus, the confirmatory test differs from the comprehensive performance test in which you may choose to extend to the edge of the operating envelope to establish operating parameters.

The April 1996 NPRM would have required normal operating conditions for particulate matter continuous emissions monitoring systems. For the final rule, particulate matter levels are limited during confirmatory testing to ensure normal operations only when your source is equipped with carbon injection or carbon bed for dioxin/furan emissions control (see dioxin/furan operating limits discussion below).

The April 1996 NPRM also would have required you to operate under representative conditions for types of organic compounds in the waste (e.g., aromatics, aliphatics, nitrogen content, halogen/carbon ratio, oxygen/carbon ratio) and volatility of wastes when demonstrating compliance with the dioxin/furan emission standard. Several commenters object to this requirement. We agree that restrictions on these organic compounds in the waste are redundant and not necessary to assure good combustion. In addition, the requirement would be impracticable because in most cases measured data would not be available on these parameters. Therefore, the final rule does not require ''representative'' wastes with regard to these organic compounds for confirmatory testing.

It is prudent to require that chlorine be fed at normal levels or greater during the dioxin/furan confirmatory performance test. Although most studies show poor statistical correlation between dioxin/furan emissions and chlorine feedrate, some practical considerations are important. Chlorinated dioxin/furan obviously contain chlorine and some level of chlorine is necessary for its formation. During the confirmatory testing for dioxin/furan, we want you to operate your combustor under normal conditions relative to factors that can affect emissions of dioxin/furan. Therefore, you must feed chlorine at normal or greater levels given the potential for chlorine feedrates to affect dioxin/furan emissions. For the confirmatory performance test, normal is defined as the average chlorine fed over the previous 12 months. If you have established a maximum chlorine value for metals or total chlorine compliance in your previous comprehensive performance test, then that value can be used in the confirmatory test.

Several commenters suggest that when defining normal operation, a provision should be made to exclude inappropriate data, such as those occurring during instrument malfunction, at unit down time, or during instrument zero/calibration adjustment. The April 1996 NPRM did not allow for any data to be excluded. To define ''normal'' operation, we agree it is reasonable to exclude inappropriate data. For the final rule, calibration data, malfunction data, and data obtained when not burning hazardous waste do not fall into the definition of ''normal'' operation.

4. What Are the Consequences of Failing a Confirmatory Performance Test?

If you determine that you failed the dioxin/furan emission standard based on results of analysis of samples taken during manual stack sampling, you must immediately stop burning hazardous waste. You must then modify the design or operation of the unit, conduct a new comprehensive performance test to demonstrate compliance with the dioxin/furan emission standard (and other standards if the changes could adversely affect compliance with those standards), and establish new operating parameter limits. Further, prior to submitting a NOC based on the new comprehensive performance test, you can burn hazardous waste only for a total of 720 hours (renewable based on the discretion of the Administrator) and only for purposes of pretesting or comprehensive performance testing. These conditions apply when you fail the initial or any periodic confirmatory performance test.

However, if you conduct the comprehensive performance test under two or more modes of operation, and meet the dioxin/furan emission standards during confirmatory testing when operating under one or more modes of operation, you may continue burning under the modes of operation for which you meet the standards.

Other than stopping burning of hazardous waste, we do not specifically address the consequences of failing the confirmatory performance test in the regulatory language but will instead rely on the regulating agency's enforcement policy to govern the type of enforcement response at a facility that exceeds an emission standard, fails to ensure compliance with the standards, or fails to meet a compliance deadline. This approach is consistent with the way other MACT standards are implemented.

Some commenters suggest that the requirement to stop burning waste after a failed confirmatory test is overly harsh. They suggest that temporarily restricted burning should be allowed, conservative enough to insure compliance, while a permanent solution is developed. We continue to believe that a source should stop burning hazardous waste until it reestablishes operating parameter limits that ensure compliance with the dioxin/furan emission standard. We note that hazardous waste combustors are currently subject to virtually these same requirements under RCRA rules.

D. What Is the Relationship Between the Risk Burn and Comprehensive Performance Test?

1. Is Coordinated Testing Allowed?

Traditionally, a RCRA trial burn serves three primary functions: (1) Demonstration of compliance with performance standards such as destruction and removal efficiency; (2) determination of operating conditions that assure the hazardous waste combustor can meet applicable performance standards; and (3) collection of emissions data for incorporation into a SSRA that, subsequently, is used to establish risk-based permit conditions where necessary.[185] Today's rulemaking transfers the first two functions of a RCRA trial burn from the RCRA program to the CAA program. The responsibility for collecting emissions data needed to perform a SSRA is not transferred because SSRAs are exclusively a RCRA matter.

Generally speaking, the type of emissions data needed to conduct a SSRA includes concentration and gas flow rate data for dioxin/furans, nondioxin/furan organics, metals, hydrogen chloride, and chlorine gas. Additionally, particle-size distribution data are normally needed for the air modeling component of the SSRA. We have recently published guidance on risk burns and the data to be collected. See USEPA, ''Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities'' External Peer Review Draft, EPA–530–D–98–001A, B & C and USEPA, ''Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities,'' EPA 530–D–98–002, August 1998.

A large number of hazardous waste combustors subject to today's rule will have completed a RCRA trial burn and SSRA emissions testing prior to the date of the MACT comprehensive performance test. There may exist, however, some facilities for which this is not the case. For these facilities, the Agency proposed, in both the April 1996 NPRM and the May 1997 NODA, an option of coordinating SSRA emissions data collection with MACT performance testing. Facilities choosing to perform coordinated testing would be expected to factor SSRA data collection requirements into the MACT performance test plan. Commenters support this approach, emphasizing that coordinated testing would conserve the resources of both the regulatory authority and regulated source. The Agency agrees with the commenters and continues to support coordinated testing. There is no need, however, for today's final rule to include regulatory language for coordinated testing since it is simply matter of submitting and implementing a test plan which accomplishes the objectives of both a risk burn and MACT performance test.

Coordinated testing may not be possible for all hazardous waste combustors subject to today's MACT standards. Some sources may not be able to test under one set of conditions that addresses all data needs for both MACT implementation and SSRAs. SSRA emissions testing traditionally is performed under worst-case conditions, but may be obtained under normal testing conditions when necessary.[186] As noted in the April 1996 NPRM, as well as in this preamble, we generally anticipate sources will conduct MACT performance testing under conditions that are at the edge of the operating envelope or the worst-case to ensure operating flexibility. Regardless of which test conditions are used to collect SSRA emissions data, under the coordinated testing scenario, those conditions should be consistent with the MACT performance test to the extent possible.

Similarly, a source may experience difficulty integrating MACT performance testing with SSRA emissions testing due to conflicting goals in establishing enforceable operating parameters, i.e., a parameter cannot be maximized for purposes of the SSRA data collection while at the same time be properly maximized or minimized for purposes of performance testing. It is additionally important to ensure that the feed material used during the performance testing is appropriate for SSRA emissions testing. When collecting emissions data for a SSRA, testing with actual worst-case waste is preferred to ensure that the testing material is representative of the toxic, persistence and bioaccumulative characteristics of the waste that ultimately will be burned. However, even if multiple tests need to be performed to accomplish all of the objectives, it is still advantageous to conduct these tests in the same general time frame to minimize mobilization and sampling costs.

The timing of the required tests may cause difficulty for some sources wishing to use coordinated testing. As we discussed in the May 1997 NODA, if the timing of the SSRA data collection does not coincide with the MACT performance test requirement, the performance test should not be unduly delayed. Commenters agree with this approach.

2. What Is Required for Risk Burn Testing?

We expect that sources for which coordinated testing is not possible will need to obtain SSRA emissions data through a separate risk burn. Similar to a traditional RCRA trial burn, risk burn testing should be conducted pursuant to a test plan that is reviewed and approved by the RCRA permitting authority. 40 CFR 270.10(k) provides that the permitting authority may require the submittal of information to establish permit conditions to ensure a facility's operations will be protective of human health and the environment. This regulatory requirement provides for the collection of emissions data, as appropriate, for incorporation into a SSRA as well as for the performance of the SSRA itself. We clarify in amendments to §§ 270.19, 270.22, 270.62 and 270.66 that the Director may apply provisions from those sections, on a case-by-case basis, to establish a regulatory framework for conducting the risk burn under § 270.10(k) and imposing risk-based conditions under § 270.32(b)(2) (omnibus provisions). This clarifying language is intended to prevent any confusion from other language added to §§ 270.19, 270.22, 270.62 and 270.66 today stating that

[185] Under 40 CFR 270.10(k), which is the RCRA Part B information requirement that supports implementation of the RCRA omnibus permitting authority, a regulatory authority may require a RCRA permittee or an applicant to submit information to establish permit conditions as necessary to protect human health and the environment. Under this authority, risk burns and SSRAs may be required.

[186] Criteria for determining the circumstances under which SSRA emissions data should be collected using normal versus worst-case testing conditions are provided in EPA's Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities (EPA 530–D–98–002, August 1998).

these provisions otherwise no longer apply once a source has demonstrated compliance with the MACT standards and limitations of 40 CFR part 63, subpart EEE. (See Part Five, Section XI.B.3 for further discussion.) Facilities and regulatory authorities may consult existing EPA guidance documents for information regarding the elements of risk burn testing.[187]

E. What Is a Change in Design, Operation, and Maintenance? (See § 63.1206(b)(6).)

The April 1996 NPRM noted that sources may change their design, operation, or maintenance practices in a manner that may adversely affect their ability to comply with the emission standards. These sources would be required to conduct a new comprehensive performance test to demonstrate compliance with the affected emission standards and would be required to re-establish operating limits on the affected parameters specified in § 63.1209. (See 61 at FR 17518.) The proposal stated that until a complete and accurate revised NOC is submitted to the Administrator, sources would be permitted to burn hazardous waste following such changes for time a period not to exceed 720 hours and only for the purposes of pretesting or comprehensive performance testing. The approach in the April 1996 NPRM remains appropriate, and we are adopting it in today's final rule with minor modifications.

For changes made after submittal of your NOC that may adversely affect compliance with any emission standard, as defined later in this section, today's rule requires you to notify the Administrator at least 60 days prior to the change unless you document circumstances that dictate that such prior notice is not reasonably feasible. The notification must include a description of the changes and which emission standards may be affected. The notification must also include a comprehensive performance test schedule and test plan that will document compliance with the affected emission standard(s). You must conduct a comprehensive performance test to document compliance with the affected emission standard(s) and establish operating parameter limits as required and submit a revised NOC to the Administrator. You also must not burn hazardous waste for more than a total of 720 hours after the change and prior to submitting your NOC, and you must burn hazardous waste during this time period only for the purposes of pretesting or comprehensive performance testing.

Some commenters are uncomfortable with the proposed regulatory language, stating that it was too generic and that the Agency could require a comprehensive performance test even after minor changes in maintenance practices. One commenter suggests that EPA incorporate a list of changes significant enough to affect compliance, similar to what is currently done in the RCRA permit modification classification scheme in Appendix I of § 270.42.

We intentionally proposed an approach that provides some degree of flexibility to permit authorities. Individual facilities will need to consult with these permit authorities who will make the decision on the site-specific facts. We do not intend to require a comprehensive performance test after minor modifications to system design, or after implementing minor changes to operating or maintenance practices. We considered incorporating sections of Appendix I of § 270.42 to further clarify when comprehensive performance tests would be required.[188] However, it is impossible to envision all scenarios in which changes in design, operation, or maintenance practices may or may not trigger the requirement of a complete, or even partial, comprehensive performance test. Discussion of specific scenarios is more suitable in an Agency guidance document as opposed to regulatory provisions, and implemented on a site-specific basis. Thus, the April 1996 NPRM set out the regulatory approach as well as can be done, and we are adopting it today with minor modifications.

In the April 1996 NPRM, we did not address what must be done when you change design, operation, or maintenance practices during the time period between the compliance date and when you submit your NOC. If you make a change during this time period, today's rule requires you to revise your DOC, which is maintained on-site, to incorporate any revised limits necessary to comply with the standards. For purposes of this provision, today's rule defines ''change'' as any change in reported design, operation, or maintenance practices you previously documented to the Administrator in your comprehensive performance test plan, NOC, DOC, or startup, shutdown, and malfunction plan.

Commenters point out that the proposal did not discuss recordkeeping requirements necessary for the Administrator to determine if you are adequately concluding that changes in design, operation, or maintenance practices do not trigger a comprehensive performance test requirement[189]. As a result, today's rule requires you to document in your operating record whenever you make a change (as defined above) in design, operation, or maintenance practices, regardless of whether the change may adversely affect your ability to comply with the emission standards. See § 63.1206(b)(6)(ii). You are also required to maintain on site an updated comprehensive performance test plan, NOC, and startup, shutdown, and malfunction plan that reflect these changes. See § 63.1211(c).

F. What Are the Data In Lieu Allowances?

You are allowed to submit data from previous emissions tests in lieu of performing a MACT performance test to set operating limits. See § 63.1207(c)(2). To use previous emissions test data, the data must have been collected less than 5 years before the date you intend to submit your notification of compliance. The data must also have been collected as part of a test that was for the purpose of demonstrating compliance with RCRA or CAA requirements. Additionally, you must submit your request to use previous test data in your comprehensive performance test plan which is submitted 1 year in advance of the MACT performance test. Finally, you must schedule your subsequent MACT performance test and MACT confirmatory test 5 years and 2.5 years respectively following the date the emissions test data your submitting was collected.

We developed this allowance in response to comments that suggested we should allow previous RCRA testing to be used in lieu of performing a new MACT performance test if the data could be used to demonstrate compliance and establish operating limits to ensure compliance with the MACT emissions standards. Commenters reasoned, and we agreed, that such an allowance was reasonable and necessary for those sources that

[187] USEPA. ''Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities'' External Peer Review Draft. EPA–530–D–98–001A,B&C. Date.; USEPA, ''Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities'' EPA 530–D–98–002. August 1998.

[188] One approach would be to require performance tests for modifications covered by the class 2 and class 3 permit modifications associated with combustion source design and operating parameter changes.

[189] We cannot determine if a source has accurately concluded that a change does not adversely affect its ability to comply with the emission standards if we are never aware that changes were made to the source.

must perform emissions tests to satisfy other state or federal requirements. As we developed this allowance, we decided that it is necessary to limit the age of the data and specify the date of the following performance test because we need to be consistent with the MACT performance test requirements with respect to testing frequency. We can further justify the time and testing limitations of the data in lieu of allowance by acknowledging that we don't want some sources gaining an advantage over others by extending the date between performance tests. However, we also weighed the fact that some sources may be required to perform RCRA testing fairly close to the compliance date or promulgation date of today's rule and we didn't want to penalize them by forcing them to perform a new performance test before five years had elapsed since their previous test. So we settled on an approach that allows the use of previous emissions test data and effectively sets the same testing frequency as is applied to test data collected via a MACT performance test following the compliance date. This approach doesn't penalize or favor any source over another and it allows each source to take advantage of this provision when it makes sense. For instance, a source may be granted approval to use data from a RCRA trial burn performed 1 year before today's date, thus not requiring the source to perform a comprehensive performance test 270 days following the compliance date. Instead, the source must schedule its next MACT performance test five years after the date the test was performed. However, the source must perform a confirmatory test 270 days following the compliance date because the test schedule for the confirmatory test is also linked to the date of the performance test. So in this situation the source must determine if its better to run the comprehensive performance test on a normal schedule after the compliance date or delay the comprehensive test and perform a confirmatory test instead.

VI. What Is the Notification of Compliance?

A. What Are the Requirements for the Notification of Compliance?

You must submit to the Administrator the results of the comprehensive performance test in a notification of compliance (NOC) no later than three months after the conclusion of the performance test. You must submit the initial NOC later than nine months following the compliance date.

B. What Is Required in the NOC?

You must include the following information in the NOC:

—Results of the comprehensive performance test, continuous monitoring system performance evaluation, and any other monitoring procedures or methods that you conducted;
—Test methods used to determine the emission concentrations and feedstream concentrations, as well as a description of any other monitoring procedures or methods that you conducted;
—Limits for the operating parameters;
—Procedures used to identify the operating parameter limits specified in § 63.1209;
—Other information documenting compliance with the operating requirements, including but not limited to automatic waste feed cutoff system operability and operator training;
—A description of the air pollution control equipment and the associated hazardous air pollutant that each device is designed to control; and
—A statement from you or your company's responsible official that the facility is in compliance with the standards and requirements of this rule.

C. What Are the Consequences of Not Submitting a NOC?

The normal CAA enforcement procedures apply if you fail to submit a timely notification of compliance. We do not adopt our proposed approach that would have required you to immediately stop burning hazardous waste if you failed to submit a timely NOC.

We proposed regulatory language stating that failure to submit a notification of compliance by the required date would result in the source being required to immediately stop burning hazardous waste. This proposal was similar to requirements applied to BIFs certifying compliance under RCRA. Under the proposal, if you wanted to burn hazardous waste in the future, you would be required to comply with the standards and permit requirements for new MACT and RCRA sources.

In the 1997 NODA, however, we proposed to rely on the regulating agency's policy regarding enforcement response to govern the type of enforcement response at a facility that fails to submit a notification of compliance. Based on NODA comments and review of this enforcement process, we are not including in the final rule regulatory language addressing the consequences of failure to submit a timely or complete NOC. Instead, we rely on the regulating agency's policy regarding enforcement response to govern the type of enforcement response at a facility that fails to meet a compliance deadline. This approach is more practical to implementing today's MACT standards and is more consistent with the way other MACT standards are implemented.

D. What Are the Consequences of an Incomplete Notification of Compliance?

In response to our April 1996 NPRM, commenters state that we were unclear as to the consequences of an incomplete NOC. Furthermore, commenters state that it was important that we specify what is needed and the consequences if an NOC is incomplete or more information is needed. Additionally, commenters recommend that if the NOC contains emission information, the certification statement, and a signature, we should judge the NOC to be administratively complete and an acceptable submission. In addition, commenters suggest that if the regulatory official reviewing the NOC determines that additional information is required, the source should be given ample time to submit that information.

Our enforcement approach to incomplete submissions, under RCRA or the CAA, is generally determined on a site-specific basis. We will not attempt to foresee and develop enforcement responses to all the possible levels of incompleteness for the NOC. This is beyond the scope of our national rulemaking. Furthermore, defining what constitutes an incomplete submission requires us to specifically prescribe a complete submission, which is not possible for all situations or all source designs. Some sources may require more detail than others in defining the parameters necessary to determine compliance on a continuous basis. Therefore, we instead define the minimum information necessary in the submission and allow the implementing agency to determine if more information is necessary in a facility's site-specific NOC.

In response to comments advocating that facilities be given ample time to submit additional information required by the regulatory official, we prefer to allow the implementing agency to determine the time periods that will be granted to submit additional information because some information requests may require widely varying degrees of time and effort to develop. Many potential problems associated with incomplete submissions can be prevented through interaction between the source and the regulatory agency during the test plan review and approval process. We do not want our rules to act as disincentive to those discussions by providing a complete shield, regardless of the severity of the omission.

E. Is There a Finding of Compliance?

We adopt the requirement we proposed for the regulatory agencies to make a finding of compliance based on performance test results (see § 63.1206(b)(3)). This provision specifies that the regulatory agency must determine whether an affected source is in compliance with the emissions standards and other requirements of subpart EEE, as provided by the general provisions governing findings of compliance in § 63.6(f)(3). Thus, the regulatory agency is obligated to make this finding upon obtaining all the compliance information required by the standards, including the written reports of performance test results, monitoring results, and other applicable information. This includes, but may not be limited to, the information submitted by the source in its NOC.

VII. What Are the Monitoring Requirements?

In this section, we discuss the following topics: (1) The compliance monitoring hierarchy that places a preference on compliance with a CEMS; (2) how limits on operating parameters are established from comprehensive performance test data; (3) status and use of CEMS other than carbon monoxide, hydrocarbon, and oxygen CEMS; and (4) final compliance monitoring requirements for each emission standard.

A. What Is the Compliance Monitoring Hierarchy?

We proposed the following three-tiered compliance monitoring hierarchy in descending order of preference to ensure compliance with the emission standards: (1) Use of a continuous emission monitoring system (CEMS) for a hazardous air pollutant; (2) absent a CEMS for that hazardous air pollutant, use of a CEMS for a surrogate of that hazardous air pollutant and, when necessary, setting limits on operating parameters to account for the limitations of using surrogates; and (3) lacking a CEMS for either, requiring periodic emissions testing and site-specific limits on operating parameters. Accordingly, we proposed to require the use of carbon monoxide, hydrocarbon, oxygen, particulate matter, and total mercury CEMS. We also proposed performance specifications for multimetal, hydrochloric acid, and chlorine gas CEMS to give sources the option of using a CEMS for compliance with the semivolatile and low volatile metal emissions standards, and the hydrochloric acid/chlorine gas emission standard.

Commenters question the availability and reliability of CEMS other than those for carbon monoxide, hydrocarbon, and oxygen. We concur with some of the commenters' concerns and are not requiring use of a total mercury CEMS in the final rule or specifying the installation deadline and performance specifications for particulate matter CEMS. In addition, we have not promulgated performance specifications for these CEMS or multimetal, hydrochloric acid, and chlorine gas CEMS. We nonetheless continue to encourage sources to evaluate the feasibility of using these CEMS to determine the performance specifications, correlation acceptance criteria, and detector availability that can be achieved. Sources may request approval from permitting officials under § 63.8(f) to use CEMS to document compliance with the emission standards in lieu of periodic performance testing and compliance with limits on operating parameters. See discussion in Section VII.C below on these issues.

B. How Are Comprehensive Performance Test Data Used To Establish Operating Limits?

In this section, we discuss: (1) The definitions of terms related to monitoring and averaging periods; (2) the rationale for the averaging periods for operating parameter limits, (3) how comprehensive performance test data are averaged to calculate operating parameter limits; (4) how the various types of operating parameters are monitored/established; (5) how nondetect performance test feedstream data are handled; and (6) how rolling averages are calculated initially, upon intermittent operations, and when the hazardous waste feed is cut off.

1. What Are the Definitions of Terms Related to Monitoring and Averaging Periods?

In the April 1996 NPRM, we proposed definitions for several terms that relate to monitoring and averaging periods. For the reasons discussed below, we conclude that the proposed definitions are appropriate and are adopting them in today's rule. We also finalize definitions for "average run average" and "average highest or lowest rolling average" which were not proposed. We conclude these new definitions are necessary to clarify the meaning and intent of regulatory provisions associated with the monitoring requirements that are discussed in Part 5, Section VII.D. of this preamble.

We promulgate the following definitions in today's rule (see § 63.1201).

"Average highest or lowest rolling average" means the average of each run's highest or lowest rolling average run within the test condition for the applicable averaging period.

"Average run average" means the average of each run's average of all associated one minute values.

"Continuous monitor" means a device that: (1) Continuously samples a regulated parameter without interruption; (2) evaluates the detector response at least once every 15 seconds; and (3) computes and records the average value at least every 60 seconds, except during allowable periods of calibration and as defined otherwise by the CEMS Performance Specifications in appendix B of part 60.

"Feedrate operating limits" means limits on the feedrate of materials (e.g., metals, chlorine) to the combustor that are established based on comprehensive performance testing. The limits are established and monitored by knowing the concentration of the limited material (e.g., chlorine) in each feedstream and the flow rate of each feedstream.

"Feedstream" means any material fed into a hazardous waste combustor, including, but not limited to, any pumpable or nonpumpable solid, liquid, or gas.

"Flowrate" means the rate at which a feedstream is fed into a hazardous waste combustor.

"Instantaneous monitoring" means continuously sampling, detecting, and recording the regulated parameter without use of an averaging period.

"One-minute average" means the average of detector responses calculated at least every 60 seconds from responses obtained at least each 15 seconds.

"Rolling average" means the average of all one-minute averages over the averaging period.

One commenter opposes the requirement to take instrument readings every 15 seconds. This commenter contends that such an approach is simply impractical, unnecessary, and imposes a harsh burden upon members of the regulated community. Another commenter maintains that the CEMS Data Acquisition System should be capable of sampling the analyzer outputs at least every 15 seconds. With today's processing power and speed, the commenter states that this can easily be achieved. We agree with the second commenter and are requiring instrument readings at least every 15 seconds because this is currently required in the Boilers and Industrial Furnace rulemaking. (See § 266.102(e)(6))

Another commenter states that the Agency's definition of ''instantaneous monitoring'' of combustion chamber pressure to control combustion system leaks is not clear.[190] The commenter states that, although an instantaneous limit cannot be exceeded at any time, continuous monitoring systems are required to detect parameter values only once every 15 seconds. We note that the final rule requires instantaneous monitoring only for the combustion chamber pressure limit to control combustion system leaks. The rule requires an automatic waste feed cutoff if the combustion chamber pressure at any time (i.e., instantaneously) exceeds ambient pressure (see § 63.1209(p)). The definition of a continuous monitoring system is that it must record instrument readings at least every 15 seconds. For instantaneous monitoring of pressure, the detector must clearly record a response more frequently than every 15 seconds.[191] It must detect and record pressure constantly without interruption and without any averaging period.

2. What Is the Rationale for the Averaging Periods for the Operating Parameter Limits?

The final rule establishes the following averaging periods: (1) No averaging period (i.e., instantaneous monitoring) for maximum combustion chamber pressure to control combustion system leaks; (2) 12-hour rolling averages for maximum feedrate of mercury, semivolatile metals, low volatile metals, chlorine, and ash (for incinerators); and, (3) one-hour averaging periods for all other operating parameters. As discussed later in this section, we conclude that the proposed ten-minute averaging periods are not necessary, on a national basis, to better ensure compliance with the emission standards at hazardous waste combustors, and have not adopted these averaging periods in this rulemaking.

a. When Is an Instantaneous Limit Used? An instantaneous limit is required only for maximum combustion chamber pressure to control combustion system leaks. This is because any perturbation above the limit may result in uncontrolled emissions exceeding the standards.

b. When Is an Hourly Rolling Average Limit Used? An hourly rolling average limit is required for all parameters that are based on operating data from the comprehensive performance test, except combustion chamber pressure and feedrate limits. Hourly rolling averages are required for these parameters rather than averaging periods based on the duration of the performance test because we are concerned that there may be a nonlinear relationship between operating parameter levels and emission levels of hazardous air pollutants.

c. Why Has the Agency Decided Not to Adopt Ten-Minute Averaging Periods? Dual ten-minute and hourly rolling averages were proposed for most parameters for which limits are based on the comprehensive performance test. See 61 FR at 17417. We proposed ten-minute rolling averages in addition to hourly rolling averages for these parameters because short term excursions of the parameter can result in a disproportionately large excursion of the hazardous air pollutant being controlled.

Commenters claim that the Agency's concerns with emission excursions due to short term perturbations of these operating parameters were not supported with data and are therefore unjustified, and claim that averaging periods shorter than those required in the existing BIF regulations would provide no environmental benefit.

We acknowledge that the Agency does not have extensive short-term emission data that show operating parameter excursions can result in disproportionately large excursions of hazardous air pollutants being emitted. These short-term data cannot be obtained without the use of continuous emission monitors that measure dioxin/furans, metals, and chlorine on a real-time basis. Such monitors, for the most part, are not currently used for compliance purposes at hazardous waste combustors. However, known relationships between operating parameters and hazardous air pollutant emissions indicate that a nonlinear relationship exists between operating parameter levels and emissions. This nonlinear relationship can result in source emissions that exceed levels demonstrated in the performance test if the operating parameters are not properly controlled. An explanation of these nonlinear relationships, including examples that explain why this relationship can result in daily emissions that exceed levels demonstrated in the performance test, are included in the Final Technical Support Document.[192] Thus, at least in theory, an environmental benefit can result from shorter averaging periods, including ten-minute rolling averages and perhaps instantaneous readings in certain situations.

We also acknowledge, however, that the Agency's ability to assess this potential benefit in practice for all hazardous waste combustors affected by this final rule is limited significantly by the paucity of short-term, minute-by-minute, operating parameter data. Without this data we cannot effectively evaluate whether operating parameter excursions occur to an extent that warrant national ten-minute averaging period requirements for all hazardous waste combustors. We therefore conclude that averaging period requirements shorter than those required by existing BIF regulations are not now appropriate for adoption on a national level, and do not adopt ten-minute averaging period requirements in this rulemaking.

We maintain, however, that there may be site-specific circumstances that warrant averaging periods shorter than one hour in duration, including possibly instantaneous measurements. Regulatory officials may determine, on a site-specific basis, that shorter averaging periods are necessary to better assure compliance with the emission standards. The provisions in § 63.1209(g)(2) authorize the regulatory official to make such a determination. Factors that may be considered when determining whether shorter averaging periods are appropriate include (1) the ability of a source to effectively control operating parameter excursions to levels achieved during the performance test; (2) the source's previous compliance history regarding operating parameter limit exceedances; and (3) the difference between the source's performance test emission levels and the relevant emission standard. For additional information, see the Final Technical Support Document, Volume 4, Chapter 2.

d. What Is the Basis for 12-Hour Rolling Averages for Feedrates? The rule requires 12-hour averages for the feedrate of mercury, semivolatile metals, low volatile metals, chlorine, and ash (for incinerators) because feedrate and emissions are, for the most part, linearly

[190] ''Combustion system leaks'' is the term used in today's rule to refer to leaks that are called fugitive emissions under current RCRA regulations. We use the term combustion system leaks to refer to those emissions because the term fugitive emissions has other meanings under part 63.

[191] Typical pressure transducers in use today are capable of responding to pressure changes once every fifty milliseconds. See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume IV: Compliance with the Hazardous Waste Combustor Standard,'' July 1999.

[192] See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume IV: Compliance With the Hazardous Waste Combustor Standards, July 1999, Chapters 2 and 3.

related. A 12-hour averaging period for feedrates is appropriate because it is the upper end of the range of time required to perform three runs of a comprehensive performance test. Thus, a 12-hour averaging period will ensure (if all other factors affecting emissions are constant) that emissions will not exceed performance test levels during any interval of time equivalent to the time required to conduct a performance test. A 12-hour averaging period is also achievable and appropriate from a compliance perspective because the emission standards are based on emissions data obtained over (roughly) these sampling periods.[193]

e. Has the Agency Over-Specified Compliance Requirements? Some commenters state that the Agency is over-specifying compliance requirements by requiring limits on many operating parameters, requiring dual ten-minute and hourly rolling average limits on many parameters, and requiring that sources interlock the operating parameter limits with the automatic waste feed cutoff system. These commenters wrote that this compliance regime may lead to system over-control and instability, and an unreasonable and unnecessary increase in automatic waste feed cutoffs, a result that is contrary to good process control principles. They propose that we work with industry to develop a process control system and performance specification regulatory approach to establish minimum system standards. These would include: (1) Minimum process instrument sampling time; (2) maximum calculation capability for output signals; (3) minimum standard for process control sequences; and (4) minimum requirements for incorporating automatic waste feed cutoffs into the control scheme. The specifications would be incorporated into guidance, rather than regulation. Commenters suggest that the rule should only specify general goals, similar to the guidance approach we took for hazardous waste incinerators in the 1981 RCRA regulations.[194]

We evaluated these comments carefully, balancing the need to provide industry with operational flexibility with the need for compliance assurance. As previously discussed, we are not adopting ten-minute averaging period requirements in this rulemaking, although it can be imposed on a site-specific basis under appropriate circumstances. This addresses commenter's concerns that relate to the complexity of the proposed dual averaging period requirements. We acknowledge, however, that today's rule requires that more operating parameter limits be interlocked to the automatic waste feed cutoff system than is currently required by RCRA regulations. Nonetheless, we conclude that the compliance regime of today's final rule is necessary to ensure compliance with the emission standards and will not overly constrain process control systems for the following reasons.

Automatic waste feed cutoffs are (by definition) automatic, and the control systems used to avoid automatic waste feed cutoffs require adequate response time and are primarily site-specific in design. The closer a source pushes the edge of the operating envelope, the better that control system must perform to ensure that an operating parameter limit (and emission standard) is not exceeded. Therefore, a source has extensive control over the impact of these requirements.

Under the compliance regime of today's rule, sources will continue to perform comprehensive performance testing under ''worst case'' conditions as they currently do under RCRA requirements to establish limits on operating parameters that are well beyond normal levels. This cushion between normal operating levels and operating parameter limits enables the source to take corrective measures well before a limit is about to be exceeded, thus avoiding an automatic waste feed cutoff.

Regulatory officials do not have the extensive resources that would be required to develop and implement industry-specific control guidelines and we are not confident that this approach would provide adequate compliance assurance. Although specifying only emissions standards and leaving the compliance method primarily up to the source and the permit writer (aided by guidance) would provide flexibility, it would place a burden on the permit writers and the source during the development and approval of the performance test plan and the finding of compliance subsequent to Notification of Compliance. In addition, this level of interaction between permitting officials and the source is contrary to our policy of structuring the MACT standards to be as self-implementing as possible.[195] The Agency therefore maintains its position that the compliance scheme adopted in today's rule, is appropriate.

f. Why Isn't Risk Considered in Determining Averaging Periods? Several commenters state that long averaging periods (e.g., monthly metal feedrate rolling averages) for the operating parameter limits and CEMS-monitored emission standards would be appropriate. These commenters believe that long averaging periods would be appropriate given that the Agency has performed a risk assessment and concluded that the emission standards would be protective over long periods of exposure. They state that long averaging periods would ensure that emissions are safe and reduce compliance costs.

Consideration of risk is not an appropriate basis for determining averaging periods to ensure compliance with the technology-based MACT emission standards.[196] As previously stated, we must establish averaging periods that ensure compliance with the emission standard for time durations equivalent to the emission sampling periods used to demonstrate compliance. Longer averaging periods would not ensure compliance with the emission standard because many of the operating parameters do not relate to emissions linearly.

In addition, a longer averaging period is not warranted even for those operating parameters than may relate linearly to emissions because this would allow a source to emit hazardous air pollutants in excess of the emission standard for times periods equivalent to the stack emission sampling periods used to demonstrate compliance. For example, a monthly averaging period for metal feedrates could result in a source emitting metals at a level three times the regulatory standard continuously for a one week period.[197] This would not be consistent with the level of control that was achieved by the best performing sources in our data base. Modifying the results of the MACT process based on risk considerations is thus contrary to Congressional intent that MACT

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[193] See *Chemical Waste Management* v. *EPA,* 976 F.2d, 2, 34 (D.C. Cir. 1992) (It is inherently reasonable to base compliance on the same type of data used to establish the requirement).

[194] The incinerator regulations promulgated in 1981, at the outset of the RCRA regulatory program, used such a general guidance approach. However, sources have had over 15 years since then to gain experience with process control techniques associated with the combustion of hazardous waste.

[195] The time that would be associated with this type of review and negotiation between permit writer and source would be better spent on developing, reviewing, and approving the comprehensive performance test plan under today's compliance regime.

[196] We note, however, that within eight years of promulgating MACT standards for a source category, we must consider risk in determining under section 112(f) whether standards more stringent than MACT are necessary to provide an ample margin of safety to protect public health and the environment.

[197] For this to occur, the source would have to emit metals far below the standard for time periods before and after this one-week period.

standards, at a minimum, must represent the level of control being achieved by the average of the best performing 12 percent of the sources. We therefore conclude that we must limit averaging times at least to time durations equivalent to the emission sampling periods used to demonstrate compliance.

g. Will Relaxing Feedrate Averaging Times Increase Environmental Loading? One commenter questions whether relaxing the averaging time for the feedrate of metals and chlorine from an hourly rolling average under current RCRA regulations to the 12-hour rolling average of today's rule would increase total environmental loading of pollutants and be counter to the Agency's pollution prevention objectives. Contrary to the commenter's concern, we conclude that today's rule will decrease environmental loading of hazardous air pollutants because the emission standards are generally more stringent than current RCRA standards. Today's standards more than offset any difference in environmental loading associated with longer averaging times. As previously discussed, the averaging periods in today's rule were chosen to ensure compliance with the emission standard for intervals of time equivalent to the time required to conduct a performance test.

Although current RCRA standards generally establish hourly rolling averages for the feedrate of metals, sources are actually allowed to establish up to 24-hour rolling averages for arsenic, beryllium, chromium, cadmium, and lead, provided they restrict the feedrate of these metals at any time to ten times what would be normally allowed under an hourly rolling average basis. For these reasons, the commenter's concern is not persuasive.

3. How Are Performance Test Data Averaged To Calculate Operating Parameter Limits?

The rule specifies which of two techniques you must use to average data from the comprehensive performance test to calculate limits on operating parameters: (1) Calculate the limit as the average of the maximum (or minimum, as specified) rolling averages for each run of the test; or (2) calculate the limit as the average of the test run averages for each run of the test.

Hourly rolling averages for two parameters—combustion gas flowrate (or kiln production rate as a surrogate) and hazardous waste feedrate—are based on the average of the maximum hourly rolling averages for each run. Hourly rolling average and 12-hour rolling average limits for all other parameters, however, are based on the average level occurring during the comprehensive performance test. We determined that this more conservative approach is appropriate for these parameters because they can have a greater effect on emissions, and because it is consistent with how manual method emissions results are determined.[198]

These are examples of how the averages work. The hourly rolling average hazardous waste feedrate limit for a source is calculated using the first technique. If the highest hourly rolling averages for each run of the comprehensive performance test were 200 lbs/hour, 210 lbs/hr, 220 lbs/hr, the hourly rolling average feedrate limit would be 210 lbs/hr.

The second approach uses the average of the test run averages for a given test condition to calculate the limit. Each test run average is calculated by summing all the one-minute readings within the test run and dividing that sum by the number of one-minute readings. For example, if: (1) The sum of all the one-minute semivolatile metal feedrate readings for each run within a test condition is 2,400 lbs/hour, 2,500 lbs/hour, and 2,600 lbs/hour; and (2) there are 240, 250, and 200 one-minute readings in each run, respectively; then (3) the average feedrate for each of these three runs is 10 lbs/hour, 10 lbs/hour, and 13 lbs/hour, respectively. The 12-hour rolling average semivolatile metal feed rate limit for this example is the average of these three values: 11 lbs/hour. This averaging methodology is not equivalent to an approach where the limit is calculated by taking the time-weighted average over all three runs within the test condition, because, as noted by the example, sampling times may be different for each run. The time-weighted average feedrate over all three test runs for the previous example is equivalent to 10.9 lbs/hr.[199] Although the two averaging techniques may not result in averages that are significantly different, we conclude that basing the limits on the average of the test run averages is more appropriate, because this approach is identical to how we determine compliance with the emission standards.

These averaging techniques are the same as we proposed (see 61 FR at 17418).[200] A number of commenters object to the more conservative second technique of basing the limits on the average levels that occur during the test. The commenters claim that this approach ensures a source would not comply with the limits 50% of the time when operating under the same conditions as the performance test. Further, they are concerned that this approach would establish operating parameter limits that would ''ratchet'' emissions to levels well below the standards, and further ratcheting would occur with each subsequent performance test (i.e., because the current operating limits could not be exceeded during subsequent performance testing). Some commenters prefer the approach of setting the limit as the average of the highest (or lowest) rolling average from each run, technique one above, which is the same approach used in the BIF rule.

Notwithstanding the conservatism of the promulgated approach (technique two above) for many operating parameter limits, we maintain that the approach results in achievable limits and is necessary to ensure compliance with the emission standards. Comprehensive performance tests are designed to demonstrate compliance with the emission standards and establish corresponding operating parameter limits. Thus, sources will operate under ''worst-case'' conditions during the comprehensive performance tests, just as they do currently for RCRA trial burns. Given that the source can readily control (during the performance test and thereafter) the parameters for which limits are established based on the average of the test run averages during performance testing (i.e., rather than on the average of the highest (or lowest) hourly rolling averages), and that these parameters will be at their extreme levels during the performance test, the limits are readily achievable.

There may be situations, however, where a source cannot simultaneously demonstrate worst-case operating conditions for all the regulated operating parameters. An example of this may be minimum combustion chamber temperature and maximum temperature at the inlet to the dry particulate matter control device because when the combustion chamber temperature is minimized, the inlet temperature to the control device may also be minimized. Sources should consult permitting officials to resolve

[198] Manual method emission test results for each run represents average emissions over the entire run.

[199] This time weighted average is calculated by summing all the one-minute feedrate values in the test condition and dividing that sum by the number of one minute readings in the test condition.

[200] Except that average hourly rolling average limits are calculated as the average of the test run averages rather than simply the average over all runs as proposed.

compliance difficulties associated with conflicting operating parameters. Potential solutions to conflicting parameters could be to conduct the performance test under two different modes of operation to set these conflicting operating parameter limits, or for the Administrator to use the discretionary authority provided by § 63.1209(g)(2) to set alternative operating parameter limits.

We address commenters' concern that subsequent performance tests would result in a further ratcheting down of operating parameter limits by waiving the operating limits during subsequent comprehensive performance tests (see § 63.1207(h)). The final rule also waives operating limits for pretesting prior to comprehensive performance testing for a total operating time not to exceed 720 hours. See discussion in Part Five, Section VI for more information on this provision.

Some commenters suggest that we use a statistical analysis to determine rolling average limits, such that the limits are calculated as the mean plus or minus three standard deviations of all rolling averages for all runs. Commenters state that this would ensure that the operating parameter limits are achievable. If such an approach were adopted, there would be no guarantee that a source is maintaining compliance with the emission standards for the time durations of the manual stack sampling method used to demonstrate compliance during the comprehensive performance test. Such an approach could conceivably encourage a source to intentionally vary operating parameter levels during the comprehensive performance test to such an extent that the statistically-derived rolling average limits would be significantly higher than the true average of the test condition. This could also result in widely varying statistical correction factors from one source to another, which is undesirable for reasons of consistency and fairness.

Such a statistical approach prevents us from establishing the minimum emission standards that Congress generally envisioned under MACT because we would not be assured that the sources are achieving the emission standard. We would also have difficulty estimating environmental benefits if this statistical approach were used because we would not know what level of emission control each source achieves. Again, the methodology promulgated for averaging performance test data to calculate operating parameter limits results in limits that are achievable and necessary to ensure compliance with the emission standards for time durations equivalent to emission sampling periods.

Several commenters oppose the compliance regime whereby limits on operating parameters are established during performance testing. They are concerned that this approach encourages sources to operate under worst-case conditions during testing. One commenter states that this approach effectively punishes sources for demonstrating emissions during their performance test that are lower than the standards (i.e., by establishing limits on operating parameters that would be well below those needed to comply with the standards).

We understand these concerns, but absent the availability of continuous emissions monitoring systems, we are unaware of another compliance assurance approach that effectively addresses the (perhaps unique) problem posed by hazardous waste combustors. The Agency is using this same approach to implement the RCRA regulations for these sources. Compliance assurance for hazardous waste combustors cannot be maintained using the general provisions of Subpart A in Part 63—procedures that apply to all MACT sources unless we promulgate superseding provisions for a particular source category. Those procedures require performance testing under normal operating conditions, but operating limits are not established based on performance test operations. This approach is appropriate for most industrial processes because process constraints and product quality typically limit ''normal'' operations to a fairly narrow range that is easily defined.

Hazardous waste combustors may be somewhat unique MACT sources, however, in that the characteristics of the hazardous waste feed (e.g., metals concentration, heating value) can vary over a wide range and have a substantial effect on emissions of hazardous air pollutants. In addition, system design, operating, and maintenance features can substantially affect pollutant emissions. This is not the same situation for many other MACT source categories where feedstream characteristics and system design, operation, and maintenance features must be confined to a finite range so that the source can continue to produce a product. Hazardous waste incinerators do not have such inherent controls (i.e., because they provide a waste treatment service rather than produce a product), and cement and lightweight aggregate kilns can vary substantially hazardous waste characteristics in the fuel, as well as system design, operation, and maintenance features and still produce marketable product.

To address commenters' concerns at least in part, however, we have included a metals feedrate extrapolation provision in the final rule. This will reduce the incentive to spike metals in feedstreams during performance testing (and thus reduce the cost of testing, the hazard to test crews, and the environmental loading) by explicitly allowing sources to request approval to establish metal feedrate limits based on extrapolating upward from levels fed during performance testing. See discussion in Section VII.D.4 below, and §§ 63.1209(l)(1) and 63.1209(n)(2)(ii).

4. How Are the Various Types of Operating Parameters Monitored or Established?

The operating parameters for which you must establish limits can be categorized according to how they are monitored or established as follows: (1) Operating parameters monitored directly with a continuous monitoring system; (2) feedrate limits; and (3) miscellaneous operating parameters. (Each of these parameters is discussed in Section VII.D below.)

a. What Operating Parameters Are Monitored Directly with a Continuous Monitoring System? Operating parameters that are monitored directly with a continuous monitoring system include: Combustion gas temperature in the combustion chamber and at the inlet to a dry particulate matter control device; baghouse pressure drop; for wet scrubbers, pressure drop across a high energy wet scrubber (*e.g.*, venturi, calvert), liquid feed pressure, pH, liquid-to-gas ratio, blowdown rate (coupled with either a minimum recharge rate or a minimum scrubber water tank volume or level), and scrubber water solids content; minimum power input to each field of an electrostatic precipitator; flue gas flowrate or kiln production rate; hazardous waste flowrate; and adsorber carrier stream flowrate. These operating parameters are monitored and recorded on a continuous basis during the comprehensive performance test and during normal operations. The continuous monitoring system also transforms and equates the data to its associated averaging period during the performance test so that operating parameter limits can be established. The continuous monitoring system must operate in conformance with § 63.1209(b).

b. How Are Feedrate Limits Monitored? Feedrate limits are monitored by knowing the concentration of the regulated parameter in each feedstream and continuously monitoring the flowrate of each feedstream. See § 63.1209(c)(4). You must establish limits on the feedrate parameters specified in § 63.1209, including: semivolatile metals, low volatile metals, mercury; chlorine, ash (for incinerators), activated carbon, dioxin inhibitor, and dry scrubber sorbent. The flowrate continuous monitoring system must operate in conformance with § 63.1209(b).

c. How Are the Miscellaneous Operating Parameters Monitored/ Established? Other operating parameters specified in § 63.1209 include: Specifications for activated carbon, acid gas sorbent, catalyst for catalytic oxidizers, and dioxin inhibitor; and maximum age of carbon in a carbon bed. Because each of these operating parameters may be unique to your source, you are expected to characterize the parameter (*e.g.*, using manufacturer specifications) and determine how it will be monitored and recorded. This information must be included in the comprehensive performance test plan that will be reviewed and approved by permitting officials.

5. How Are Rolling Averages Calculated Initially, Upon Intermittent Operations, and When the Hazardous Waste Feed Is Cut Off?

a. How Are Rolling Averages Calculated Initially? You must begin complying with the limits on operating parameters specified in the Documentation of Compliance on the compliance date.[201] See § 63.1209(b)(5)(i). Given that the one-hour, and 12-hour rolling averages for limits on various parameters must be updated each minute, this raises the question of how rolling averages are to be calculated upon initial startup of the rolling average requirements. We have determined that an operating parameter limit will not become effective on the compliance date until you have recorded enough monitoring data to calculate the rolling average for the limit. For example, the hourly rolling average limit on the temperature at the inlet to an electrostatic precipitator does not become effective until you have recorded 60 one-minute average temperature values on the compliance date. Given that compliance with the standards begins nominally at 12:01 am on the compliance date, the hourly rolling average temperature limit does not become effective as a practical matter until 1:01 am on the compliance date. Similarly, the 12-hour rolling average limit on the feedrate of mercury does not become effective until you have recorded 12 hours of one-minute average feedrate values after the compliance date. Thus, the 12-hour rolling average feedrate limits become effective as a practical matter at 12:01 pm on the compliance date.

Although we did not specifically address this issue at proposal, commenters raised the question in the context of CEMS. Given that the same issue applies to all continuous monitoring systems, we adopt the same approach for all continuous monitoring systems, including CEMS. See discussion below in Section VII.C.5.b. We adopt the approach discussed here because a rolling average limit on an operating parameter does not exist until enough one-minute average values have been obtained to calculate the rolling average.

b. How Are Rolling Averages Calculated upon Intermittent Operations? We have determined that you are to ignore periods of time when one-minute average values for a parameter are not recorded for any reason (*e.g.*, source shutdown) when calculating rolling averages. See § 63.1209(b)(5)(ii). For example, consider how the hourly rolling average for a parameter would be calculated if a source shuts down for yearly maintenance for a three week period. The first one-minute average value recorded for the parameter for the first minute of renewed operations is added to the last 59 one-minute averages before the source shutdown for maintenance to calculate the hourly rolling average.

We adopt this approach for all continuous monitoring systems, including CEMS (see discussion below in Section VII.C.5.b) because it is simple and reasonable. If, alternatively, we were to allow the ''clock to be restarted'' after an interruption in recording parameter values, a source may be tempted to ''clean the slate'' of high values by interrupting the recording of the parameter values (*e.g.*, by taking the monitor off-line for a span or drift check). Not only would this mean that operating limits would not be effective again until an averaging period's worth of values were recorded, but it would be contrary to our policy of penalizing a source for operating parameter limit exceedances by not allowing hazardous waste burning to resume until the parameter is within the limit. Not being able to burn hazardous waste during the time that the parameter exceeds its limit is intended to be an immediate economic incentive to minimize the frequency, duration, and intensity of exceedances.

c. How Are Rolling Averages Calculated when the Hazardous Waste Feed Is Cut Off? Even though the hazardous waste feed is cut off, you must continue to monitor operating parameters and calculate rolling averages for operating limits. See § 63.1209(b)(5)(iii). This is because the emission standards and operating parameter limits continue to apply even though hazardous waste is not being burned. See, however, the discussion in Part Five, Sections I.C and I.D above for exceptions (*i.e.*, when a hazardous waste combustor is not burning hazardous waste, the emission standards and operating requirements do not apply: (1) During startup, shutdown, and malfunctions; or (2) if you document compliance with other applicable CAA section 112 or 129 standards).

6. How Are Nondetect Performance Test Feedstream Data Handled?

You must establish separate feedrate limits for semivolatile metal, low volatile metal, mercury, total chlorine, and/or ash for each feedstream for which the comprehensive performance test feedstream analysis determines that these parameters are not present at detectable levels. The feedrate limit must be defined as nondetect at the full detection limit achieved during the performance test. See § 63.1207(n).

You will not be deemed to be exceeding this feedrate limit when detectable levels of the constituent are measured, provided that: (1) Your total system constituent feedrate, considering the detectable levels in the feedstream (whether above or below the detection limit achieved during the performance test) that is limited to nondetect levels, is below your total system constituent feedrate limit; or (2) except for ash, your uncontrolled constituent emission rate for all feedstreams, calculated in accordance with the procedures outlined in the performance test waiver provisions (see § 63.1207(m)) are below the applicable emission standards.

We did not address in the April 1996 NPRM how you must handle nondetect compliance test feedstream results when determining feedrate limits, nor did commenters suggest an approach. After careful consideration, we conclude that the approach presented above is reasonable and appropriate.

The LWAK industry has expressed concern about excessive costs with compliance activities that would be needed for the mercury standard. They

[201] The operating parameters for which you must specify limits are provided in § 63.1209. You must include these limits in the Documentation of Compliance, and you must record the Documentation of Compliance in the operating record.

claim that the increased costs associated with achieving lower mercury detection limits are large, and does not result in significant environmental benefits.

The final rule includes four different methods an LWAK can use to comply with the mercury emission standard in order to provide maximum flexibility. The basic compliance approach (described below) does not require an LWAK to achieve specified minimum mercury detection limits for mercury standard compliance purposes.[202] Under this approach, analytical procedures that achieve given detection limits are evaluated on a site-specific basis as part of the waste analysis plan review and approval process, which is submitted as part of the performance test plan. An LWAK can make the case to the regulatory official that the increased costs associated with achieving a very low mercury detection limit is not warranted. We therefore do not believe that the LWAK industry will incur significant additional analytical costs over current practices for daily mercury compliance activities. We acknowledge, however, that site-specific circumstances may lead a regulatory official to conclude that lower detection limits are warranted. To better understand this concept, the following paragraphs summarize this basic mercury emission standard compliance scheme and discusses why a regulatory official may determine, on a site-specific basis, that lower detection limits are needed to better assure compliance with the emission standard.

Under this basic approach, the source conducts a performance test and samples the emissions for mercury to demonstrate compliance with the emission standard. To ensure compliance with the emission standard during day-to-day operations, the source must comply with mercury feedrate limits that are based on levels achieved during the performance test. A source must establish separate mercury feedrate limits for each feed location. As previously discussed in this section, for feedstreams where mercury is not present at detectable levels, the feedrate limit must be defined as ''nondetect at the full detection limit''.

There is no regulatory requirement for a source to achieve a given detection limit under this approach. We acknowledge, however, that feedstream detection limits can be high enough such that a mercury feedrate limit that is based on nondetect performance test results may not completely ensure compliance with the emission standard during day-to-day operations. For example, the LWAK industry has indicated that a hazardous waste mercury detection limit of 2 ppm is reasonably achievable at an on-site laboratory. If we assume that mercury is present in the hazardous waste at a concentration of 1.99 ppm (just below the detection limit), the expected mercury emission concentration would be approximately 80 µg/dscm, which is above the standard.[203] (Note also that this does not consider mercury emission contributions from the raw material.) This is not to say that this LWAK will be exceeding the mercury emission standard during day-to-day operations. However, their inability to achieve low mercury detection limits results in less assurance that the source is continuously complying with the emission standard.

The regulatory official should consider such emission standard compliance assurance concerns when reviewing the waste analysis plan to determine if lower detection limits are appropriate (if, in fact such lower detection limits are reasonably achievable). Factors that should be considered in this review should include: (1) The costs associated with achieving lower detection limits; and (2) the estimated maximum mercury concentrations that can occur if the source's feedstreams contain mercury just below the detection limit (as described above).

C. Which Continuous Emissions Monitoring Systems Are Required in the Rule?

Although the final rule does not require you to use continuous emissions monitoring systems (CEMS) for parameters other than carbon monoxide, hydrocarbon, oxygen, and particulate matter[204] we have a strong preference for CEMS because they: (1) Are a direct measure of the hazardous air pollutant or surrogate for which we have established emission standards; (2) lead to a high degree of certainty regarding compliance assurance; and (3) allow the public to be better informed of what a source's emissions are at any time. Additionally, from a facility standpoint, CEMs provide you with real time feedback on your combustion operations and give you a greater degree of process control. Therefore, we encourage you to use CEMS for other parameters such as total mercury, multimetals, hydrochloric acid, and chlorine gas. You may use the alternative monitoring provision of § 63.8(f) to petition the Administrator (i.e., permitting officials) to use CEMS to document compliance with the emission standards in lieu of emissions testing and the operating parameter limits specified in § 63.1209. You may submit the petition at any time, such as with the comprehensive performance test plan. See Section VII.C.5.c below for a discussion of the incentives for using CEMS.

In this section, we discuss the status of development of particular CEMS and provide guidance on issues that pertain to case-by-case approval of CEMS in lieu of compliance using operating parameter limits and periodic emissions testing. Key issues include appropriate CEMS performance specifications, reference methods for determining the performance of CEMS, averaging periods, and temporary waiver of emission standards if necessary to enable sources to correlate particulate matter CEMS to the reference method.

1. What Are the Requirements and Deferred Actions for Particulate Matter CEMS?

In the April 1996 NPRM, we proposed the use of particulate matter CEMS to document compliance with the particulate matter emission standards. Particulate matter CEMS are used for compliance overseas[205], but are not yet a regulatory compliance tool in the U.S. Concurrent with this proposal, we undertook a demonstration of particulate matter CEMS at a hazardous waste incinerator to determine if these CEMS were feasible in U.S. applications. We selected the test incinerator as representative of a worst-case application for a particulate matter CEMS at any hazardous waste

[202] The other three approaches are (1) performance test waiver provisions (see preamble, part 5, section X.B); (2) alternative standards when raw materials cause an exceedance of the emission standard (see preamble, part 5, section X.A); and, (3) alternative mercury standards for kilns that have non-detect levels of mercury in the raw material (see preamble, part 5, section X.A). These mercury standard compliance alternatives require a source to achieve feedstream detection limits that either ensure compliance with an emission standard or ensure compliance with a hazardous waste feedrate limit that is used in lieu of a numerical emission standard. See previous referenced preamble for further discussion.

[203] This assumes that all the mercury fed to the unit is emitted, and is based on typical LWAK gas emission rates.

[204] The final rule requires that particulate matter CEMS be installed, but defers the effective date of the requirement to install, calibrate, maintain, and operate PM CEMS until these actions can be completed.

[205] The EU guidelines for hazardous waste combustion state that particulate matter is a parameter for which compliance must be documented continuously. In addition, proposals from vendors that we received in response to our February 27, 1996 NODA (see 61 FR 7262) indicate that there are many installations elsewhere overseas where particulate matter CEMS are used for compliance assurance.

combustor. It was important to document feasibility of the CEMS at a worst-case application to minimize time and resources needed to determine whether the CEMS were suitable for compliance assurance at all hazardous waste combustors.

We published preliminary results of our CEMS testing and sought comment on our approach to demonstrating particulate matter CEMS in the March 1997 NODA. We then revised our approach and sought comment on the final report in the December 1997 NODA. The December 1997 NODA also clarified several issues that came to light during the demonstration test pertaining to the manual reference method, particulate matter CEMS, and general quality assurance issues. These clarifications were embodied in a new manual method, Method 5–I (Method 5i), a revision to the proposed Performance Specification 11 for particulate matter CEMS, and a new quality assurance procedure, Procedure 2.

We believe that our tests adequately demonstrate that particulate matter CEMS are a feasible, accurate, and reliable technology that can and should be used for compliance assurance. In addition, preliminary analyses of the cost of PM CEMS applied to hazardous waste combustors suggest that these costs are reasonable. Accordingly, the final rule contains a requirement to install PM CEMS. However, we agree with comments that indicate a need to develop source-specific performance requirements for particulate matter CEMS and to resolve other outstanding technical issues. These issues include all questions related to implementation of the particulate matter CEMS requirement (i.e. relation to all other testing, monitoring, notification, and recordkeeping), relation of the particulate matter CEMS requirement to the PM emission standard, as well as technical issues involving performance, maintenance and correlation of the particulate matter CEMS itself. These issues will be addressed in a subsequent rulemaking. Therefore, we defer the effective date of this requirement pending further testing and additional rulemaking.

As a result, in today's final rule, we require that particulate matter CEMS be installed at all hazardous waste burning incinerators, cement kilns, and lightweight aggregate kilns. However, since we have not finalized the performance specifications for the use of these instruments or resolved some of the technical issues noted above, we are deferring the effective date of the requirement to install, calibrate, maintain and operate particulate matter CEMS until these actions can be completed. The particulate matter CEMS installation deadline will be established through future rulemaking, along with other pertinent requirements, such as final Performance Specification 11, Appendix F Procedure 2. Finally, it should be noted that EPA has a concurrent rulemaking process underway for nonhazardous waste burning cement kilns and plans to adopt the same approach in that rule.

2. What Are the Test Methods, Specifications, and Procedures for Particulate Matter CEMS?

a. What Is Method 5i? We promulgate in the final rule a new manual method for measuring particulate matter, Method 5i. See appendix A to part 60. We first published this new method in the December 1997 NODA. One outgrowth of these particulate matter CEMS demonstration tests is that we made significant improvements in making low concentration Method 5 particulate measurements. We first discussed these improvements in the preliminary report released in the March 1997 NODA, and commenters to that NODA ask that these improvements be documented. We documented these improvements by creating Method 5i.

We incorporated the following changes to Method 5 into Method 5i: Improved sample collection; minimization of possible contamination; Improved sample analysis; and an overall emphasis on elimination of systemic errors in measurement. These improvement achieved significant improvements in method accuracy and precision at low particulate matter concentrations, relative to Method 5.

We are promulgating Method 5i today, in advance of any particulate matter CEMS requirement, for several reasons. We expect this new method will be preferred in all cases where low concentration (i.e., below 45 mg/dscm (~0.02 gr/dscf)[206]) measurements are required for compliance with the standard. Given that all incinerators, nearly all lightweight aggregate kilns, and some cement kilns are likely to have emissions lower than 45 mg/dscm, we expect that Method 5i will become the particulate method of choice for most hazardous waste combustors. In addition, we expect that Method 5i will be used to correlate manual method results to particulate matter CEMS outputs for those sources that elect to petition the Administrator to use a CEMS in lieu of operating parameter limits for compliance assurance with the particulate matter standard.[207] This is because, unlike the worst-case particulate matter measurements normally used to verify compliance with the standard, low (or lower than normal) concentration particulate matter data are required to develop a good correlation between the CEMS output and the manual, reference method.

Many of the issues commenters raise relate to how Method 5i should be used to correlate particulate matter CEMS outputs to manual method measurements. Even though we are deferring a CEMS requirement, we address several key issues here given that sources may elect to petition the Administrator under § 63.8(f) to use a CEMS. This discussion may provide a better understanding on our thinking on particulate matter CEMS issues. In addition, certain comments are specific to how Method 5i is performed. These comments and our responses are relevant even if you use Method 5i only as a stack particulate method and not to correlate a particulate matter CEMS to the reference method.

i. Why Didn't EPA Validate Method 5i Against Method 5? Several commenters recommend that we perform a full Method 301 validation to confirm that Method 5i is equivalent to Method 5. We determined that a full Method 301 validation is not necessary because the differences in the two methods do not constitute a major change in the way particulate samples are collected from an operational or an analytical standpoint. We validated the filter extraction and weighting process—the only modification from Method 5 (see ''Particulate Matter CEMS Demonstration Test Final Report,'' Appendix A, in the Technical Support Document[208]) '' and documented that Method 5i gives nearly identical results as Method 5. Therefore, we disagree with the commenters' underlying concern and conclude that Method 5i has been validated.

ii. When Are Paired Trains Required? We have included in Method 5i a requirement that paired trains must be

[206] As noted later in the text, the filter and assembly used for Method 5i is smaller than the one used for Method 5. This means that the Method 5i filter plugs more easily than the one used for Method 5. This issue becomes important at particulate matter concentrations above 45 mg/dscm, or 0.02 gr/dscf.

[207] As alluded to previously, sources may elect to use a CEMS to comply with the numerical value of the particulate matter emission standard on a six-hour rolling average in lieu of complying with operating parameter limits specified by § 63.1209(m).

[208] See USEPA, ''Final Technical Support Document for Hazardous Waste Combustor MACT Standards, Volume IV: Compliance With the Hazardous Waste Combustor Standards,'' July 1999.