However, the State must modify its RCRA program by the deadline set forth in § 271.21(e). States that submit official applications for final authorization 12 months after the effective date of these regulations must include standards equivalent to these regulations in their application. The requirements a State must meet when submitting its final authorization application are set forth in 40 CFR 271.5.

3. Streamlined Authorization Under RCRA

Recently, EPA has initiated a series of rulemakings intended to streamline and speed the State authorization of RCRA rules. On August 22, 1995, EPA proposed abbreviated authorization procedures for certain routine Land Disposal Restrictions (LDR) provisions as part of the Phase IV LDR rule (see 60 FR 43654 and 43686). This proposal would implement streamlined authorization procedures for certain minor and routine rulemakings for those States which certify that they have authority equivalent to and no less stringent than the federal rule. EPA believes that the abbreviated authorization procedures proposed in the August 22, 1995, proposal would be appropriate for RCRA Subtitle C authorization for those States that are approved to implement this rule pursuant to 40 CFR Part 63, Subpart E, and are simply incorporating this rule into their RCRA regulations. EPA requests comment regarding the use of this proposed procedure for this authorization scenario. Note however, that EPA is not proposing to use RCRA authorization as a substitute for CAA section 112(l) approvals.

The primary reason that EPA is proposing to use an abbreviated authorization procedure when States are approved to implement this rule under the CAA, is that the delegation process and requirements in Part 63 are similar to authorization under 40 CFR 271.21. For example, section 112(l)(1) of the CAA requires that a program submitted by a State "shall not include authority to set standards less stringent than those promulgated by the Administrator." Further, section 116 of the CAA precludes a State from adopting or enforcing less stringent standards than those under section 112. See 40 CFR §§ 63.12(a)(1), 271.1(h), and section 3009 of RCRA. States may also establish more stringent requirements as long as they are not inconsistent with the CAA. Further, section 112(l)(5)(A) of the CAA requires States to have adequate authorities to ensure compliance, similar to the requirement in section 3006(b) of RCRA. Thus, for EPA to approve a State rule or program, the procedures and criteria in 40 CFR 63.91(b) must be met, as well as any applicable requirements of §§ 63.92 through 63.94. These requirements are equivalent to those under RCRA. Therefore, using an abbreviated RCRA authorization procedure would prevent States from going through substantial authorization procedures under both the CAA program and the RCRA program.

EPA is also committed to streamlining the authorization process for States that would not be incorporating delegated CAA standards stemming from the final rule. EPA believes that authorized States have experience implementing sophisticated combustion regulatory programs and would have the ability to effectively implement today's proposed standards. Thus, EPA requests comment on whether all States that are authorized for the incinerator regulations under 40 CFR Part 264 and the Boiler and Industrial Furnace (BIF) regulations should use the authorization procedure proposed on August 22, 1995. EPA is also developing a second authorization procedure for those RCRA rules which have more significant impacts on State hazardous waste programs that is slightly more extensive than the procedure proposed on August 22, 1995. This second procedure is also intended to significantly streamline the authorization process, and will be described in detail in the upcoming Hazardous Waste Identification Rule (HWIR) proposal for contaminated media. EPA believes that this second procedure may be more appropriate for today's proposal, given its significance and complexity. In the upcoming HWIR-Media proposal, EPA will request comment whether this procedure should be used for RCRA authorization in this case.

VIII. Definitions

Many of the terms used in today's proposal have been defined either in the Clean Air Act or in existing § 63.2. For terms that are not already defined, we are proposing definitions in § 63.1201. In addition, we are proposing conforming definitions to the existing RCRA regulations in §§ 260.10 and 270.2.

A. Definitions Proposed in § 63.1201

We are proposing definitions for the following terms in § 63.1201: Air Pollution Control System, Automatic Waste Feed Cutoff System, Cement Kiln, Combustion Chamber, Compliance Date, Comprehensive Performance Test, Confirmatory Performance Test, Continuous Monitor, Dioxins and Furans, Feedstream, Flowrate, Fugitive Combustion Emissions, Hazardous Waste, Hazardous Waste Combustor, Hazardous Waste Incinerator, Initial Comprehensive Performance Test, Instantaneous Monitoring, Lightweight Aggregate Kiln, Low Volatility Metals, New Source, Notification of Compliance, One-Minute Average, Operating Record, Reconstruction, Rolling Average, Run, Semivolatile Metals, and TEQ.

We believe that the definitions of these terms is self-explanatory as proposed.

B. Conforming Definitions Proposed in §§ 260.10 and 270.2

To avoid confusion and ambiguity, we are proposing conforming definitions in §§ 260.10 and 270.2 for the following terms that pertain to implementation of the current RCRA requirements and RCRA requirements that would not be superseded by the proposed MACT standards: RCRA operating permit, DRE performance standard, closure and financial responsibility requirements, addition of permit conditions as warranted on a site-specific basis to protect human health and the environment.

Because these definitions pertain to existing RCRA requirements, the effective date for the definitions would be six months after the date of publication in the **Federal Register**.

C. Clarification of RCRA Definition of Industrial Furnace

Today's proposed rule applies to combustion units that are already subject to regulation under RCRA. These devices are presently classified as hazardous waste incinerators or hazardous waste-burning industrial furnaces, depending on their mode of operation. As discussed below, the distinctions between these classifications (i.e., incinerator and industrial furnace) are important in determining the level for Clean Air Act technology-based standards and also in applying a variety of RCRA regulatory provisions.

From the RCRA perspective, the distinction between incinerators and industrial furnaces (and boilers, for that matter) is important, among other things, for determining facility eligibility for interim status, the regulatory regime for classification of combustion residue (i.e., for example, product or non-product), and eligibility for Bevill status for combustion residue. EPA defines industrial furnaces as those designated devices that are an integral part of a manufacturing process and that use thermal treatment to recover materials or energy. 40 CFR 260.10.

Other criteria in the rule indicate what it means to be an "integral part of a manufacturing process." The RCRA rules thus set out "aspects of industrial furnaces that distinguish them from hazardous waste incinerators", 48 FR 14472, 14483 (April 4, 1983); 50 FR 614, 626–27 (January 4, 1985). These include whether the device is designed and used "primarily to accomplish recovery of material products", the "use of the device to burn or reduce raw materials to make a material product", "the use of the device to burn or reduce secondary materials as effective substitutes for raw materials, in processes using raw materials as principal feedstocks", "the use of the device to burn or reduce secondary materials as ingredients in an industrial process to make a material product", and "the use of the device in common industrial practice to produce a material product. 40 CFR 260.10.

EPA interprets the regulatory definition of industrial furnace as applying only to devices that are enumerated in the rule and that also satisfy the narrative portion of the definition, that is, functions as an integral part of a manufacturing process, taking into account the narrative criteria in the rule. Thus, for example, if a device which is otherwise a cement kiln is not used as an integral component of a manufacturing process, it is not an industrial furnace. See 56 FR at 7140, 7141 (February 21, 1991) (Device-by-device application of industrial furnace regulatory definition); 48 FR at 14485 (April 4, 1983) (same). A cement kiln used primarily to burn contaminated soil from Times Beach so as to destroy dioxins thus is not an industrial furnace because it would not be an integral component of a manufacturing process but essentially a waste treatment unit. Among other things, it would not be used "primarily for recovery of material products." 40 CFR 260.10(13)(I); See also Background Document for the Regulatory Definition of Boiler, Incinerator, and Industrial Furnace (October 1984), at page 6. Conversely, a cement kiln making cement from raw materials but burning some hazardous waste for destruction as an adjunct to its normal activities could be classified as an industrial furnace.

Industrial furnaces burning hazardous wastes for any purpose—energy recovery, material recovery, or destruction—are currently subject to the rules for BIFs in Part 266 subpart H. 56 FR at 7138; 40 CFR 266.100. In this regard, the BIF rule changed the previous regulatory regime whereby if a combustion device burned hazardous waste for destruction, it was regulated as an incinerator no matter what the proportion of burning for destruction to other activities. 40 CFR 264.340(a) and 265.340(a) as promulgated at 50 FR at 665–66 (January 4, 1985); 48 FR at 14484 and n. 15 (April 4, 1983). However, a device must still satisfy the regulatory definition of industrial furnace, and thus must in the first instance be an integral component of a manufacturing process. This means, among other things, that enclosed combustion devices that burn hazardous wastes for destruction may not be industrial furnaces. See 1984 Background Document for Definition of Boiler, Incinerator, and Industrial Furnace (cited above), page 6. This is because hazardous waste destruction devices may not be designing and using the device primarily to accomplish recovery of material products, may not be using the device to combust secondary materials as effective substitutes for raw materials, etc.[184]

PART SIX: MISCELLANEOUS PROVISIONS AND ISSUES

I. Comparable Fuel Exclusion

EPA is proposing to exclude from the definition of solid and hazardous waste materials that meet specification levels for concentrations of toxic constituents and physical properties that affect burning. Generators that comply with sampling and analysis, notification and certification, and recordkeeping requirements would be eligible for the exclusion.[185] See proposed § 261.4(a)(13).

Hazardous waste is burned for energy recovery in boilers and industrial furnaces in lieu of fossil fuels. There are benefits to this energy recovery in the form of diminished use of petroleum-based fossil fuels. Industry sources contend that in some cases, hazardous waste fuels can be "as clean or cleaner" (meaning they present less risk) than the fossil fuels they displace. This claim has not been documented with full emissions and risk analysis. Industry further contends that currently regulating these materials under normal hazardous waste regulations acts as a disincentive to using them as fuels.

EPA's goal is to develop a comparable fuel specification which is of use to the regulated community but assures that an excluded waste is similar in composition to commercially available fuel and poses no greater risk than burning fossil fuel. Accordingly, EPA is using a "benchmark approach" to identify a specification that would ensure that constituent concentrations and physical properties of excluded waste are comparable to those of fossil fuels. We note that this is consistent with the main approach discussed in the Dow Chemical Company petition of August 10, 1995, which also points out a number of benefits that would result from promulgating this type of exemption: (1) support for the Agency's goal of promoting beneficial energy recovery and resource conservation; (2) reduction of unnecessary regulatory burden and allowing all parties to focus resources on higher permitting and regulatory priorities; and (3) demonstration of a common-sense approach to regulation.[186]

The rationale for the Agency's approach is that if a secondary material-based fuel is comparable to a fossil fuel in terms of hazardous and other key constituents and has a heating value indicative of a fuel, EPA has ample authority to classify such material as a fuel product, not a waste. Indeed, existing rules already embody this approach to some degree. Under § 261.33, commercial chemical products such as benzene, toluene, and xylene are not considered to be wastes when burned as fuels because normal fossil fuels can contain significant fractions of these chemicals and these chemicals have a fuel value. Given that a comparable fuel would have legitimate energy value and the same hazardous constituents in comparable concentrations to those in fossil fuel, classifying such material a non-waste would promote RCRA's resource recover goals without creating any risk greater than those posed by the commonly used commercial fuels. Under these circumstances, EPA can permissibly classify a comparable fuel as a non-waste. See also 46 FR at 44971 (August 8, 1981) exempting from Subtitle C regulation spent pickle liquor used as a wastewater treatment agent in part because of its similarity in composition to the commercial acids that would be used in its place.

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[184] The Administrator specifically rejects the contrary suggestion of the Agency's Environmental Appeals Board that "the purpose for which hazardous waste is burned at the facility has little or no bearing on whether the facility meets the industrial furnace definition." *In re Marine Shale Processors, Inc.*, RCRA Appeal No. 94–12 (March 17, 1995) p. 25 n. 32.

[185] We note that DOW Chemical Company (Dow) in a petition to the Administrator, dated August 10, 1995, specifically requested that the Agency develop a generic exclusion for "materials that are burned for energy recovery in on-site boilers which do not exceed the levels of fossil fuel constituents. . . ." (Petition, at p. 3). This proposal also responds to that petition.

[186] We also note there are other details in the DOW petition that are congruent with aspects of today's proposal. The Agency specifically invites comment on the DOW petition as part of this rulemaking.

As discussed below, EPA seeks comment on a number of options including what fossil fuel or fuels should be used as a benchmark, and how to select appropriate specification limits given the range of values both within and across fuel types. EPA also requests additional data on hazardous constituents naturally occurring in commercially available fuels. (The Agency's current data on fossil fuel composition are provided in the docket to this rulemaking.)

Also, the exclusion would operate from the point of fuel generation to the point of burning. Thus, the fuel's generator would be eligible for the exclusion and could either burn the excluded comparable fuel on site or ship it off-site directly to a burner. Thus, the Agency must ensure that storage and transportation of excluded comparable fuel poses no greater hazard than fossil fuel. The Agency invites comment on whether the applicable Department of Transportation (DOT) and Office of Occupational Safety and Health (OSHA) requirements are adequate to address this concern so that separate, potentially duplicative RCRA regulation would not be needed.

Note also that, because EPA is proposing to eliminate or amend other combustion-related exemptions in this rulemaking (i.e., the exemption for incinerators for wastes that are hazardous solely because they are ignitable, corrosive, or reactive and contain no or insignificant levels of Appendix VIII, Part 261, toxic constituents; and the low-risk waste exemption under BIF), the inclusion of a comparable fuels exemption may offset the effects of these changes at a number of affected facilities.

EPA also invites comment on whether acutely hazardous wastes should be ineligible for the exemption. See the section called "CMA Clean Fuel Proposal", below, for what is considered an acutely hazardous waste.

A. EPA's Approach to Establishing Benchmark Constituent Levels

1. The Benchmark Approach

EPA considered using risk to human health and the environment as the way to determine the scope and levels of a "clean fuels" specification. However, the Agency encountered several technical and implementation problems using a purely risk-based approach. Specifically, we have insufficient data relating to the types of waste burned and the risks they pose. To pursue a risk-based "clean fuels" approach, EPA needs to examine emissions from a number of example facilities at which "clean fuel" would be burned. The Agency could then analyze risks while the facility is burning the "clean fuel". EPA also does not have sufficient data to determine the relationship between the amount of "clean fuel" burned and emissions, especially dioxins and other non-dioxin PICs. EPA also does not know how emissions relate to real individual facilities as compared to example facilities used to derive the "clean fuel" specification. (Emissions and/or risks at a given facility could be higher than those of the example facilities given site-specific considerations.) Without this, it is not clear how the Agency can use risk to establish a "clean fuel" specification. The Agency requests data and invites comment on deriving a risk based specification.

The Agency is instead proposing to develop a comparable fuel specification, based on the level of hazardous and other constituents normally found in fossil fuels. EPA calls this the "benchmark approach". For this approach, EPA would set a comparable fuel specification such that concentrations of hazardous constituents in the comparable fuel could be no greater than the concentration of hazardous constituents naturally occurring in commercial fossil fuels. Thus, EPA would expect that the comparable fuel would pose no greater risk when burned than a fossil fuel and would at the same time be physically comparable to a fossil fuel.

2. The Comparable Fuel Specification

EPA is proposing to use this benchmark approach to develop a series of technical specifications addressing:

(1) physical specifications:

—Kinematic viscosity (cST at 100° F),
—Flash point (°F or °C), and
—Heating value (BTU/lb);

(2) general constituent specifications for:

—Nitrogen, total (ppmw), and
—Total Halogens (ppmw, expressed as Cl^{1-}), including chlorine, bromine, and iodine;[187] and

(3) individual hazardous constituent specifications, for:

—Individual Metals (ppmw), including antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, silver, and thallium, and
—Individual Appendix VIII, Part 261, Toxic Organics and Fluorine (ppmw).

(Note that ppmw is an alternate way of expressing the units mg/kg.) The constituent specifications and heating value would apply to both gases and liquids. The flash point and kinematic viscosity would not apply to gases. EPA invites comment on whether this list of specifications should be expanded to include other parameters, specifically ash and solids content, to ensure that excluded comparable fuels have the same handling and combustion properties as fossil fuels.

There are existing specifications for fossil fuels that are developed and routinely updated by the American Society for Testing and Materials (ASTM). (See ASTM Designation D 396 for fuel oils and D 4814 for gasoline.) These requirements specify limits for physical properties of fossil fuels, such as flash point, water and sediment, distillation temperatures,[188] viscosity, ash, sulfur, corrosion, density, and pour point. The ASTM requirements do not limit specific constituents in fuel. As a result, fossil fuels are quite diverse in their hydrocarbon constituent make-up. Specific levels of hydrocarbon constituents are a function of the crude oil, the processes used to generate the fuels, and the blending that occurs. This makes ASTM requirements for fuels of no use for deriving individual hazardous constituent specifications, but useful for deriving physical specifications. EPA invites comment on whether ASTM's physical specifications for flash point and viscosity should be used instead of the results of EPA's analysis.[189] [190]

a. Standards for CAA Metal HAPs. EPA is proposing limits for two metals that are not found on Part 261, Appendix VIII: cobalt and manganese. EPA included these metals in the analysis because they are listed in the Clean Air Act (CAA) as hazardous air pollutants (HAPs). See CAA, section 112(b). These metals are included because burning does not destroy metals, and will cause the release of metals into the air. Therefore, if a comparable fuel contained more of a metal than a fossil fuel, the result would be more air emissions of that metal than would be the case if the facility burned only fossil fuels. From a CAA perspective, it would not be acceptable to increase emissions of CAA HAP metals, relative to what would be emitted if fossil fuels were burned.

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[187] See discussion below concerning another halogen, fluorine.

[188] The temperature at which a certain volumetric fraction of the fuel has distilled.

[189] The issue is that all analytical results should meet ASTM's specifications. Thus, basing a specification limit on analysis of samples will result in limits more restrictive than the ASTM specification defining an acceptable fuel.

[190] ASTM does not specify a heating value requirement.

Therefore, constituent levels (or detection limits) for the two CAA HAPs are proposed as well.

b. Heating Value. With respect to heating value, the Agency is concerned with the issues of overall environmental loading and acceptability of the waste as a fuel. Comparable fuels may have a lower heating value than the fossil fuels they would displace. In these situations, more comparable fuels would be burned to achieve the same net heating loads, with the result that more of the hazardous constituents in the comparable fuel would be emitted (e.g., halogenated organic compounds and metals) than if fossil fuel were to be burned. This would lead to greater environmental loading of potentially toxic substances, which is not in keeping with the intent of the comparable fuels exclusion.

To address environmental loading, the Agency could establish a minimum heating value specification comparable to the BTU content of the benchmark fossil fuel(s). Fossil fuels have a higher heating value than most hazardous waste fuels, however; so this approach might exclude many otherwise suitable fuels. Therefore the Agency chose to establish the specification(s) for comparable fuels at a heating value of 10,000 BTU/lb.[191] EPA chose 10,000 BTU/lb because it is typical of current hazardous waste burned for energy recovery.[192] However, hazardous waste fuels have a wide range of heating values. Therefore, EPA is proposing that, when determining whether a waste meets the comparable fuel constituent specifications, a generator must first correct the constituent levels in the candidate waste to a 10,000 BTU/lb heating value basis prior to comparing them to the comparable fuel specification tables. In this way, a facility that burns a comparable fuel would not be feeding more total mass of hazardous constituents than if it burned fossil fuels.[193]

Also, EPA wants to ensure that currently defined wastes which meet the comparable fuels exclusion have a legitimate use as a fuel. Historically, the Agency has relied on a heating value of 11,500 J/g (5,000 BTU/lbm) as a minimum heating value specification for determining if a waste is being burned for energy recovery. (See § 266.103(c)(2)(ii).) EPA proposes this limit today as a minimum heating value for a comparable fuel to ensure that comparable fuels are legitimate fuels.

c. Applicability of the specifications. A separate issue is the applicability of these specifications. EPA is proposing that these specifications apply to all gases and liquids currently defined as hazardous wastes. (However as noted elsewhere, used oil, and used crude oil that is also a hazardous waste, would remain subject to regulation as used oil under 40 CFR Part 279, even if it meets the comparable fuel specifications.) The specifications for viscosity and flash point would only pertain to liquid fuels. This is because gases are inherently less viscous than liquids and flash point does not apply to gases. Therefore, EPA proposes that the specifications for viscosity and flash point not apply to gaseous comparable fuels.

d. Organic Constituent Specifications. With respect to Appendix VIII organic toxic constituents and other toxic synthetic chemicals, such as pesticides and pharmaceuticals, the Agency needs to ensure that only waste fuels comparable to fossil fuels are excluded. Therefore, the Agency proposes to limit the Appendix VIII constituents in comparable fuels to those found in the benchmark fossil fuel. These limits were calculated using a statistical analysis of individual samples EPA obtained.

If the benchmark fossil fuel has no detectable level of a particular Appendix VIII constituent, then the comparable fuel specification would be "non-detect" with an associated, specified maximum allowable detection limit for each compound. (Note exception in the following section.) The detection limit is a statistically derived level based on the quantification limit determined for each sample.

There are also compounds found on Appendix VIII which were not analyzed for, either because an analytical method is not available or could not be identified in time for this analysis. These compounds are not listed in today's specifications. If EPA is able to identify methods for analyzing these compounds and is able to analyze for these compounds prior to promulgation, an appropriate specification level or detection limit will be promulgated for Appendix VIII compounds missing from today's specification. If EPA is not able to analyze for compounds on Appendix VIII, we propose that the standard for these remaining Appendix VIII constituents be "nondetect" without a maximum detection limit proposed.

e. Specification Levels for Undetected Pure Hydrocarbons. A corollary issue is that, since fossil fuels are comprised almost entirely of pure hydrocarbons[194] in varying concentrations, it is possible that many pure hydrocarbons on Appendix VIII, Part 261, could be present in fossil fuel but below detection limits. Therefore, EPA proposes allowing pure hydrocarbons on Appendix VIII to be present up to the detection limits in EPA's analysis. Compounds on Appendix VIII which contain atoms other than hydrogen and carbon would be limited to "non-detect" levels as described in the previous paragraph.

f. Specification Levels for Other Fuel-like Compounds. In addition there are classes of fuel-like compounds that are not found in fossil fuels. These include oxygenates, an organic compound comprised solely of hydrogen, carbon, and oxygen above a minimum oxygen-to-carbon ratio. Examples of oxygenates which are used as fuels or fuel additives include alcohols such as methanol and ethanol, and ethers such as Methyl tert-butyl ether (MTBE).[195] However, Appendix VIII oxygenates are not routinely found in fossil fuels and were not detected in EPA's sampling and analysis program.[196] Since oxygenates can serve as fuels and are believed to burn well (i.e., may not produce significant PICs), EPA invites comment on: (1) whether these compounds should also be allowed up to the detection limits in EPA's analysis; and (2) an appropriate minimum oxygen-to-carbon ratio to identify an oxygenate.

g. Total Halogen Specification and Fluorine. Another issue is that the methods for determining total halogens do not measure fluorine, the lightest of the halogen compounds. Fluorine is, however, listed as an Appendix VIII constituent and methods are available for measuring fluorine directly. Therefore, EPA proposes that the total halogen limit pertain only to halogens other than fluorine, i.e., chlorine, bromine, and iodine. EPA also proposes that a fluorine limit be established separately from the total halogen limit. Specification values for fluorine are included in the specifications described below.

h. Specification Levels for Halogenated Compounds. EPA invites comment on whether it is necessary to

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[191] Constituent levels presented in today's proposed rule have been corrected from the fuel's heating value (approximately 20,000 BTU/lb) to 10,000 BTU/lb.

[192] Consult USEPA, "Draft Technical Support Document for HWC MACT Standards, Volume II: HWC Emissions Database", February 1996.

[193] Note that the heating value correction would apply only to allowable constituent levels in fuels, not to detection limits. Detection limits would not be corrected for heating value.

[194] Excluding sulfur, carbon and hydrogen comprise 99.6 to 100 percent of liquid fossil fuels.

[195] A compound such as 2,3,7,8–TCDD is not an oxygenate since it contains atoms other than hydrogen, carbon, and oxygen. Compounds such as Dibenzo-p-dioxin and Dibenzofuran are not oxygenates even though they are comprised solely of hydrogen, carbon, and oxygen because the oxygen-to-carbon ratio is too low.

[196] See the appendix for this notice for the results of EPA's analysis.

specify limits for halogenated compounds found on Appendix VIII. Nondetect levels of halogens were found in EPA's fossil fuel analysis and the nondetect levels for total halogens were much less than those of the individual halogenated compounds. Therefore, a waste that meets the total halogen limit should, by default, meet the non-detect levels specified for halogenated compounds. EPA prefers this approach since it will simplify the comparable fuels specification and mean fewer and less costly sampling and analysis of comparable fuel streams for generators. We invite comment on this approach.

EPA also invites comment on whether this approach could be expanded to other Appendix VIII constituents as well (e.g., whether the total nitrogen specification level would ensure compliance with specification levels for individual compounds containing nitrogen).

3. Selection of the Benchmark Fuel

Another issue is selecting the appropriate fossil fuel(s) for the benchmark, and therefore the basis of the comparable fuel specification. Commercially available fossil fuels are diverse. They range from gases, such as natural gas and propane, to liquids, such as gasoline and fuel oils, to solids, such as coal, coke, and peat.

EPA does not believe, from an environmental standpoint, that the comparable fuel specification, which would exclude a hazardous waste fuel from RCRA subtitle C regulation, should be based on fossil fuels that have high levels of toxic constituents that may (or will) not be destroyed or detoxified by burning (e.g., metals and halogens). One would expect that solid fuels, such as coal, would have relatively high metal and possibly halogen levels. Metals and halogens are not destroyed in the combustion process and as a result can lead to increases in HAP emissions, unlike organic Appendix VIII constituents which (ideally) are destroyed or detoxified through combustion. Therefore, EPA is not inclined to include a solid fuel as a benchmark fuel. Also, we believe that basing the comparable fuel specification on a gas fuel would be overly conservative and have no utility to the regulated industry. Liquid fuels, on the other hand, are widely used by industry and do not have disadvantages of solid or gaseous fuels. Liquid fuels seem a good compromise among the fuel types. The Agency is therefore proposing to base the comparable fuel specification on benchmark liquid fuels.

However, even liquid fossil fuels are diverse and add to the complexity of selecting a benchmark fuel. For instance, gasoline has relatively higher levels of toxic organics, such as benzene and toluene but lower concentrations of metals. Conversely, we have also found and would continue to expect that typical fuel oils have lower concentrations of toxic organics and higher concentrations of metals than gasoline. We also have found that heavier fuel oils (e.g., No. 6) contain more metals than lighter fuel oils (e.g., No. 2).[197]

In addition, EPA could choose a vegetable oil-based fuel, such as "tall oil", rather than a fossil fuel. EPA has no data on concentrations of hazardous constituents in these fuels, however. Also, these fuels are not as widely used as commercial fuels. In keeping with the benchmark approach, EPA believes it is appropriate to base the comparable fuel specification on an appropriate and widely used type of commercial fuel, i.e., fossil fuels.

We specifically request constituent data for gasoline, automotive diesel, and No. 1 (kerosene/Jet fuel), No. 2 (different from automotive diesel), No. 4, and No. 6 fuel oils. These data should be complete and include analyses for all Appendix VIII constituents including nondetect values. When supplying data during the comment period, commenters should follow the same analytical and quality procedures EPA used. It would assist the Agency greatly if the data were supplied in electronic (1.44–MB PC or Macintosh floppy disk) as well as hard-copy form. Electronic versions should be in a spreadsheet form (for instance, Lotus 1,2,3, or Microsoft Excel) or an ASCII file with a description of how the records are classified/organized into which fields. Consult the Technical Background Document for a complete list of constituents and additional information concerning EPA's sampling and analysis and quality assurance protocols used.

B. Sampling, Analysis, and Statistical Protocols Used

This section describes the sampling, analysis, and statistical protocols used to derive the comparable fuels specifications described below. For more detailed discussion, refer to the Technical Background Document.

1. Sampling

EPA obtained a total of 27 fossil fuel samples. They were comprised of eight gasoline and eleven No. 2, one No. 4, and seven No. 6 fuel oil samples. The samples were collected at random from sources across the country: Irvine, CA; north west New Jersey; north east Connecticut; Coffeyville, KS; Fredonia, KS; Norco, LA; Hopewell, VA; and Research Triangle Park, NC.

Only one No. 4 fuel oil sample was obtained. Very little "No. 4" fuel oil[198] is sold in the United States. Rather, what is used as No. 4 is essentially a blend of No. 2 and 6 fuel oils. These blends vary, are contract specific, and are not No. 4 fuel oil, per se. EPA specifically requests data on (genuine) No. 4 fuel oil constituent levels.

2. Analysis of the Fuel Samples

Analytical methods have not been defined for all compounds on Part 261, Appendix VIII. Where analytical methods have not been defined, analysis of those constituent levels in fossil fuels are not possible. However, EPA is working on identifying methods for compounds on Appendix VIII which were not analyzed for during this initial analysis. If EPA is able to identify analysis methods for these compounds, constituent specifications for these compounds will be included in the final rule using the same methodology for constituent specifications described in today's notice.

After the samples were obtained, they were analyzed at a laboratory accustomed to analyzing fossil fuels. SW–846 methods were used whenever possible. Where SW–846 methods were not available, established ASTM procedures or other EPA methods for fuel analyses were used. Table VI.1.1 summarizes the analytical methods used.

TABLE VI.1.1: ANALYTICAL METHODS USED FOR COMPARABLE FUELS ANALYSIS

Property of interest	Method
Heating Value	EPA 325.3/PARR.
Kinematic Viscosity	ASTM D240.
Flash Point	SW–846 1010.
Total Nitrogen	ASTM D4629.
Total Halogens	EPA 325.3/PARR.
Antimony	SW–846 7040.
Arsenic	SW–846 7060.
Barium	SW–846 7080.
Beryllium	SW–846 7090.
Cadmium	SW–846 7130.
Chromium	SW–846 7190.
Cobalt	SW–846 7200.
Lead	SW–846 7420.
Manganese	SW–846 7460.
Mercury	SW–846 7470.
Nickel	SW–846 7520.
Selenium	SW–846 7740.
Silver	SW–846 7760.

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[197] See the appendix to this notice for the results of EPA's analysis.

[198] No. 4 fuel oil is defined as fuel that meets the physical specifications established by the American Society of Testing and Materials.

TABLE VI.1.1: ANALYTICAL METHODS USED FOR COMPARABLE FUELS ANALYSIS—Continued

Property of interest	Method
Thallium	SW–846 7840.
Appendix IX Volatile Organics.	SW–846 8240.
Appendix IX Semivolatile Organics.	SW–846 8270.

In addition, the analysis was conducted in such a way as to ensure the lowest detection limits, also called "quantification limits," possible. Detection limits were determined by calculating the "method detection limit" (MDL) for each analysis. To do this, EPA used a modified version of the procedures defined by EPA in 40 CFR 136, Appendix B, *Definition and Procedure for Determination of Method Detection Limits, Revision 1.1.* The modification involved spiking for each of the samples being analyzed instead of spiking once for all the samples, as stated by the method.

One issue concerning the analysis is that, even when attempts are made to minimize detection limits, detection limits can still be extremely high. This is particularly so for volatile organic compounds in the gasoline samples. There is no feasible analytical way to address this issue, so it is addressed when deriving the comparable fuel specification.

3. Statistical Procedures Used

Due to the small sample sizes of each fuel type, EPA used a nonparametric "order statistics" approach to analyze the fuel data. If enough data are received to determine the distribution of the enlarged data set, statistical procedures appropriate to the distribution, i.e., different than those described here, may be used for the promulgated specification.

"Order statistics" involves ranking the data for each constituent from lowest to highest concentration, assigning each data point a percentile value from lowest to highest percentile, respectively. Result percentiles were then calculated from the data percentiles. Consult the Technical Background document for more information regarding the statistical approach.

EPA is considering using either the 90th or 50th percentile values to determine the comparable fuel specification. If the exclusion were to be based on specifications from one or more individual benchmark fuels (e.g., separate gasoline or fuel oil based specifications), EPA believes it is more appropriate to establish the specification(s) based on the 90th percentile rather than the 50th percentile values. The 90th percentile represents an estimate of an upper limit of what is in a particular fuel while the 50th percentile values would exclude up to 50 percent of the fossil fuel samples. For composite specifications (discussed in detail below), EPA is considering using either the 50th or 90th percentile, but the considerations differ. A 50th percentile analysis was conducted because it represents what, "on average", is found in all potential benchmark fuels that were studied. A 90th percentile was also conducted because it represents the upper bound of what is found in all fuels. EPA invites comment on which percentile(s) is appropriate for both the individual specifications as well as the composite specification.

C. Options for the Benchmark Approach

As just described, EPA has several options for deciding what fossil fuel(s) to use as the benchmark. The following options range from developing a suite of comparable fuel specifications based on individual benchmark fuels (i.e., gasoline, No. 2, No. 6) to basing the specification on composite values derived from the analysis of all benchmark fuels.

The Agency invites comment on which of the following options should be selected. Again, EPA desires to provide constructive relief to the regulated community by having a comparable fuel specification that can be used in practice. On the other hand, EPA needs to ensure that the release of toxic compounds is not increased significantly by burning comparable fuels in lieu of fossil fuels. For this reason, we are offering several options for comment. Commenters should also address in their comments the justification needed to support their preferred option.

The options discussed below are not the only possible options. If commenters have other options they wish the Agency to consider, they should recommend them and explain how they meet the objectives of a benchmark approach to comparability.

1. Individual Benchmark Fuel Specifications

Under this option, EPA invites comment on establishing individual specifications based on the benchmark fuels for which EPA has obtained data: gasoline, and No. 2 and No. 6 fuel oils.[199] [200] Each would have a unique set of constituent and physical specifications, based on the individual benchmark fossil fuel. A generator would use one of these specifications (after correcting for heating value) to determine if a waste qualifies for the exclusion. As mentioned in subsection A.2.B., above, heating value of a comparable fuel would have to exceed 11,500 J/g (5,000 BTU/lbm).

EPA envisions that individual fuel specification(s) could be implemented in one of two ways under this approach. First, a facility could use any of the individual benchmark specifications, without regard to what fuel it currently burns. This approach would provide flexibility for the facility in choosing which specification to use. Although this approach could allow higher emissions of certain toxic compounds at the particular site than would be the case if they burned their normal fuel(s), overall (total) emissions of hazardous constituents may be lower since a comparable fuel is unlikely to have high levels of all constituents. In addition, the amounts of excluded waste may well be small relative to the quantity of fossil fuels burned annually.

The second approach is to link the comparable fuel specification to the type of fuel burned at the facility and being displaced by the comparable fuel. In this case, if a facility burns only No. 2 fuel oil, it could only use the No. 2 fuel oil comparable fuel specification to establish whether its current waste stream is a comparable fuel. Implementation issues include the following: what specification would apply if a facility uses a gas or solid fuel, and what is the degree of inflexibility introduced?

EPA prefers the first implementation approach, but invites comment on whether a single fuel should be used to base a comparable fuel specification and if so, which implementation should be adopted.

2. A Composite Fuel as the Benchmark

One issue associated with the single fuel specification approach is that

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[199] This list could be expanded, depending on the amount and quality of data received during the comment period.

[200] EPA is reluctant to propose a No. 4 oil specification at this time. As noted, EPA has been able to obtain only one sample of No. 4 oil. EPA desires more data on genuine samples of this fuel before establishing a comparable fuel specification based on No. 4 fuel oil. As is the case with other types of fuel, if a sufficient number of samples are obtained, a No. 4 fuel oil comparable fuel specification may be promulgated.

gasoline has relatively high levels of volatile organic compounds while No. 6 fuel oil has higher levels of semivolatile organic compounds and metals. If a potential comparable fuel were to have a volatile organic constituent concentration below the gasoline specification but higher than the others, and a particular metal concentration lower than the No. 6 fuel oil specification but higher than gasoline, it would not be a comparable fuel since it meets no single specification entirely. Therefore, EPA is concerned that establishing specifications under this option would limit the utility of the exclusion.

To address this issue, one option is to use a composite approach to setting the comparable fuel specification. In this option, EPA would use a variety of liquid fuels from which certain compounds would be selected to derive the complete specification.

EPA determined composite fuel specifications for this proposal by compositing the data from all fuels analyzed (gasoline and the three fuel oils individually). Compositing all the fuels has the advantage that it may better reflect the range of fuel choices and potential for fuel-switching available nationally to burners. A facility would be allowed to use the composite fuel specification regardless of which fuel(s) it burns.

One technical issue is that EPA has different number of samples for each fuel type. Therefore, the fuel with the largest number of samples would dominate the composite database. To address this issue, EPA's statistical analysis "normalizes" the number of samples, i.e., treat each fuel type in the composite equally without regard to the number of samples taken.

The Agency has evaluated establishing a composite specification using: (1) the 90th percentile aggregate values for the benchmark fuels; and (2) the 50th percentile aggregate values for the benchmark fuels. Under either approach, high gasoline volatile organic nondetects would be omitted from the analysis.

The 90th percentile approach has the virtue of being representative of a range of fuels that are burned nationally in combustion devices. It also provides maximum flexibility for the regulated community. However, the 90th percentile composite approach does allow for higher amounts of toxic constituents than other approaches EPA is considering. As a practical matter, though, no excluded fuel is likely to contain constituent levels at or near all of the 90th percentile composite specification level. EPA invites comment on this issue.

The 50th percentile approach ensures the comparable fuel specification is representative of a range of benchmark fuels commonly burned at combustion devices, perhaps even more so than the 90th percentile approach since it better represents an "average" level for fuels in general. It also provides flexibility for the regulated community, though the specification levels (and potentially the usefulness) would be lower than those resulting from the 90th percentile approach. If facilities indeed are likely to have at least several constituents near the 90th percentile composite levels, a 50th percentile composite would be more restrictive and less useful than the 90th percentile composite approach.

EPA seeks comments on whether a composite of fuels should be used to base a comparable fuel specification and, if so, whether a 90th or 50th percentile approach would be more appropriate. Further, the Agency seeks comment on whether the exclusion should be based on a suite of specifications comprised of the individual benchmark fuel-based specifications plus a composite specification. Under this approach the generator could select any specification in the suite as the basis for the exclusion.

3. Waste Minimization Approaches

By proposing this comparable fuels exemption the Agency does not wish to discourage pollution prevention/waste minimization opportunities to reduce or eliminate the generation of wastes in favor of burning wastes as comparable fuels. EPA solicits comments on the effect of today's comparable fuels proposal on facilities' efforts to promote source reduction and environmentally sound recycling (which does not include burning for energy recovery as a form of recycling in the RCRA waste management hierarchy.)

D. Comparable Fuel Specification

In this section, EPA will outline the five specifications discussed above: gasoline, No. 2 fuel oil, No. 6 fuel oil, composite 50th percentile values, and composite 90th percentile values. For reasons stated above, the individual fuel specifications were based on the 90th percentile values. EPA is not proposing any particular approach at this time, but invites comments on which approach(es) should be promulgated in a final rule. EPA is also presenting the results of the No. 4 fuel oil sample for comparison.

1. Hazardous Constituent Specifications

a. Gasoline Specification. The gasoline-based specification is presented in Table 1 of the appendix to this preamble. As stated above, gasoline contains more volatile organic compounds (such as benzene and toluene) than the other fuels. This results in detection limits for volatile organic compounds an order of magnitude higher than the other fuel specifications. EPA believes analysis of comparable fuels will more likely result in detection limits much lower than gasoline and similar to those associated with analysis of fuel oils. To address this issue, EPA has performed an analysis of a fuel oil-only composite (one which does not include gasoline in the composite) at the 90th percentile to use as a surrogate for the volatile organic gasoline non-detect values. Those values from the fuel oil-only composite are presented as the volatile organic nondetect values in Table 1. EPA invites comment on whether the approach of substituting fuel oil-only volatile organic nondetect values in lieu of those values for gasoline is appropriate.

b. Number 2 Fuel Oil Specification. The No. 2 fuel oil-based specification is presented in Table 2 of the appendix to this preamble. As suggested above, No. 2 fuel oil contains more volatile organic compounds than the other fuel oils, but less than gasoline. In addition, its metal concentrations are lower than the other fuel oils, but more than gasoline.

c. Number 4 Fuel Oil Specification. The No. 4 fuel oil-based specification is presented in Table 3 of the appendix. It follows a similar trend, having fewer organic constituents than those previous described, but more metals.

However, this specification is based on only one sample. The Agency is concerned that one sample may not be representative of true No. 4 fuel oil. As a result, EPA believes that we will not be able to promulgate a No. 4 fuel oil specification unless more data is received during the comment period.

d. Number 6 Fuel Oil Specification. The No. 6 fuel oil-based specification is presented in Table 4 of the appendix.

e. Composite Fuel Specifications. Two alternative composite fuel specifications are presented in Tables 5 and 6 of the appendix. Table 5 presents a specification based on the aggregate 50th percentile values for the benchmark fuels, and Table 6 presents a specification based on the aggregate 90th percentile values of the benchmark fuels.

As was the case with the gasoline specification, volatile organic detection limits for gasoline are quite large. For this reason, EPA is relying on surrogate values for volatile organic detection limits, one based on the detection limits from a fuel oil-only composite. For the 50th percentile composite fuel specification, the 50th percentile fuel oil-only volatile organic nondetect values were used. The 90th percentile composite fuel specification was handled similarly, using the 90th percentile volatile organic nondetect values from the fuel oil-only composite. See the discussion for the gasoline sample for EPA's concerns regarding gasoline's high detection limits.

2. Physical Specifications (Flash Point and Kinematic Viscosity)

Alternative physical specifications for the options evaluated are presented collectively in Tables 7 and 8 of the appendix. Table 7 presents the results of the analyses EPA conducted. Table 8 presents an alternate approach, using the requirements for viscosity and flash point for fuel oil specified by ASTM. Physical specifications for viscosity and flash point for gasoline are not required by ASTM, but their upper and lower limits, respectively, are available from other reference sources.

When considering a composite physical specifications using the reference values presented in Table 8, EPA believes it is appropriate to use the second highest viscosity and second lowest flash point as the specifications. This would have the effect of not considering the extremes, No. 6 fuel oil viscosity (50.0 cSt at 100°C) and gasoline flash point (−42°C), and using as the specification the viscosity of No. 4 fuel oil (24.0 cSt at 40°C) and the flash point of No. 2 fuel oil (38°C). EPA believes this approach will result in specifications which are representative of comparable fuels and the fossil fuels they displace, and ensure adequate safety during transportation and storage.

Subsection A.2.b. discusses the proposed minimum heating value of 11,500 J/g (5,000 BTU/lbm).

E. Exclusion of Synthesis Gas Fuel

EPA is also proposing to exclude from the definition of solid waste (and, therefore regulation as hazardous waste) a particular type of hazardous waste-derived fuel, namely a type of synthesis gas ("syngas") meeting particular, stringent specifications. The Agency believes that many fuels produced from hazardous wastes are more waste-like than fuel- or product-like, and must be regulated as such. We are aware, however, of certain fuels and products produced from hazardous waste that are more appropriately classified and managed as products rather than wastes. EPA believes that syngas meeting the requirements of the proposed exclusion is such a material. Syngas is a commercial product which has important uses in industry as both a feedstock and commercial fuel, and it may be used as both a feedstock and commercial fuel at a manufacturing facility. The Agency is therefore proposing this exclusion to clarify the distinction between syngas products meeting these stringent specifications and hazardous wastes and other waste-derived fuels. The Agency believes it is useful to provide a conditional exclusion for these particular fuels, possibly before promulgating the broader rule being proposed today. This is because, although there may be much debate about the generic comparable fuel specification levels discussed above, the syngas at issue here appears to be well within the bounds of what would be excluded, whatever the final rule levels may actually be for other comparable fuels.

The proposal applies to syngas that results from thermal reaction of hazardous wastes which is optimized to both break organic bonds and reformulate the organics into hydrogen gas (H2) and carbon monoxide (CO). This process is more similar to a chemical reaction, rather than to combustion. The process is optimized to produce an end-product, rather than merely to destroy organic matter.

EPA is aware of one such process, proposed to be operated by Molten Metals Technology (MMT). MMT intends to operate a catalytic extraction process (CEP) unit that generates certain gas streams from the thermal reaction of various hazardous wastes, including chlorinated hazardous wastes. See letter of July 21, 1995, from Molten Metal Technology to EPA. This letter and other information on the MMT process are in the docket for today's proposed rule. MMT claims that the syngas generated by the processes has legitimate fuel value (i.e., 6,000 to 7,000 Btu/lb), has a chlorine level of 1 ppmv or less, and does not contain hazardous compounds at higher than parts per billion levels. Thus, this syngas possesses standard product indicia in the form of fuel value plus being the output of a process designed to optimize these properties, and the syngas product does not contain hazardous constituents at levels higher than those present in fossil fuel.

To ensure that any excluded syngas meets these low levels of hazardous compounds relative to levels in fossil fuels in order to be excluded from the definition as a solid waste, the Agency is proposing the following syngas specifications:

—Minimum Btu value of 5,000 Btu/lb;
—Less than 1 ppmv [202] of each hazardous constituent listed in Appendix VIII of Part 261 (that could reasonably be expected to be in the gas), except the limit for hydrogen sulfide is 10 ppmv;
—Less than 1 ppmv of total chlorine; and
—Less than 1 ppmv of total nitrogen, other than diatomic nitrogen (N_2).

EPA seeks comment on whether there are other hazardous waste-derived synthesis gas fuels (i.e., other than MMT's) that meet the criteria for this proposed exclusion.

We also note that conditions imposed for exclusion of syngas fuels in no way precludes the use of syngas as an ingredient in manufacturing, which is evaluated under a different set of criteria, when the syngas is produced from hazardous waste. In other words, if the syngas were to be used as either a product in manufacturing or burned as a fuel, it would be excluded as a product when it met the criteria for use as a product and was used for that purpose and excluded as a fuel when burned.

If EPA adopts this exclusion for syngas fuel, we believe that the implementation procedures for the generic comparable fuel exclusion discussed subsequently in Section F would also be appropriate for syngas. This includes requirements for the syngas producer to notify the Regional Administrator that an excluded fuel is produced, a certification that the syngas meets the exclusion specification levels, and sampling and analysis requirements. EPA invites comment on these implementation procedures for syngases and whether any of these procedures should be modified to address any unique characteristics of syngases.

Finally, we note that in Section F below we discuss whether the burning of hazardous waste excluded under the generic comparable fuel exclusion should be restricted only to stationary sources either with air permits or that otherwise have their air emissions regulated by a federal, state, or local entity. We specifically request comment on whether this restriction would also be appropriate for excluded syngas. Given that the Agency may undertake final rulemaking to provide an exclusion for syngas before promulgating a generic exclusion for

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[202] All specification levels would be documented at normal temperature and pressure of the gas at the point that the exclusion is claimed.

comparable fuels, however, we request comment on whether more restrictive requirements on burning excluded syngas would be appropriate to minimize concern about burning a hazardous waste-derived gas. For example, the exclusion could be limited to syngas which is burned in an industrial boiler, industrial furnace (as defined in 40 CFR 260.10) or incinerator. We note that these units would not necessarily have to be RCRA Subtitle C units.

F. Implementation of the Exclusion

The implementation scheme described here is adapted from the current used oil management system and is tailored to the particular characteristics of the comparable fuel universe.[203] It provides for one-time notification and certification, sampling and analysis, and recordkeeping requirements. Other issues addressed include blending, ensuring that the comparable fuel is burned, and treatment to meet the specification.

1. Notification and Certification

EPA proposes that a generator (or syngas producer [204]) who claims that a (currently defined) hazardous waste meets the specification for exclusion must submit a one-time notification and certification to the Regional Administrator. The notification would state that the generator manages a comparable fuel and certifies (through a responsible company official) that the generator is in compliance with the conditions of the exclusion regarding sampling and analysis, recordkeeping, blending, and ultimate use of the waste as a fuel. EPA understands that a “generator” may be a company with multiple facilities. For this reason, a single company would be allowed to submit one notification, but must specify at what facilities the comparable fuels notification applies. All other provisions apply to each stream at the point of generation.

2. Sampling and Analysis

EPA believes it is appropriate that the generator document by sampling and analysis that the hazardous waste meets the specification. Until such documentation is obtained, the waste would not be excluded. Waste analysis rules for TSDFs would apply to comparable fuel generators. Consequently, generators would implement a comparable fuels analysis plan.

The sampling and analytical procedures for determining that the waste meets the specification must be documented in a comparable fuels analysis plan. The comparable fuel analysis plan would involve sampling and analyzing for all Appendix VIII constituents initially and at least every year thereafter for constituents that the generator could have reason to believe are present in the comparable fuel. EPA specifically invites comment on whether to allow a generator to use process knowledge to determine what compounds to sample and analyze for during the first analysis, as well.

The generator would use current EPA guidance for developing waste analysis plans to derive their comparable fuel analyze plan. This will ensure that generators sample and analysis as often as necessary, i.e., more frequently than every year, for constituents present in the fuel to ensure that excluded waste meets the specification.

Analytical methods provided by SW–846 must be used, unless written approval is obtained from the Regional Administrator to use an equivalent method. EPA invites comment on establishing a procedure similar to Part 63, Appendix A, Method 301 to validate alternate analytical methods. EPA also invites comment on whether to limit the Agency’s time to approve an equivalent method. In this case, the Regional Administrator would have a set period of time, such as 60 days, to respond to the request. If an approval is not received within 60 days, the alternative method is considered approved. If the Regional Administrator later rejects the method, the rejection would only pertain to analyses conducted after the rejection of the method.

3. Use as a Fuel

An integral part of the comparable fuel exclusion is that the fuel must be burned. To ensure that the comparable fuel is burned, the person who claims the exclusion must either:

—Burn the comparable fuel on-site; or
—Ship the waste off-site to a person who in turn burns the comparable fuel.

This provision would not allow any party to manage the fuel other than those who generate or burn the fuel (and other than transportation related handling). EPA is reluctant to allow persons other than the generator and the burner to manage the comparable fuel because it would likely be too difficult to ensure that the excluded fuel meets the specification and is burned. We invite comment on how to allow third party intermediaries, such as fuel blenders, to handle an excluded comparable fuel without precipitating serious enforcement and implementation difficulties.

Additionally, EPA is concerned that comparable fuel shipped directly to an off-site burner may not in fact be burned. Therefore, EPA invites comment on whether, for off-site shipments to a burner, the following information should be retained in the record for each shipment:

—Name and address of the receiving facility;
—Cross-reference to a certification from the facility certifying that the comparable fuel will be burned;
—Quantity of excluded waste shipped;
—Date of shipment; and
—A cross-reference to the analyses performed to determine that the waste meets the specification.

A comparable fuel which is not burned remains a hazardous waste and is subject to regulation cradle-to-grave.[205] This documentation would provide a paper trail to ensure that the comparable fuel is burned.

EPA invites comment on whether the burning of a comparable fuel should be restricted to only stationary sources either with air permits or that otherwise have their air emissions regulated by a federal, state, or local entity. EPA’s primary concern is that excluded fuel may be burned in unregulated combustion devices. EPA believes that unregulated burners may be unaware of or unprepared to handle many unique issues related to fuels other than fossil fuels. In addition, EPA invites comment on whether comparable fuels should be allowed for use in sources other than stationary sources, i.e., mobile sources (on- and off-road automobiles, trucks, and engines) and small engines.

4. Blending To Meet the Specification

The issue of whether to allow blending to meet the comparable fuel specification also needs to be addressed. One alternative is to exclude only those comparable fuels that meet the specification as generated and which are destined for burning. The facilities would be required to demonstrate, for

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[203] Note that used oil has its own separate management system, as allowed under RCRA, tailored to the unique characteristics of used oil recycling practices. The comparable fuel exclusion proposed today would not apply to used oil because it is adequately and appropriately managed under its own tailored system. Used oil will still be managed under 40 CFR Part 279. This proposal in no way reopens the used oil specification or management structure in 40 CFR Part 279.

[204] Requirements applicable to the generator of an excluded fuel would also apply to producers of excluded syngas.

[205] Note that the only disposal method for a comparable fuel is burning. Any disposal method other than burning is a RCRA violation, unless the comparable fuel is properly managed as a hazardous waste.

compliance purposes, that the waste as generated meets the specification and to certify that the waste is destined for burning.

If blending to lower the concentrations of hazardous constituents in a waste were allowed to meet the specification, EPA believes that a very extensive compliance and enforcement system would have to be instituted to ensure that blending was done properly (with any necessary storage and treatment permits) and that the resultant mixture meets the specification continually. This alternative appears to warrant a degree of oversight that may be infeasible from the industry viewpoint and unworkable from the Agency's viewpoint. EPA is also investigating whether blending removes the incentive for facilities to engage in source reduction and recycling of waste. Finally, this alternative raises the issue of whether blending is simply a form of prohibited or objectionable dilution that could result in an overall increase in environmental loading of toxic, persistent, or bioaccumulative substances.

Complicating this issue is the fact that blending to lower hazardous constituent concentrations in used oil is allowed. (40 CFR 279.50(a).) However, EPA believes it is appropriate to deviate from the approach for used oil in this case. Used oil is better defined and understood in its origins and use than currently defined hazardous wastes. Used crankcase oil is a petroleum product analogous to a thick fuel with enriched metal concentrations due to its use for lubricating metal-bearing parts in situations of tight tolerance. In the case of used oil, blending a thick fuel enriched with metals with a thinner fuel with low concentrations of metals is appropriate since the resulting mixture would be wholly a petroleum product with similar levels of metals as other petroleum fuels.

Comparable fuels, however, differ substantially from used oil in both the nature of materials to which the exclusion pertains and the scope of the exclusion. A comparable fuel is presently defined as a hazardous waste and is unlikely to be a petroleum distillate. The issue of toxic organic constituents is important for comparable fuels due to the diversity of processes and process ingredients from which potential comparable fuels may result. This is not relevant for the used oil rules since they deal with the post-use material stemming from a highly consistent and well known petroleum distillate. Therefore, blending used oil would result in a more predictable mixture, one which would be expected to contain the same organic compounds in varying concentrations. The same cannot be said for the large variety of potential comparable fuels, which can vary significantly in the constituents present.

The issue of metals in a comparable fuel is similarly different from the case of used oil. While used oil does contain enriched levels of metals relative to virgin oil or petroleum fuels, those levels are greatly understood (relative to hazardous waste in general) due to their use in only one process, the lubrication of metal-bearing parts. Therefore, there is essentially a real-world limit to the amount and type of metal that could be entrained in a used oil, so blending to meet metal specifications is more appropriate. In the case of comparable fuels if there were no prohibition on blending to meet constituent specifications, a generator would be allowed to take a predominantly metal waste, blend it into a fuel to levels lower than the constituent specification levels, and (through pure dilution) meet the exclusion. For these reasons, EPA believes the specially tailored used oil program does not provide a satisfactory model to use for addressing the issue of blending potential comparable fuels.

We also note that the LDR program specifically prohibits dilution as a form of treatment. (40 CFR 268.3.) Allowing blending to meet the specification may, in effect, allow dilution as a form of treatment contrary to the LDR prohibition for these hazardous wastes. For these reasons, EPA desires to stay consistent with other rules and policies and not allow blending to meet the comparable fuels specification.

Similarly, EPA proposes that the specification for heating value be met on an as-generated basis as well. In other words, blending would not be allowed to meet the heating value specification. If the Agency were to allow blending to meet the heating value specification, wastes with no heating value could be blended with high heating value fossil fuels and meet the comparable fuel heating value specification. EPA does not believe this approach can be justified, allowing a waste which as generated has little or no heating value to be a comparable fuel. Therefore, we propose that heating value be met on an as generated basis.

For these reasons, EPA is proposing that the comparable fuel constituent and heating value specifications be met on an "as generated" basis, and that blending to meet the constituent and heating value specifications not be allowed. However, if the constituent and heating value specifications have been met as generated, EPA believes it may be appropriate for a comparable fuel to be treated like any other fuel and allow it to be blended *after the constituent and heating value specifications have been met.* This includes blending for the purposes of meeting other physical specifications (flash point and viscosity), pH neutralization, etc.

After blending, generators would have to retest the prospective comparable fuel to ensure that blending did not increase the levels of constituents to above the specification levels or decrease it to below the heating value requirement. If the waste were blended with a clean fossil fuel, such as No. 2 fuel oil, it would be sufficient to document that the substance the prospective comparable fuel is being blended with has lower constituent levels and a higher heating value than the comparable fuel specification. If the waste is above constituent specifications or below the heating value requirement after blending, the waste would not be a comparable fuel.

EPA invites comment on the issue of blending only to meet the physical specifications, flash point and kinematic viscosity.

5. Treatment To Meet the Specification

It is possible, as a technical matter, for hazardous wastes to undergo treatment that destroys or removes hazardous constituents and thereby produce a comparable fuel. Likewise, it is possible to treat a waste such that the heating value of the waste is increased. For example, distillation could remove certain organic constituents from the waste matrix, thereby allowing the treated waste to meet the comparable fuel specification. Similarly, decanting to decrease the water concentration of the waste stream would increase the heating value of the waste by concentrating those compounds which are burned. The issue discussed here is whether such processes should be allowed under a comparable fuel regime, and if so, under what circumstances. The Agency is proposing to allow treatment under limited circumstances.

The Agency's concern about allowing such treatment is that it could increase the incentive and opportunity for impermissible blending or otherwise fraudulent treatment. Thus, at the least, EPA would seek to set up controls to reduce the possibility of such practices if treatment were allowed. This might be done by requiring treaters to document that the comparable fuel specification is being satisfied through treatment that destroys or removes hazardous constituents and/or increases heating value by removing constituents from the waste, not through blending or other dilution-type activities. Second, where the treater has a RCRA permit for the storage/treatment activity (i.e., treatment of hazardous waste conducted in any unit except a 90-day generator unit not subject to permitting requirements under § 262.34), the rule could authorize permit writers to add conditions to the permit to assure the integrity of the permitted process. Such conditions could take the form of extra conditions on the treatment process, conditions on the wastes which could be treated to produce comparable fuels, and additional sampling and analysis of both incoming wastes and outgoing comparable fuels. The Agency solicits comment on what limitations or conditions should be imposed on treatment activities and whether and how to adapt such limitations or conditions to the non-permitted context of 90-day generator units.

Finally, it should be noted that if hazardous wastes are treated to produce comparable fuels, only the comparable fuel would be excluded from RCRA subtitle C regulation. The hazardous wastes would be regulated from point of generation until a comparable fuel is produced, so that generation, transport, storage, and treatment of the waste until production of the comparable fuel would remain subject to the applicable subtitle C rules. Also any residuals resulting from treatment remain hazardous wastes as a result of the derived-from rule.

6. Recordkeeping

It is proposed that documentation pertaining to verification that the waste meets the comparable fuel specification and the information on shipments be retained for three years. The sampling and analysis plan and all revisions to the plan since its inception would be retained for as long as the person claims to manage excluded waste, plus three years. Certifications from burners (if required in the final rule) would be retained for as long as the burner is shipped comparable fuels, plus three years.

The generator would retain the records supporting its claim for the exemption. For comparable fuels which are not blended, the records that must be retained are the as generated results. For comparable fuels which are blended to meet the flash point and/or kinematic viscosity specifications, the records which must be retained are those after blending.

7. Small Business Considerations: Inherently Comparable Fuel

Small businesses may, hypothetically, generate wastes (such as mineral spirits used to clean automotive parts) that could meet a comparable fuel specification. However, the Agency is concerned that the proposed implementation scheme for the comparable fuel exclusion may be overly burdensome to small businesses because of the small volume of waste each business may generate. EPA requests data on whether categories of high volume inherently comparable fuel from a large number of small generators exist. If so, EPA would consider providing an exclusion for these fuels in the final rule. For these fuels to be excluded, the Agency would need constituent data from various small generators indicating that these wastes would meet the comparable fuel exclusion levels on a routine basis.

If an inherently comparable fuel exclusion were promulgated in the final rule, the Agency would promulgate a petitioning process whereby classes of generators could document that a specific type of waste is virtually always likely to meet the comparable fuel specification. If the Agency granted the petition through rulemaking, such waste would be classified as inherently comparable fuel. As such, the generator would not be subject to the proposed implementation requirements for the comparable fuel exclusion: notification, sampling and analysis, and recordkeeping. In addition, such inherently comparable fuel could be blended, treated, and shipped off-site without restriction given that it would be excluded from regulation as generated.

EPA invites comment on whether high volumes of comparable fuel is generated from a large number of small generators. If so, the Agency requires data on whether this approach provides relief to small businesses while ensuring protection of human health and the environment. In addition, EPA invites analytical data supporting classification of particular wastes as inherently comparable fuel. The Agency would provide notice and request comment on such data prior to making a final determination that the waste is inherently comparable fuel.

G. Transportation and Storage

Waste derived fuels can pose risks during transportation and storage, not just when burned. For instance, comparable fuels could be reactive and corrosive (virgin fossil fuels are neither), more volatile than fossil fuels, or have other special properties affecting handling and storage. The Agency believes we can exempt comparable fuels from RCRA storage and transportation requirements and therefore rely on the storage and transportation regulations of other federal and state agencies. However, the affected industries may have more direct knowledge of how these requirements actually affect shipments and storage of the potential fuels, particularly with respect to the extent of state regulatory controls. We are therefore asking commenters to give EPA information on the adequacy of DOT and OSHA requirements related to storage and transportation, particularly with respect to whether a combustion facility (including an industrial boiler) will be on proper notice about the nature and behavior of the comparable fuel to allow for safe handling and burning.

In this regard, EPA believes it is appropriate to set a minimum flash point for comparable fuels. (See section A.2. for a general discussion concerning the Comparable Fuels Specification.) The flash point is defined as the minimum temperature at which a substance gives off enough flammable vapors which in contact with a spark or flame will ignite. Setting a minimum flash point would ensure that under ambient conditions the comparable fuel would not ignite during transportation and storage.

A shortcoming of this approach is that a purchaser or other off-site facility may desire a comparable fuel with a flash point lower than the comparable fuel specified flash point. EPA does not wish to preclude low flash point comparable fuels from the exemption. Therefore, the Agency is inclined to allow some waiver of the minimum flash point specification under certain circumstances.

EPA is proposing to allow low flash point comparable fuels if there is some notice to intermediate carriers and the ultimate user of what the flash point of this comparable fuel is. To do this, EPA needs to be assured that these low flash point comparable fuels can be stored, handled, and transported safely. EPA is inclined to believe current DOT and OSHA requirements for transportation and storage of hazardous or combustible liquids are adequate for this purpose, but we specifically seek comment on this issue.

H. Speculative Accumulation

EPA is also proposing that comparable fuels remain subject to the speculative accumulation test found in § 261.2(c)(4). This means that persons generating or burning comparable fuels must actually put a given volume of the fuel to its intended use during a one-year period, namely 75 per cent of what is on hand at the beginning of each calendar year commencing on January 1. See the definition of "accumulated speculatively" in § 261.1(c)(8). (The rules also provide for variances to accommodate circumstances where such turnover is not legitimately practical. § 260.31(a).) EPA applies this test to other similar exclusions of recycled secondary materials in the rules (see § 261.2(e)(2)(iii).) This is because over accumulation of hazardous waste-derived recyclables has led to many of the most severe hazardous waste damage incidents. See 50 FR at 658–61 and 634–37 (January 4, 1985). There is no formal recordkeeping requirement associated with the speculative accumulation test, but the burden of proof is on the person claiming the exclusion to show that the test has been satisfied. § 261.2(f) and 50 FR at 636–37.

I. Regulatory Impacts

EPA also requests data from the regulatory community concerning the regulatory impacts of this proposed comparable fuel exclusion. Impact data includes the quantity of waste which would be excluded (by weight) and the cost savings as a result of the exclusion. Based on the data submitted, EPA will develop a full regulatory impact assessment during the final rulemaking.

J. CMA Clean Fuel Proposal

The Chemical Manufacturers Association (CMA) submitted a proposal to exempt certain "clean" liquid wastes from RCRA regulation[206]. Unlike EPA's benchmark-based comparable fuel proposal, the CMA approach would establish clean fuel specifications for mercury, LVM, and SVM metals based on the technology-based MACT emission standards proposed today. For mercury, CMA calculated the maximum feed rate the facility would be allowed if it had a given gas flowrate, no mercury control, and yet complied with today's proposed standards. This would establish the maximum mercury concentration of the CMA "clean fuel" specification. Limits would be established for LVM and SVM metals in a similar fashion. For chlorine, CMA presented a specification level based on the concentration of chlorine found in coal. Limits for ash content would be derived from No. 4 fuel oil.

The CMA proposal also appears to rely solely on adequate thermal destruction of the organics to control potential organic contamination and risks therefrom. Combustion would be limited to on-site boilers or boilers owned and operated by the clean fuel generator, where these boilers meet a 100 ppmv hourly rolling average CO limit.

CMA's clean fuel proposal would also establish limits on physical specifications. The heating value of a CMA clean fuel would have to be at least 5,000 BTU/lb, viscosity would have to be less that 26.4, and the clean fuel must be a liquid.

Acutely hazardous wastes[207] would not be eligible for CMA's proposed clean fuel exemption, nor would dioxin-listed wastes (hazardous waste numbers F020, F021, F022, F023, F026, F028.)

EPA invites comment on CMA's proposed "clean fuels" specification. Specifically, EPA requests commentors address the following issues and questions:

—Is reliance on the technology-based MACT emission standards approach appropriate for establishing a clean fuel exemption under RCRA, either with or without restrictions on the type of device that can be used to burn the clean fuel? How does EPA justify not establishing specific constituent limits for the other five RCRA metals?

—Does a CO limit alone ensure adequate destruction of toxic organics in a clean fuel scenario? Would additional controls, such as an HC limit, limits on inlet temperature to a dry PM APCD, DRE testing, and site-specific risk assessment also be appropriate?

—Does CMA's proposal adequately address new facilities? Would it be appropriate to allow off-site shipment to a facility not owned by the generator if the generator owns no combustion device in the vicinity? If so, how would EPA be able to ensure compliance regarding the CO emissions (and possibly other testing and operational conditions) of a combustion device not owned by the generator?

—Should CMA's clean fuel approach be expanded to include gaseous as well as liquid fuels?

—Are there wastes other than those identified by CMA (acutely toxic and dioxin-listed wastes) which should not be eligible for a "clean fuel" exemption? If so, what would be the practical impacts of such expanded ineligibility?

—Are data available documenting that emissions from burning a "clean fuel" would not pose a significant risk for the potential combustion and management scenarios in which the clean fuel exclusion from RCRA might be used?

II. Miscellaneous Revisions to the Existing Rules

This section provides several miscellaneous revisions to the RCRA hazardous waste combustion rules provided by 40 CFR Parts 260–270. We note that we are also proposing other revisions to Parts 260–270 that would be conforming revisions to ensure that the RCRA rules are consistent with similar provisions of the proposed Part 63 rules. Those proposed conforming revisions are discussed elsewhere in the preamble.

A. Revisions to the Small Quantity Burner Exemption Under the BIF Rule

The Agency is proposing to revise the small quantity burner (SQB) exemption provided by § 266.108 of the BIF rule because the current exemption may not be protective of human health and the environment. Under the exemption, BIFs could burn up to the exempt quantities absent regulation other than notification and recordkeeping requirements. Under a settlement agreement, the environmental petitioners in *Horsehead Resource Development Company, Inc.,* v. *EPA* (No. 91–1221 and Consolidated Cases), the Agency must reevaluate whether the small quantity burner exemption is sufficiently protective given that the Agency did not consider indirect exposure pathways in calculating the exemption levels. In addition, the petitioners argued that the exemption is inconsistent with the intent of RCRA § 3004(q)(2)(B) which specifically allows the Administrator to exempt facilities which burn *de minimis* quantities of hazardous waste because the exemption as promulgated would allow sources to burn up to 2,000 gallons of hazardous waste per month absent substantive emissions controls. Petitioners believe that 2,000 gallons per month is not a *de minimis* quantity.

EPA attempted to reevaluate exempt quantities considering indirect exposure pathways for, in particular, emissions of dioxins and furans (D/F). Unfortunately, we were not able to adequately predict emission levels of D/F for purposes of conducting a generic, national risk assessment to back-calculate exempt

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[206] See *Revised CMA Proposal for Clean Waste Fuels Exemption to RCRA* dated March 1, 1996.

[207] That is, discarded commercial chemical products listed in § 261.33 ("P" listed wastes), and acutely hazardous (those with "H" hazard codes) wastes listed in §§ 261.31 and 261.32 (hazardous wastes from non-specific and specific sources, "F" and "K" listed wastes, respectively.)

quantities. We could not effectively predict D/F emissions because: (1) There may be little relationship between quantity of hazardous waste burned and D/F emissions (i.e., other factors may result in high or low D/F emissions); and (2) there are several site-specific factors that can affect D/F emissions, including combustion efficiency (that is affected by factors such as combustion zone temperature, oxygen levels, and residence time in the combustion zone), gas temperature at the particulate matter control device, and presence of precursors such as PCBs.

In addition, we found it difficult to identify an appropriate indirect exposure scenario for purposes of assessing risk to support a generic exemption. We note that to evaluate whether the proposed MACT standards met RCRA protectiveness requirements, we analyzed 11 example facilities assuming the example facilities emitted HAPs at the regulatory option levels. We did not have site-specific stack gas properties (e.g., gas flow rate, gas temperature, stack height) and exposure information to conduct similar indirect exposure assessments for example SQB facilities.

Given these difficulties, the Agency is proposing to revise the SQB exemption to limit exempt quantities to 100 kg/mo (27 gal/mo), which is the current exemption level for small quantity generators (SQG) provided by § 261.5. We believe that this is appropriate given that SQG hazardous waste is already exempt from regulation and thus, may be burned absent emission controls. We note, however, that the SQB exemption can apply to facilities owned or operated by large quantity generators. Thus, under today's proposal, wastes not eligible for the SQG exemption could be eligible for the SQB exemption. Nonetheless, we believe that 27 gal/mo is a reasonable level for the exemption because it is truly a *de minimis* quantity and such quantities can be burned absent emission controls under existing SQG regulations.

We believe that approximately 200 boilers are currently operating under the SQB exemption. Many of these boilers are likely burning quantities in excess of 27 gallons/mo, and so would be subject to full regulation as a BIF under today's proposal. We note, however, that we are also proposing today a comparable fuels exclusion that would exclude from the definition of solid and hazardous waste any material that meets the proposed comparable fuels specification. Although we currently have no information on how many SQBs could use the comparable fuels exclusion, some heretofore SQBs are expected to be eligible for this proposed exclusion.

Sources that burn hazardous waste that do not meet the comparable fuels specification may determine that it is less expensive to send their waste to a commercial burner than comply with the BIF regulations. Those sources that choose to continue burning hazardous waste would be required to comply with the substantive requirements of the BIF rule. Since the BIF rule would subject some of these facilities to RCRA regulation for the first time (assuming no other permitted units are at the facility), these SQB facilities would be eligible for interim status. See 56 FR at 7186 (February 21, 1991) for requirements regarding permit modifications, section 3010 notifications, and Part A permit applications. Such sources would also be required to submit a certification of precompliance (required by § 266.103(b)) within 6 months of the date of publication of the final rule in the **Federal Register**, and a certification of compliance (required by § 266.103(c)) within 18 months of the date of publication of the final rule.

B. The Waiver of the PM Standard Under the Low Risk Waste Exemption of the BIF Rule Would Not Be Applicable to HWCs

Section 266.109 of the BIF rule provides a conditional exemption from the destruction and removal efficiency (DRE) standard and the particulate matter (PM) emission standard. The DRE standard is waived if the owner or operator complies with prescribed procedures to show that emissions of toxic organics are not likely to pose a potential hazard to human health considering the direct inhalation pathway. The PM standard is waived if the DRE standard is waived and the source complies with the Tier I or adjusted Tier I feedrate limits for metals.

We are proposing today to restrict eligibility for the waiver of the PM standard to BIFs other than cement and lightweight aggregate kilns. This is because: (1) Compliance assurance with the proposed MACT standards for D/F, SVM, and LVM is based on compliance with a CEM-monitored, site-specific PM emission limit;[208] and (2) the proposed MACT PM standard would be used to help minimize emissions of adsorbed non-D/F organic HAPs. Given that this restriction for cement and lightweight aggregate kilns is needed to ensure compliance with the proposed MACT standards, the restriction would be effective at the time that the kiln begins to comply with the MACT standard (i.e., when the source submits the initial notification of compliance).

Finally, we note that, as a practical matter, we believe that this proposed restriction of eligibility for the PM waiver for kilns will have little or no effect on the regulated community. We are not aware of any cement or lightweight aggregate kilns that both meet the conditions for the exemption and have elected or intend to elect to request the waiver.

The Agency solicits comment on the application of waste minimization to lower the volume of waste streams fed to combustors so that the combustor can meet the proposed revised SQB feed limitations. Such reductions might be achieved by meeting the proposed HWIR standards and thus removing entire streams from Subtitle C requirements. The Agency is particularly interested in technical and economic information about commercial or experimental processes to reduce stream volume.

C. The "Low Risk Waste" Exemption from the Emission Standards Provided by the Existing Incinerator Standards Would Be Superseded by the MACT Rules

Section 264.340(c) exempts certain incinerators from the emission standards if the hazardous waste burned contains insignificant concentrations of Appendix VIII, Part 261, hazardous constituents which would reasonably be expected to be in the waste. In implementing this provision, the Agency has used various measures of risk potential to define "insignificant" concentrations. We believe that a risk-based waiver is inconsistent with today's proposed technology-based MACT standards for incinerators, and in any case could not supersede those standards. Thus, we are proposing that this provision no longer be applicable to an incinerator at the time it begins complying with the MACT standards (i.e., when the initial notification of compliance is submitted).

We also note that § 264.340(b) provides the same exemption from emission standards if the hazardous waste burned does not contain any (i.e., nondetect levels) of the Appendix VIII constituents. We are proposing that this provision also be superseded by the proposed MACT standards because: (1) Detection limits may be high for some waste matrices; and (2) nontoxic organics in the waste can result in emissions of toxic organics under poor combustion conditions or conditions favorable to formation of D/F in the

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[208] Not to exceed the proposed national MACT standard.

post-combustion zone (e.g., a PM control device operating at temperatures above 400°F).

D. Bevill Residues

1. Required Testing Frequency for Bevill Residues

The Agency is proposing to set a minimum sampling and analysis frequency for residues derived from the burning or processing of hazardous waste in units that may qualify for the Bevill exemption by satisfying the requirements of § 266.112 (a) and (b). The Agency believes a minimum testing frequency is necessary to prevent large quantities of hazardous residues from being managed in an environmentally unsound manner.

Current regulations require that waste derived residue be sampled and analyzed "as often as necessary to determine whether the residue generated during each 24-hour period" meets requirements to qualify for the Bevill exemption. Because large volumes of residue are generated in any 24-hour period, it is possible that a facility may have disposed of the residue after a sample had been taken, but before the analysis results are received. The Agency stated in the preamble to the BIF regulations (56 FR 42504 (August 27, 1991)) that "if the waste derived residue is sampled and analyzed less often than on a daily basis, and subsequent analysis determines that the residue fails the test and is fully regulated hazardous waste, the Agency considers all residue generated since the previous successful analysis to be fully regulated hazardous waste absent documentation otherwise." Residue generated after the failed test may also be considered hazardous waste until the next passing test. The residue disposal area or unit would also become subject to Subtitle C requirements.

In the interest of protecting human health and the environment and avoiding the scenarios mentioned above, the Agency is today proposing that if a facility elects to sample and analyze less frequently than every day, approval must be granted by the Regional Administrator and the sampling and analysis frequency used must be based on and justified by statistical analysis. The Agency is also proposing that, in the event the Regional Administrator approves less than daily sampling at a facility, the facility must, at a minimum, sample and analyze its residues at least once every month for metals and once every six months for other compounds. A more frequent minimum sampling frequency has been proposed for metals because of the variability of metal content in feed materials and because metals cannot be destroyed in the furnace. The proposed sampling frequency will minimize the possibility of large volumes of hazardous residues being placed on the land or otherwise being stored or disposed of contrary to Subtitle C requirements. The Agency does not believe these proposed requirements will unduly burden the regulated community and requests comments on this issue.

The following factors must be considered when determining an appropriate sampling frequency:

—Selection of a statistical method and distribution of data (normal or log normal distribution)
—Feedrates of wastes and all other feed streams
—Volatility of metals in all feed streams
—Physical form of various feed streams (solid versus liquid)
—Type of feed system
—Levels and types of organic constituents in all feedstreams (for example, difficulty of destruction or formation of by-products)
—Levels and types of metals regulated under RCRA, other than those regulated by the BIF regulations (for example, selenium)
—Changes in feed streams
—Changes in operating conditions or equipment
—Operating conditions when sampling compared with those when not sampling
—Trends in partitioning of metals in fly as compared with bottom ash

Facilities with a high variability of hazardous constituents in their residues should closely examine these factors in deciding upon a sampling frequency. Facilities with residues that exhibit little or no constituent variability may be able to sample at the minimum frequency, pending approval of less than daily sampling by the Regional Administrator.

2. Dioxin Testing of Bevill Residues

a. Regulatory History. Under 40 CFR § 266.112 of the boiler/industrial furnace (BIF) rule, EPA codified procedures for owners and operators of Bevill devices to determine whether their residues retain the Bevill exemption when the facilities co-fire or co-process hazardous waste fuels along with fossil fuels or normal raw materials. These procedures were deemed necessary to ensure that the burning of hazardous waste does not alter the residues so that they are no longer the "high volume, low hazard" materials exempted by the Bevill amendment. This test was upheld by the D.C. Circuit in *Horsehead Resource Development Co.* v. *Browner,* 16 F. 3d 1246 (D.C. Cir. 1994).

Specifically, 40 CFR § 266.112 requires facilities that claim the Bevill exemption for residues from co-burning hazardous waste along with Bevill raw materials to conduct sampling and analysis of their residues to document that either: (1) Levels of toxic constituents in the waste-derived residue are not significantly higher than normal (i.e., when not burning hazardous waste) residues; or (2) levels of toxic constituents in waste-derived residue do not exceed health-based levels specified in the rule. This is commonly referred to as the two-part Bevill test. The constituents for which analysis must be conducted include: (1) Appendix VIII, Part 261, hazardous constituents that could reasonably be expected to be in the hazardous waste burned, and that are listed in § 268.40 for F039 non-wastewaters (see 59 FR 4982 of September 19, 1994); and (2) compounds that the Agency has determined are common products of incomplete combustion (i.e., they may be formed during combustion of the waste) and have been listed in Appendix VIII of Part 266.

b. Addition of Dioxin/Furan Compounds to the Appendix VIII, Part 266 Product of Incomplete Combustion List. The Appendix VIII, Part 266 product of incomplete combustion (PIC) list does not currently include polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzo-furan (PCDF) compounds. In addition, most BIF facilities do not burn wastes which could reasonably be expected to contain PCDD/PCDF compounds. Thus, few § 266.112 facilities have been analyzing their residues on a routine basis for PCDD/PCDF compounds to determine whether burning hazardous waste has affected the character of the residue.

EPA believes that it is important to add PCDD/PCDF compounds to the PIC list in order to make residue analysis for PCDD/PCDFs a mandatory component of the two-part Bevill test. First, dioxin/furan compounds are likely to be PICs and, as such, should rightfully be included on the PIC list. As described in Chapter 4 of the May 1994 Draft Combustion Emissions Technical Resource Document (CETRED), there is a considerable body of evidence to show that PCDD/PCDF compounds can be formed in the post-combustion regions of boilers, industrial furnaces and incinerators, even if no PCDD/PCDF compounds are fed to the combustion device. Secondly, the level of dioxins in residues can be influenced by hazardous waste burning activities. The October 1994 Cement Kiln Dust Notice of Data Availability, which augmented the December 1993 Report to Congress on Cement Kiln Dust, provided a regression analysis to determine the impact of hazardous waste fuel use on dioxin and furan concentrations. Every one of the dioxins and furans evaluated appeared in significantly higher concentrations in cement kiln dust generated by plants that burned hazardous waste fuel in comparison with plants that did not burn any hazardous waste fuels. The Report concluded that the strength and consistency of this relationship for cement kiln dust was striking, and that it provides very strong evidence that dioxin and furan concentrations in the dust are systematically higher at plants that burn hazardous waste fuel.

Finally, it is important to note that, where the potential for excess risks were identified in the Report, the constituents of concern included metals and dioxin/furan compounds. Metals are already covered by the two-part test of § 266.112. However, it is equally important to include PCDDs/PCDFs in the two-part test to make sure that residues from hazardous waste-burning devices continue to meet the high volume, low hazard criteria presumed by the Bevill exemption.

c. Use of Land Disposal Restriction Standards as Interim Limits for PCDD/PCDFs. On November 9, 1993, EPA published an interim final rule establishing alternate concentration limits for nonmetals to be used for the health-based comparison portion of the two-part Bevill test (i.e., 40 CFR § 266.112(b)(2)). The alternate levels were based on the land disposal restriction (LDR) limits for F039 non-wastewaters pending further administrative action to determine whether more appropriate health-based levels should be developed. Although the LDR limits are not health-based levels, the Agency noted in the preamble (58 FR at 59598 (Nov. 9, 1994)) that the technology-based LDR treatment limits should serve to identify residues that have the "low toxicity" attribute that is one of the key bases for the temporary exemption of Bevill residues from the definition of hazardous waste. See *Horsehead Resource Development Co.* v. *Browner,* 16 F. 3d. The Agency also noted that the LDR levels are promulgated limits and so have been scrutinized and subject to public comment in previous rulemakings.

As part of today's proposal to add PCDD/PCDF constituents to the Appendix VIII, Part 266 PIC list, the Agency would continue the interim practice of basing the concentration limits for the health-based portion of the two-part Bevill test on the LDR F039 nonwastewater levels. The LDR regulation establishes concentration limits of 1 part-per-billion (ppb) for total HxPCDDs, total HxPCDFs, total PePCDDs, total PePCDFs, total TCDDs and total TCDFs. The Agency believes that these levels for dioxin/furan compounds will serve as adequate screening levels on an interim basis to ensure that residues from hazardous waste-burning devices continue to meet the "low toxicity" attribute presumed by the Bevill exemption.

The Report to Congress on Cement Kiln Dust provides some support for the 1 ppb PCDD/PCDF screening criteria. In baseline risk modeling for fifteen case study facilities managing CKD on-site, dioxin/furan compounds were not identified as contributors to adverse health effects for either direct or indirect exposure pathways (see Report, Exhibit 6–14). Risk from PCDD/PCDFs only reached levels of concern when the Agency performed a sensitivity analysis to examine the change in risks that would occur at five baseline facilities based on the hypothetical management of CKD containing the highest measured PCDD/PCDF concentrations found in EPA's sampling at 11 cement plants. The highest concentrations were observed in samples from a cement facility, and were at least 2½ times higher than concentrations observed at any other facility. All of the samples from that facility exceeded 1 ppb for at least one homolog listed as part of the LDR F039 criteria (i.e., total HxPCDDs, total HxPCDFs, total PePCDDs, total PePCDFs, total TCDDs or total TCDFs). Thus, the levels which showed potential for adverse health effects in the site-specific modeling would be screened by application of the 1 ppb criteria listed in the F039 LDR. By comparison, none of the samples from facilities other than the above facility had any PCDD/PCDF homologs exceeding 1 ppb.

The Agency is proposing continued use of the LDR levels because it does not believe that it is appropriate to establish a more specific health-based level for dioxin/furan compounds at this time.[209] A separate regulatory process is underway which will establish controls on management of cement kiln dust (60 FR 7366). Any health-based level established in advance of these controlled CKD management standards would quickly become obsolete because, at a minimum, the fate and transport assumptions would be different. The Agency specifically requests comment regarding whether the interim LDR F039 limits for PCDD/PCDF constituents are appropriate. Alternatively, the Agency requests information regarding an appropriate methodology for establishing more specific health-based limits.

d. Clarification of Appendix VIII, Part 266 PIC List Applicability. There has historically been some confusion regarding whether each of the constituents listed on the Appendix VIII, Part 266 list must be a mandatory component of the residue testing at every facility, or whether a facility could exclude some of the constituents on the list. Today, the Agency clarifies that the Appendix VIII, Part 266 list is applicable to every facility in its entirety, without exclusion.

3. Application of Derived From Rule to Residues From Hazardous Waste Combustion in non-Bevill Boilers and Industrial Furnaces

As part of a settlement agreement of the lawsuit over the 1991 BIF regulations, EPA agreed to reconsider the appropriateness of applying the derived from rule to residues from co-processing listed hazardous waste fuels and raw materials in non-Bevill boilers and industrial furnaces. An example would be an oil-fired boiler burning listed hazardous waste fuel and generating emission control dusts or scrubber effluents, which dusts or effluents would not be considered to be Bevill excluded. If this type of burning occurs in a boiler or furnace whose residues are otherwise within the scope of the Bevill amendment, the residues remain exempted from subtitle C (i.e. remain exempted by virtue of the Bevill amendment) so long as they are not "significantly affected" by burning hazardous waste. § 266.112. A residue is not significantly affected if there is no statistically significant increase between baseline, non-hazardous waste-derived residues, or if hazardous constituents in the residue do not exceed health-based (or health-based surrogate) levels. *Id.* Consistent with the settlement agreement mentioned above, EPA solicits comment as to whether this same type of test could be applied to burning of hazardous waste in non-Bevill boilers and furnaces. The logic could be that if hazardous properties are not contributed by the hazardous waste, the derived from rule should not apply.

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[209] EPA notes that, by establishing LDR exemption levels for Bevill residue, the Agency is not suggesting that: (1) the technology-based treatment standards are equivalent to, or appropriate to use as, health-based limits; or (2) Bevill excluded residues should necessarily be subject to the LDR rules. See 58 FR at 59603 (November 9, 1994). These issues are the subject of other rulemakings.

EPA's inclination is not to apply any type of significantly affected test to residues at this time. The recently-proposed exit levels, and methodology, in the Hazardous Waste Identification Rule (HWIR) provide a means of automatic exit from the subtitle C system when wastes (including derived-from wastes) are no longer hazardous. Furthermore, the "significantly affected" test is closely linked to the Bevill amendment, and in fact defines the scope of that amendment in co-processing situations. EPA sees no persuasive reason to apply the test to non-Bevill residues, particularly when the Agency has proposed a means whereby such residues can automatically exit the system. It appears to EPA to be the better approach to make subtitle C exit determinations on the basis of hazards actually posed by the waste rather than by comparisons with a non-waste baseline. (Indeed, this is one component of the significantly affected test already. See § 266.112(b)(2).) The Agency solicits comment on this matter, however.

E. Applicability of Regulations to Cyanide Wastes

The Agency has received several inquiries regarding the applicability of § 266.100(c)(2)(i) criteria for processing cyanide wastes solely for metal recovery. Specifically, cyanide wastes do not meet the common dictionary meaning of being an organic, but can be destroyed by industrial furnaces. The Agency's intent of this exemption was to preclude burning of waste streams that contain greater than 500 ppm nonmetal compounds listed in Appendix VIII of Part 61, that are provided a level of destruction by the furnace. The Agency inappropriately chose the word 'organic' instead of 'nonmetal' in the above regulation. An amendment is being proposed to provide the needed clarification that wastes containing cyanides are eligible to be included in this exemption. We are also proposing similar amendments (i.e., revisions to use the term "nonmetal" rather than "organic") to subparagraphs (c)(2)(ii), (c)(3)(i)(B), and (c)(3)(ii).

F. Shakedown Concerns

There is a concern within the Agency that some new units do not effectively use their allotted 720 hour pre-trial burn period (commonly referred to as "shakedown") or extensions thereof to correct operational problems prior to the trial burn period. This ineffective use of the pretrial burn period can potentially lead to emission exceedances which pose unnecessary risks to human health and the environment. In addition, failure(s) during trial burn testing at one or more test conditions reduce a facility's flexibility to burn hazardous waste in a subsequent permit developed from the trial burn or may even lead to a need to perform other trial burns or a termination of the permit. A failure to perform adequate shakedown may also lead to difficulties in making an interpretation of trial burn data and in setting of permit conditions due to excessive variability in trial burn operation.

The Agency believes that an approach using system start-up and system problem solving with the use of a non-hazardous waste feed followed by a gradual, carefully planned introduction of hazardous waste feed is essential to avoid the potential problems which could result from the burning of hazardous waste in an undiagnosed system which may not yet be operating at steady state conditions. The absence of this type of approach has caused many previous trial burns not to be carried through to completion or has caused them to occur in a very different fashion from that prescribed in the trial burn plan. Other efforts during the trial burn have resulted in diminished operating allowances or in the need for additional trial burn testing. As a result of these occurrences, the Agency is proposing three options which center around the pretrial burn period in an attempt to enhance regulatory control over trial burn testing. The Agency is also requesting comment on the applicability of these options to interim status facilities. The shakedown period has, in the past, been applied exclusively to new facilities and has not addressed existing facilities operating under interim status. The Agency believes that these options could apply to interim status facilities if the newly proposed waste to be burned represented a very different waste than that which had been burned.

As its primary option, the Agency would require that facilities be required to show the Director prior to trial burn dates being scheduled that the facility has provided a minimum showing of operational readiness. This showing of operational readiness would be one which has been established by the Director and would be incorporated as part of the permit application process for both interim status and new devices. The manner in which this notification of readiness would occur would be determined by the Director. A trial burn could not be scheduled until this minimum showing to the Director has occurred. Criteria for trial burn readiness would include, but would not be limited to the following examples: (1) The ability of a facility to show that it has operated the device to be permitted under its planned trial burn conditions (*e.g.* temperature, feedrate) for a specified time period set by the Director, or (2) the ability of a facility to operate for a designated period of time (to be established by the Director) without an Automatic Waste Feed Cut-Off (AWFCO) occurring. To show readiness to the Director, the composition of the feed stream to the device during this showing would need to be nearly identical (if not identical) to the waste intended to be burned during the operational lifetime of the facility. This similarity should be consistent with respect to the physical, thermal, and fluid characteristics of the waste not only being burned during the trial burn tests, but also during the lifetime of the facility. It is the Agency's belief that facilities which fail their trial burn tests often fail because facilities tend to stress their devices for the first time only during trial burn testing. The system has to that point never undergone "break point" testing with an increased feedrate or maximum capacity feedrate. A trial burn should not be scheduled until a facility has shown the Director that it can operate without constant shutdowns at feedrates consistent with that of the trial burn.

A second option which the Agency offers for comment is a more restrictive option. This option proposes requirements on both the operations prior to and following the shakedown period. It incorporates the notification requirements found in the primary option along with an additional notification requirement which would occur prior to the beginning of shakedown. This option would require a facility to notify the Director that it has achieved steady state operation with non-hazardous waste during this period leading up to shakedown at operational levels set by Director (*e.g.* flowrates) which are comparable to that to be tested at trial burn and to certify that the device is ready to begin shakedown operations. As before, this option would also require a facility to notify the Director following shakedown that operational readiness with hazardous waste has been achieved and to certify that the device is ready for trial burn tests. Although this option would impose two more operational requirements for a facility, it would ensure that the facility has brought the device up to operational standards whereby the addition of hazardous waste would not represent an excessive risk to human health or the environment. The Agency believes that this option would also provide for a more efficient trial burn since it has required a facility to become operational without constant shutdowns prior to the trial burn prior to shakedown and after shakedown. Portions of this option may not be directly applicable to interim status facilities since they have been burning hazardous waste to date and may have most of their operational problems worked out.

A third option upon which the Agency is requesting comment is a "guidance only" option. Although this option would not impose any specific regulatory requirements for a showing of operational readiness prior to or after a shakedown period, it would provide guidance to industry and permit writers on how to effectively achieve preparedness prior to a trial burn without the need of formalizing it within the constraints of the regulations. Permit writers would have the ability, as they do now, to set readiness demonstration requirements if they deem it necessary for a specific site.

G. Extensions of Time Under Certification of Compliance

The Boiler and Industrial Furnace Rule, at 40 CFR § 266.103(c)(7), allows a facility to obtain a case-by-case extension under certain circumstances when events were outside of the control of the facility. There have been questions as to whether this provision meant that after August 21, 1992, a facility could no longer apply for a case-by-case extension. The Agency wants to clarify that it never intended this restrictive interpretation and so is proposing to amend this section to provide the clarification. EPA intended the case-by-case extension to apply at any time during the certification of compliance cycle, including during Revised Certification of Compliance under § 266.103(c)(8), and during Periodic Recertifications under § 266.103(d). See 56 FR at 7182 (February 21, 1991). The basis of granting the case-by-case extension is proposed to remain unchanged by today's rule. Additionally, EPA is clarifying that the automatic one year extension is not valid for facilities which were not in existence on August 21, 1991.

H. Technical Amendments to the BIF Rule

1. Facility Requirements at Closure

EPA is today proposing to amend § 266.103(l) to stipulate that at closure, the owner or operator must remove all hazardous waste and hazardous waste residues not only from the boiler or industrial furnace, but also from its air pollution control system (APCS). Although the APCS is an integral part of the facility, this minor amendment will make it explicitly clear that no hazardous waste or residues can remain in the APCS after closure.

2. Definitions under the BIF Rule

We are adding several definitions under § 260.10 for frequently used terms in combustion regulations like fugitive emissions, automatic waste feed cutoff system, run, air pollution control system and operating record. The purpose is to clarify these technical terms of thermal treatment, expedite permit writing as well as increase the enforceability of obvious technical violations. Some of these definitions already exist in the air regulations.

I. Clarification of Regulatory Status of Fuel Blenders

EPA is proposing to revise 40 CFR 266.101 ("Management prior to burning") to clarify that fuel blending activities, including those which constitute treatment, are regulated under RCRA. Section 266.101 (formerly 266.34) was written with the understanding that hazardous waste fuel-blending activities were traditionally performed in containers or tank systems where the storage standards of Part 264 could be applied. The Agency believes that protection of human health and the environment is accomplished when the permit addresses the containment of the waste being treated. Therefore, no direct reference to "treatment" was included in Section 266.34; treatment was understood to be implicit in the regulation, as shown by the reference in section 261.6 to the "* * * applicable provisions of Part 270." EPA has in fact explicitly interpreted § 266.101 (formerly § 266.34) to require tank storage standards to apply to tanks in which hazardous waste fuels are blended. See 52 FR 11820 (April 13, 1987).

More recently, it has come to the Agency's attention that fuel blenders may be using devices such as microwave units and distillation columns in their hazardous waste handling operations that differ from the traditional fuel-blending practices. These practices are, in fact, hazardous waste treatment activities requiring a RCRA permit, without which the unit cannot operate. For many such operations, the "miscellaneous unit" requirements of Part 264, Subpart X, would apply. Due to various inquiries regarding this issue, EPA has written several policy memoranda confirming that treatment, as well as storage, conducted by fuel blenders requires a RCRA permit. These memoranda are part of the Agency's RCRA Permit Policy Compendium and are available from the RCRA Hotline. They are also included in this rulemaking docket. EPA is taking this opportunity to clarify this issue in the regulations by revising the language in § 266.101.

J. Change in Reporting Requirements for Secondary Lead Smelters Subject to MACT

EPA recently promulgated MACT standards for the secondary lead smelter source category. 60 FR 29750 (June 23, 1995). In that rule, the Agency found, with unanimous support from commenters, that RCRA emission standards were unnecessary at the present time for these sources since the MACT standards provide significant health protection, area secondary lead sources will be regulated by these MACT standards, and the ultimate issue of the protectiveness of the standard will be evaluated during the section 112(f) residual risk determination.

EPA is proposing here to modify existing § 266.100(c), which provides an exemption from RCRA air emission standards for (among other sources) industrial furnaces burning hazardous waste solely for material recovery. Secondary lead smelters complying with conditions enumerated in § 266.100(c)(l) and (3) are among this type of industrial furnace. The Agency is proposing to amend § 266.100(c)and is proposing to add a new § 266.100(g) to state that RCRA provisions for air emissions do not apply to secondary lead smelters when the MACT rule takes effect (in June, 1997), provided the smelters do not burn hazardous wastes containing greater than 500 ppm nonmetal hazardous constituents (or burn wastes enumerated in 40 CFR Part 266 Appendix XI), submit a one-time notice to EPA or an authorized state, sample and analyze as necessary to document the basis for their claim, and keep appropriate records. These amendments also could take the form of an exemption (subject to the same conditions) for such secondary lead smelters from the present proposed rule.

This proposed amendment is similar to the exemption found in the existing RCRA BIF rules but does eliminate certain recordkeeping and reporting requirements for secondary lead smelters presently required as a condition of the RCRA exemption. The Agency tentatively does not believe these extra reporting requirements are needed once the MACT standards take effect. At the same time, secondary lead smelters choosing to burn hazardous wastes different from those evaluated in the secondary lead NESHAP (i.e. hazardous wastes with greater than 500 ppm toxic nonmetals or those hazardous waste not listed in Appendix XI to Part 266) would have to meet applicable standards for hazardous waste combustion units (i.e. either the existing BIF standards or revised standards based on MACT), as well as those for secondary lead smelters. EPA would administer this proposal by not requiring a secondary lead smelter that has already submitted a notification to EPA or an authorized state under existing 266.100(c)(l) or (3), to renotify under proposed 266.100 (g).

PART SEVEN: ANALYTICAL AND REGULATORY REQUIREMENTS

I. Executive Order 12866

Under Executive Order 12866, (58 FR 51735 (October 4, 1993)) the Agency must determine whether this regulatory action is "significant." A determination of significance will subject this action to full OMB review and compliance under Executive Order 12866 requirements. The order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more, adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the terms of the Executive Order.

The Agency believes that today's proposal, represents a significant action. If adopted, the proposed rule would most likely result in a cost greater than $100 million. As a result, this rulemaking action, and supporting analyses, are subject to full OMB review under the requirements of the Executive Order. The Agency has prepared "Regulatory Impact Assessment for Proposed Hazardous Waste Combustion MACT Standards" and "Addendum to the Regulatory Impact Assessment for Proposed Hazardous Waste Combustion MACT Standards" in support of today's action; this report is available in the public docket for today's rule. A summary of this analysis and findings is presented below.

II. Regulatory Options

During the regulatory developmental phases, EPA considered seven different regulatory MACT options for existing sources. Refer to the RIA for a detailed discussion of the seven options. This preamble discusses and assesses the floor option and the Agency preferred option. For more detail on the specific methodology used in developing floor and "beyond-the-floor" control levels, the reader should refer to the preamble Options section, Part Four of this preamble. Below is a summary of the impact of floor levels and the preferred option 1 on the combustion industry.

III. Assessment of Potential Costs and Benefits

A. Introduction

The Agency has prepared a regulatory impact assessment to accompany today's proposed rulemaking. The Agency has evaluated cost, economic impacts, and other impacts such as environmental justice, unfunded mandates, regulatory takings, and waste minimization incentives. The focus of the economic impact assessment was on how the MACT standards may affect the hazardous waste-burning industry. The Agency would like to note that although the cement kiln industry profits are generated by two components: cement production and hazardous waste burning, the RIA only estimated the impact the MACT standards will have on hazardous waste burning. The Agency is in the process of beginning an analysis that will study the impact of today's rule on cement production, cement prices, and competition in the cement industry. The Agency would like to solicit comments and request information in this area as we begin our research.

To develop cost estimates, EPA categorized the combustion units by size, and estimated engineering costs for the air pollution control devices (APCDs) needed to achieve the standards in the regulatory options. Based on information regarding current emissions and APCD trains EPA developed assumptions regarding the type of upgrades that units would require. Because EPA's data was limited, this analysis is meant to develop estimates of national economic impacts, and not site specific impacts.

B. Analysis and Findings

Total annual compliance costs for the floor option and the Agency's proposed standards range in costs from an estimated $93 million to $136 million.

TOTAL ANNUAL COMPLIANCE COSTS

[Millions]

Options	Cement kilns	LWA kilns	Commercial incinerators	On-site incinerators	Total
6 percent Floor	$27	$2	$13	$50	$93
6 percent BTF	44	4	20	67	136

This rule will result in a significant impact to the combustion industry. The regulatory impact assessment used a number screening indicators to assess the impact of this rule. One indicator the analysis used was the average total annual compliance cost per unit. This indicator assesses the relative impact the rule has on each facility type in the combustion universe. According to this indicator, cement kilns incur the greatest average incremental cost per unit totaling $770,000 annually for the floor and $1.1 million annually for the proposed standards, which include beyond the floor standards. The cost per unit for LWAKs range from $490,000 to $825,000 and for on-site incinerators from $340,000 to $486,000. Commercial incinerators annual average cost per unit total $493,000 for the floor and $730,000 for the proposed standards. One should note however, that the per unit costs are presented assuming no market exit. Once market exit occurs, per unit should be significantly lower particularly for on-site incinerators.

Looking at the price per ton, in the baseline, cement kilns have the lowest cost ($104 per ton) to burn hazardous waste today with commercial incinerators have $800 per ton costs and on-site incinerators have $28,460 per ton costs. For compliance costs, cement kilns have the smallest impact ($40 to $50 per ton) with on-site incinerators experiencing a high compliance cost of $47 to $57 per ton.

EPA also looked at baseline cost of burning hazardous waste as a percentage of compliance cost. This indicator assesses the relative impact of facilities within the sector but it also can be a predictor for how prices might increase for burning hazardous waste. According to the table below, the floor compliance costs are 40 percent of the current baseline cost of burning hazardous waste for cement kilns and over 20 percent for LWAKs. Many on-site incinerators and commercial incinerators have existing APCDs and have larger volumes of waste to distribute compliance costs across, thus compliance costs tend to be a smaller addition to baseline costs.

AVERAGE TOTAL ANNUAL BASELINE—INCREMENTAL COMPLIANCE

[Cost per Ton]

Options	Cement kilns	LWA kilns	Commercial incinerators	On-site incinerators
Baseline	$104	$194	$806	$28,500
6 percent Floor	$40	$39	$23	$47
6 percent BTF	50	56	31	57

Note: Baseline costs were calculated by identifying all costs associated with hazardous waste burning. Thus, for commercial incinerators and on-site incinerators, all costs associated with unit construction, operation and maintenance are included. This also includes RCRA permits and existing APCDs. The costs for on-site burners are extremely high because total costs for incineration is distributed across the small amount of hazardous waste burned. For cement kilns and LWAKs, only those incremental costs associated with burning hazardous waste are included such as, permits. The cost of the actual units (which have a primary purpose of producing cement or aggregate) are not included in the baseline. Also these costs are after consolidation occurs.

Although cement kilns incur a significant impact, they still have the lowest average waste burning cost after the regulation. As the table above illustrates in the post-regulatory scenario, cement kilns cost per ton for burning waste would total $154 compared to a cost per ton for commercial incinerators of $837. EPA expects that this advantage for cement kilns in the market will allow them to continue to set the market price for waste burning.

Not all facilities however, will be able to absorb the compliance cost to this rule and remain competitive. The economic impact assessment estimates that of the facilities which are currently burning hazardous waste 3 cement kilns, 2 LWAK, 6 commercial incinerators and 85 on-site incinerators will likely stop burning waste in the long term. Most of these units are ones which burn smaller amount of hazardous waste.

C. Total Incremental Cost per Incremental Reduction in HAP Emissions

Cost effectiveness is calculated by first estimating the compliance expenditures associated with the specific hazardous air pollutant (HAP). The estimation of costs per HAP is often difficult to ascertain because the air pollution control devices usually control more than one HAP. Therefore, estimation of precise cost per HAP was not feasible. Once the compliance expenditures has been estimated, the total mass emission reduction achieved when combustion facilities comply with the standards for a given option must be estimated. With the total compliance costs and the total mass emissions, the total incremental cost per incremental reduction in HAP emissions can be estimated. For a more detailed discussion of how the cost per HAP was calculated, please see chapter 5 of "Regulatory Impact Assessment for Proposed Hazardous Waste Combustion MACT Standards".

Results of the cost-effectiveness calculations for each HAP for all facilities are found below. For results on a facility-type level, please see chapter 5 of the RIA. Considering all facilities as a group, the results indicate that dioxin, mercury, and metals cost per unit reduction are quite high. This is the case because small amounts of the dioxin and metals are released into the environment. For other pollutants, expenditures per ton are much lower.

COST EFFECTIVENESS FOR ALL FACILITIES

HAP	Unit	Baseline to 6 percent floor	6 percent floor to 6 percent BTF
D/F	$/g	$12,000	$560,000
Mercury	$/lb	2,600	5,400
LVM	$/Mton	407,000	NA
SVM	$/Mton	315,000	NA
Chlorine	$/Mton	7,000	2,240
Particulate.	$/Mton	4,400	3,200
CO	$/Mton	1,360	NA
THC	$/Mton	2,800	NA

Note: NA = Zero incremental reduction in HAP emissions (Dollars divided by zero = NA).

D. Human Health Benefits

1. Dioxin benefits

Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, hereafter referred to collectively as dioxins, are ubiquitous in the environment. The more highly chlorinated dioxins, which are extremely stable under environmental conditions, persist in the environment for decades and are found particularly in soils, sediments, and foods. It has been hypothesized that the primary mechanism by which dioxins enter the terrestrial food chain is through atmospheric deposition.[210] Dioxins may be emitted directly to the atmosphere by a variety of anthropogenic sources or indirectly through volatilization or particle resuspension from reservoir sources such as soils, sediments, and vegetation.

The most well known incident of environmental contamination with dioxins occurred in Seveso, Italy in an industrial accident. Symptoms of acute

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[210] USEPA, "Estimating Exposure to Dioxin-Like Compounds", Volume I, June 1994.

exposures such as chloracne occurred immediately following the incident. Since then, significant increases in certain types of cancers have also been observed.[211] After evaluating a variety of carcinogenicity studies in human populations and laboratory animals, EPA has concluded that 2,3,7,8-tetrachlorodibenzo-p-dioxin and related compounds are probable human carcinogens.[212] EPA estimates that a dose of 0.01 picograms on a toxicity equivalent (TEQ) basis per kilogram body weight per day is associated with a plausible upper bound lifetime excess cancer risk of one in one million ($1 \times 10-6$).[213] Toxicity equivalence is based on the premise that a series of common biological steps are necessary for most if not all of the observed effects, including cancer, from exposures to 2,3,7,8 chlorine-substituted dibenzo-p-dioxin and dibenzofuran compounds in vertebrates, including humans. Given the levels of background TEQ exposures discussed below, as many as 600 cancer cases may be attributable to dioxin exposures each year in the United States.

EPA has also concluded that there is adequate evidence from both human populations and laboratory animals, as well as other experimental data, to support the inference that humans are likely to respond with a broad spectrum of non-cancer effects from exposure to dioxins if exposures are high enough. Although it is not possible given existing information to state exactly how or at what levels exposed humans will respond, the margin of exposure between background TEQ levels and levels where effects are detectable in humans is considerably smaller than previously thought.[214]

Dioxins are commonly found in food produced for human consumption. Consumption of dioxin contaminated food is considered the primary route of exposure in the general population. EPA evaluated data collected in four U.S. studies, three of which included analyses of all 2,3,7,8 chlorine-substituted congeners of dibenzo-p-dioxin and dibenzofuran. EPA's evaluation concluded that "background" levels in beef, milk, pork, chicken, and eggs are approximately 0.5, 0.07, 0.3, 0.2, and 0.1 parts per trillion fresh weight, respectively, on a toxicity equivalent (TEQ) basis.[215] EPA then used these background levels, together with information on food consumption, to estimate dietary intake in the general population. That estimate is 120 picograms TEQ per day.[216]

EPA has also collected data on dioxins in fish taken from 388 locations nationwide and found that at 89 percent of the locations, fish contained detectable levels of at least two of the dioxin and furan compounds for which analyses were conducted.[217] (Of the 2,3,7,8 chlorine-substituted congeners, only octachlorodibenzo-p-dioxin and octachlorodibenzofuran were not analyzed.) Seven of the compounds, including 2,3,7,8–TCDD, were detected at over half the locations. Detection limits were generally at or below 1 part per trillion on a toxicity equivalent basis. The median (50th percentile) concentration in fish on a toxicity equivalent basis (TEQ) was 3 parts per trillion (ppt) while the 90th percentile was approximately 30 ppt TEQ. Five percent of the sites exceeded 50 ppt TEQ. At most sites, both a composite sample of bottom feeders and a composite sample of game fish were collected. At sites considered representative of background levels, the median concentration was 0.5 ppt TEQ.

EPA has estimated that hazardous waste incinerators and hazardous waste-burning cement and lightweight aggregate kilns currently emit 0.08, 0.86, and less than 0.01 kg TEQ of dioxins per year, respectively, or a total of 0.94 kg TEQ per year. Excluding non-hazardous waste-burning cement kilns, an emission rate of approximately 9 kg TEQ per year is estimated for all other U.S. sources.[218] Therefore, hazardous waste-burning sources represent about 9 percent of total anthropogenic emissions of dioxins in the U.S. The following table shows hazardous waste-burning sources relative to other major emitters of dioxins:

Source category	Dioxin emissions (kg TEQ/year)
Medical Waste Incinerators	5.1
Municipal Waste Incinerators	3.0
Hazardous Waste-burning Incinerators, Cement Kilns, and Lightweight Aggregate Kilns	0.9

There is information to suggest, however, that dioxin emissions nationwide from all sources are higher than have been estimated. Public comments on EPA's dioxin reassessment have identified a number of possible additional sources of dioxins, including decomposition of materials containing chlorophenols (i.e. wood treated with PCP), metals processing industries, diesel fuel and unleaded gasoline, PCB manufacturing, and re-entrainment of reservoir sources. Reservoir sources may be a significant source of vapor phase dioxins. On the other hand, emissions from at least one of the sources, medical waste incinerators, is probably significantly overestimated. Supporting the view that dioxin emissions may be higher than previously estimated are indications that deposition may be considerably greater than can be accounted for by presently identified emissions.

The impact of emissions on exposure and risk depends on the relative geographic locations of the emission sources and receptors which contribute to exposure and risk, primarily farm animals. This applies to both near field dispersion and long-range transport and it affects exposure and risk both in determining whether the trajectory of an air parcel impacts receptors of concern and in determining the chemical fate of the emissions. The fate of dioxins depends on degradation processes that can occur in the atmosphere. These processes can increase or decrease the toxicity of the original emissions through dechlorination. This process can have different effects on different emission sources, depending on the congener distributions, residence time in the atmosphere, and climatic conditions.

Considering all these factors, it is apparent that hazardous waste-burning sources contribute significantly to the overall loading of dioxins to the environment, although the relative magnitude of the contribution remains to be determined. While there is not a one-to-one relationship between emissions and risk, it may be inferred that hazardous waste-burning sources likely do contribute significantly to dioxin levels in foods used for human consumption and, to an extent as yet unknown, the estimated 600 cancer cases attributable to dioxin exposures annually.

EPA estimates that dioxin emissions from hazardous waste-burning sources will be reduced to 0.07 kg TEQ per year at the floor levels and to 0.01 kg TEQ per year at the proposed beyond the floor standard. These reductions would result in decreases of approximately 8

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[211] USEPA, "Health Assessment Document for 2,3,7,8–Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds, Volume II, June 1994.

[212] USEPA, "Health Assessment Document for 2,3,7,8–Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds, Volume III," August 1994.

[213] *Ibid.*

[214] *Ibid.*

[215] USEPA, "Estimating Exposure to Dioxin-Like Compounds," Volume II, June 1994.

[216] *Ibid.*

[217] USEPA, "National Study of Chemical Residues in Fish," Office of Science and Technology, September 1992.

[218] USEPA, "Estimating Exposure to Dioxin-Like Compounds", Volume II, June 1994.

and 9 percent, respectively in total estimated anthropogenic U.S. emissions. EPA expects that reductions in dioxin emissions from hazardous waste-burning sources, in conjunction with reductions in emissions from other dioxin-emitting sources, will help reduce dioxin levels over time in foods used for human consumption and, therefore, reduce the likelihood of adverse health effects, including cancer, occurring in the general population.

2. Mercury Benefits

Mercury has long been a concern in both occupational and environmental settings. The most bioavailable form of mercury and, therefore, the form most likely to have an adverse effect, is methyl mercury. Human exposures to methyl mercury occur primarily from ingestion of fish. As a result of mercury contamination, there are currently fish consumption bans or advisories in effect for at least one waterbody in over two thirds of the States.

Nationally, about 60 percent of all fish consumption bans and advisories are due to mercury. In several States the mercury advisories are statewide, with the most widespread concerns being in the northern Great Lakes states and Florida. The bans and advisories vary from State to State with respect to the levels of concern, the recommended limits on consumption, and other factors. Therefore, it is difficult to develop a national estimate of potential risk based on this information. Nevertheless, these bans and advisories provide one indication of the extent and severity of mercury contamination.

Even low levels of mercury in surface waters can lead to high levels of mercury in fish. EPA has estimated that bioaccumulation factors, which represent the ratio of the total mercury concentration in fish tissue to the total concentration in filtered water, range from 5,000 to 10,000,000 depending on the species of fish, the age of the fish, and the waterbody the fish inhabit.

The most well known example of mercury poisoning from ingestion of fish occurred in the vicinity of Minamata Bay, Japan. Severe neurological effects resembling cerebral palsy occurred in the offspring of exposed pregnant women. EPA has estimated what it considers a safe level of exposure to methyl mercury. This level, referred to as the reference dose, is 1E–4 mg/kg-day. The reference dose is based on an evaluation of 81 maternal-infant pairs exposed to methyl mercury in an incident in Iraq in which methyl mercury treated seed grain was diverted for use in making bread. Sources of uncertainty in the reference dose are the relatively small number of maternal-infant pairs in the Iraqi study, the short duration of maternal exposure (approximately three months), latency in the appearance of effects (from as little as a month to as long as a year), possible misclassification of maternal exposures, differences in the vehicle of exposure (i.e., grain versus fish), and the selection of the neurologic and behavioral endpoints used in the analysis. EPA intends to further evaluate the reference dose for methyl mercury when the results from studies of fish-eating populations become available.

EPA collected data on chemical residues in fish taken from 388 locations nationwide and found that at 92 percent of the locations, fish contained detectable levels of mercury.[219] (Detection limits varied between 0.001 and 0.05 parts per million.) The median (50th percentile) mercury concentration in fish was 0.2 ppm while the 90th percentile was 0.6 ppm. Two percent of the sites exceeded 1 ppm. At most sites, both a composite sample of bottom feeders and a composite sample of game fish were collected. The highest concentration, 1.8 ppm, was measured at a remote site considered to represent background conditions.

Similar results have been obtained in other studies, strongly suggesting that long-range atmospheric transport and deposition of anthropogenic emissions is occurring. Air emissions of mercury contribute, then, to both regional and global deposition, as well as deposition locally. Congress, in fact, explicitly found this to be the case and required EPA to prioritize MACT controls for mercury for this reason. (See S. Rep. No. 228, 101st Cong. 1st Sess. at 153–54.)

An indication of the significance of mercury contamination in fish is illustrated by combining data on the levels of mercury in fish with data on fish consumption and comparing it to the reference dose for methyl mercury. For example, a fish consumption rate of 140 g/day (a 90th percentile rate associated with recreational fishing) in conjunction with a mercury concentration of 0.6 μg/g (a 90th percentile concentration) translates into an average daily dose of 1E–3 mg/kg-day, or 10 times the reference dose. Using the same fish concentration with a mean fish consumption rate for recreational anglers of 30 g/day gives a dose that is three times the reference dose. At the median fish concentration of 0.2 μg/g and a fish consumption rate of 30 g/day, the dose is nearly 90 percent of the reference dose. These results indicate that for persons who eat significant amounts of freshwater fish, exposures to mercury are significant when compared with EPA's estimate of the threshold at which effects may occur in susceptible individuals. However, it must be recognized that EPA's threshold estimate represents a lower bound; the true threshold may be higher than EPA's estimate.

EPA has estimated that hazardous waste incinerators and hazardous waste-burning cement and lightweight aggregate kilns currently emit 4.2, 5.6, and 0.3 Mg of mercury per year, respectively, or a total of 10.1 Mg per year. In addition, EPA estimates that approximately 230 Mg per year are emitted by all other U.S. sources. Based on these estimates, hazardous waste-burning sources represent about 4 percent of total anthropogenic emissions of mercury in the U.S. Therefore, hazardous waste-burning sources do contribute to the overall loading of mercury to the environment and, it may be inferred, to mercury levels in fish.

EPA estimates that mercury emissions from hazardous waste-burning sources will be reduced to 3.3 Mg per year at the proposed floor levels and to 2.0 Mg per year at the proposed beyond the floor standard. These reductions would result in reductions of total anthropogenic U.S. emissions of approximately 3 percent. EPA expects that reductions in mercury emissions from hazardous waste-burning sources, in conjunction with reductions in emissions from other mercury-emitting sources, will help reduce mercury levels in fish over time and, therefore, reduce the likelihood of adverse health effects occurring in fish-consuming populations.

E. Other Benefits

Other benefits that EPA investigated included ecological benefits, property value benefits, soiling and material damage, aesthetic damages and recreational and commercial fishing impacts. Overall, the analysis of the ecological risk suggest that only when assuming very high emissions water quality criteria is exceeded in the watersheds small in size and located near waste combustion facilities. These watersheds are typically located near cement kilns appear to exceed the water quality criteria. According to the property value analysis, there may be property value benefits associated with reduction in emission from combustion facilities. The property value work is on-going and is undergoing refinements. In addition, EPA investigated other benefits such as benefits received from

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[219] USEPA, "National Study of Chemical Residues in Fish," Office of Science and Technology, September 1992.

avoided clean-up as result of reduced particulate matter releases. For further detail, please see chapter 5 of the RIA.

IV. Other Regulatory Issues

A. Environmental Justice

The U.S. EPA completed analyses that identified demographic characteristics of populations near cement plants and commercial hazardous waste incinerators and compared them to the populations of county and state. The analysis focuses on the spatial relationship between cement plants and incinerators and minority and low income populations. The study does not describe the actual health status of these populations, and how their health might be affected proximity to facilities.

EPA used a sample of 41 cement plants was analyzed from a universe of 113 plants and a sample of 21 commercial incinerators was analyzed from a universe of 35. The complete methodology results of the analyses are found in two reports filed in the docket titled, "Race , Ethnicity, and Poverty Status of the Populations Living Near Cement Plants in the United States and Race," "Ethnicity, and Poverty Status of the Populations Living Near Commercial Incinerators." Below is a summary of the key results found in the studies.

The Agency looked at whether minority percentages within a one mile radius are significantly different than the minority percentages at the county for all cement plants and sample of incinerators, the results are as follows:

- 27 percent of the universe of all cement plants (29 plants) and 37 percent of sample of incinerators (21 plants) have minority percentages within a one mile radius which exceed the corresponding county minority percentages by more than five percentage points.
- 36 percent of the universe of all cement plants (41 plants) and 44 percent of sample of incinerators have minority percentages within a one mile radius which fall below the corresponding county minority percentages by more than five percentage points.
- 38 percent of the universe of all cement plants (43 plants) and 20 percent of sample of incinerators minority percentages within a one mile radius which fall within five percentage points (above or below) of the corresponding county minority percentages.

With regard to the question of whether poverty percentages within a one mile radius significantly different from the poverty percentages for the county for all cement plants. The results are as follows:

- 18 percent of the universe of all cement plants (20 plants) and 36 percent of the sample of incinerators (21 plants) have poverty percentages at a one mile radius which exceed the corresponding county poverty percentages by more than five percentage points.
- 22 percent of the universe of all cement plants (25 plants) and 37 percent of the sample of incinerators (21 plants) have poverty percentages at a one mile radius which fall below the corresponding county poverty percentages by more than five percentage points.
- 60 percent of the universe of all cement plants (68 plants) and 28 percent of sample of incinerators (21 plants) have poverty percentages at a one mile radius which fall within five percentage points (above or below) of the corresponding county poverty percentages.

B. Unfunded Federal Mandates

The Agency also evaluated the proposed MACT standards for compliance with the Unfunded Mandates Reform Act (UMRA) of 1995. Today's rule contains no Federal mandates under the regulatory provisions of Title II of the UMBRA for State, local or tribal governments or the private sector. The Agency concluded that the rule implements requirement specifically set forth by Congress, as stated in the Clean Air Act and the Resource Conservation Recovery Act. In addition, promulgation of these MACT standards is not expected to result in mandated costs of $100 million or more to any state, local, or tribal governments, in any one year. Finally, the MACT standards will not significantly or uniquely affect small governments.

C. Regulatory Takings

EPA found no indication that the MACT standards would be considered a "taking," as defined by legislation currently being considered by Congress. Property would not be physically invaded or taken for public use without the consent of the owner. Also, the MACT standards will not deprive property owners of economically beneficial or productive use of their property, or reduce the property's value.

D. Incentives for Waste Minimization and Pollution Prevention

The RIA results do not incorporate waste minimization at this time. However, the Agency did analyze the potential for waste minimization and the preliminary results suggest that generators have a number of options for reducing or eliminating waste at a much lower cost. To evaluate whether facilities would adopt applicable waste minimization measures, a simplified pay back analysis was used. Using information on per-facility capital costs for each technology, EPA estimated the period of time required for the cost of the waste minimization measure to be returned in reduced combustion expenditures. The assessment of waste minimization yields estimates of the tonnage of combusted waste that might be eliminated. Comprehensive data to evaluate waste minimization were not available. Improved information on the capital investment and operating costs associated with waste minimization are needed.

Overall, EPA was able to estimate that 630,000 tons of waste, a significant portion of all combusted waste, may be amenable to waste minimization. Three waste generating processes account for the reduction. These processes include solvent and product recovery, product processing waste, and process waste removal and cleaning. EPA is continuing analysis of waste minimization options and requests comments and information in this area. For a complete description of the analysis, see the regulatory impact assessment.

E. Evaluation of Impacts on Certain Generators

EPA is aware of the potential impact today's proposal may have on small business hazardous waste generators. The emission standards proposed today will require many combustion facilities to install new emission control equipment, undertake expanded monitoring, and comply with additional recordkeeping and reporting requirements. Combustion facilities will incur higher capital and operating costs as a result of today's rule. Some facilities are predicted to leave the waste management business altogether. As capacity decreases and costs increase, facilities are likely to increase the waste management prices they charge generators.

EPA believes many larger generators will respond to waste management cost increases by accelerating their waste minimization efforts. By undertaking cost-effective waste minimization initiatives, companies can reduce the amount of waste requiring combustion, thereby deflecting some of the impacts of increases in waste management costs. The same waste minimization options may not be so readily available to smaller businesses. Small businesses often do not have the financial resources to make the capital or process improvements necessary to minimize hazardous waste generation, even if such improvements will have a net cost benefit in the long run. In addition, small businesses often lack the technical expertise necessary for effective waste minimization.

Those small businesses that are unable to minimize waste generation will either incur higher costs to operate their businesses or, if allowed under federal and state regulations, manage their hazardous wastes using unregulated disposal options. Many small businesses, because they generate less than 100 kg per month or less than 10 kg of acutely hazardous waste per month, are classified as conditionally exempt small quantity generators (CESQGs). CESQGs are exempt from many of the generator requirements under 40 CFR 262 and are not required under the federal RCRA regulations to manage their wastes in TSDFs. Many CESQGs, however, send their wastes to third-party collection companies who mix CESQG waste with waste from larger generators and manage it as a fully regulated hazardous waste. Increases in waste management costs due to today's proposal could encourage some number of third-party collection companies to segregate CESQG wastes and manage them using less expensive, yet legal, alternatives, such as unpermitted boilers, space heaters, and non-TSDF cement kilns.

EPA plans to revise the Regulatory Impact Assessment (RIA) issued with today's rule to include additional analysis, as appropriate and feasible, focusing on these issues. EPA is seeking comments on any of the issues raised here.

V. Regulatory Flexibility Analysis

The Regulatory Flexibility Act (RFA) of 1980 requires Federal agencies to consider impact on "small entities" throughout the regulatory process. Section 603 of the RFA calls for an initial screening analysis to be preformed to determine whether small entities will be adversely affected by the regulation. If affected small entities are identified, regulatory alternatives must be considered to mitigate the potential impacts. Small entities as described in the Act are only those "businesses, organizations and governmental jurisdictions subject to regulation."

EPA used information from Dunn & Bradstreet, the American Business Directory and other sources to identify small businesses. Based on the number of employees and annual sales information, EPA identified 11 firms which may be small entities. The proposed rule is unlikely to adversely affect many small businesses for two important reasons. First, few combustion units are owned by businesses that meet the SBA definition as a small business. Furthermore, over one-third of those that are considered small have a relatively small number of employees, but have an annual sales in excess of $50 million per year.

Second, small entities most impacted by the rule are those that burn very little waste and hence face very high cost per ton burned. Those that burn very little waste in their existing units will discontinue burning hazardous waste rather than comply with the proposed rule and dispose of waste off-site. EPA looked at the costs of alternative disposal and concludes the costs of discontinuing burning wastes will not be so high as to result in a significant impact. Therefore, EPA believes that today's proposed rule will have a minor impact on small businesses.

VI. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. Two Information Collection Request (ICR) documents have been prepared by EPA. One ICR document covers the reporting and recordkeeping requirements for NESHAPs from hazardous waste combustors and the other ICR document covers the new and amended reporting and recordkeeping requirements for boilers and industrial furnaces burning hazardous waste. Copies may be obtained from Sandy Farmer, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136); 401 M St., SW; Washington, DC 20460 or by calling (202) 260–2740.

The annual public reporting and recordkeeping burden for the NESHAP collection of information is estimated to average 36 hours per response. The annual public reporting and recordkeeping burden for the BIF collection of information is estimated to average 2 hours per response. These estimates include the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to respond to a collection of information; search existing data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

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

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Chief, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136); 401 M St., SW; Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA." Include the ICR number in any correspondence. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

VII. Request for Data

EPA requests the following data to help refine the RIA:

(1) Waste Quantity Burned: data on hazardous and non-hazardous waste burned at on-site facilities (by combustion unit) broken down by quantity of liquids, sludges, and solids.

(2) Price Data: Aggregate prices by waste type and how they vary by geographic region and waste contamination level.

(3) Combustion Alternatives:

—Information on likelihood of on-site incinerators shipping waste to on-site boilers as an alternative.

—Realistic waste minimization practices. Information on how combustion and waste minimization prices become attractive.

—Information on the type of commercial incinerator most likely to receive waste from on-site facilities to ship waste off-site.

(4) Capacity: practical capacity levels for each combustion unit.

Appendix—Comparable Fuel Constituent and Physical Specifications

Note: All numbers in the tables of this appendix are expressed to *two* significant figures.

TABLE 1.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE GASOLINE SPECIFICATION

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limit (mg/kg)
Total Nitrogen as N	9.2	....
Total Halogens as Cl	25	....
Antimony	(1)	7.0
Arsenic	(1)	0.14
Barium	(1)	14
Beryllium	(1)	0.70
Cadmium	(1)	0.70
Chromium	(1)	1.4
Cobalt	(1)	2.8
Lead	(1)	7.0
Manganese	(1)	0.70
Mercury	(1)	0.10
Nickel	(1)	2.8
Selenium	(1)	0.14
Silver	(1)	1.4
Thallium	(1)	14
α-Naphthylamine	(1)	670
α,α-Dimethylphenethylamine	(1)	670
β-Naphthylamine	(1)	670
1,1-Dichloroethylene	(1)	34
1,1,2-Trichloroethane	(1)	34
1,1,2,2-Tetrachloroethane	(1)	34
1,2-Dibromo-3-chloropropane	(1)	34
1,2-Dichloroethylene (cis- or trans-)	(1)	34
1,2,3-Trichloropropane	(1)	34
1,2,4-Trichlorobenzene	(1)	670
1,2,4,5-Tetrachlorobenzene	(1)	670
1,3,5-Trinitrobenzene	(1)	670
1,4-Dichloro-2-butene (cis- or trans-)	(1)	34
1,4-Naphthoquinone	(1)	670
2-Acetylaminofluorene	(1)	670
2-Chloroethyl vinyl ether	(1)	34
2-Chloronaphthalene	(1)	670
2-Chlorophenol	(1)	670
2-Piccoline	(1)	670
2,3,4,6-Tetrachlorophenol	(1)	670
2,4-Dichlorophenol	(1)	670
2,4-Dimethylphenol	(1)	670
2,4-Dinitrophenol	(1)	670
2,4-Dinitrotoluene	(1)	670
2,4,5-Trichlorophenol	(1)	670
2,4,6-Trichlorophenol	(1)	670
2,6-Dichlorophenol	(1)	670
2,6-Dinitrotoluene	(1)	670
3–3′-Dimethylbenzidine	(1)	670
3–Methylcholanthrene	(1)	670
3,3′-Dichlorobenzidine	(1)	670
4-Aminobiphenyl	(1)	670
4-Bromophenyl phenyl ether	(1)	670
4,6-Dinitro-o-cresol	(1)	670
5-Nitro-o-toluidine	(1)	670
7,12-Dimethylbenz[a]anthracene	(1)	670
Acetonitrile	(1)	34
Acetophenone	(1)	670
Acrolein	(1)	34
Acrylonitrile	(1)	34
Allyl chloride	(1)	34
Aniline	(1)	670
Aramite	(1)	670
Benzene	3500	....
Benzidine	(1)	670
Benzo [a] anthracene	340	
Benzo [a] pyrene	340	
Benzo [b] fluoranthene	(1)	670
Benzo [k] fluoranthene	(1)	670
Bromoform	(1)	34
Butyl benzyl phthalate	(1)	670

TABLE 1.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE GASOLINE SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limit (mg/kg)
Carbon disulfide	(1)	34
Carbon tetrachloride	(1)	34
Chlorobenzene	(1)	34
Chlorobenzilate	(1)	670
Chloroform	(1)	34
Chloroprene	(1)	34
Chrysene	340	
cis-1,3-Dichloropropene	(1)	34
Cresol (o-, m-, or p-)	(1)	670
Di-n-butyl phthalate	(1)	670
Di-n-octyl phthalate	340	
Diallate	(1)	670
Dibenzo [a,h] anthracene	340	
Dibenz [a,j] acridine	(1)	670
Dichlorodifluoromethane	(1)	34
Diethyl phthalate	(1)	670
Dimethoate	(1)	670
Dimethyl phthalate	(1)	670
Dinoseb	(1)	670
Diphenylamine	(1)	670
Disulfoton	(1)	670
Ethyl methacrylate	(1)	34
Ethyl methanesulfonate	(1)	670
Famphur	(1)	670
Fluoranthene	(1)	670
Fluorene	(1)	670
Hexachlorobenzene	(1)	670
Hexachlorobutadiene	(1)	670
Hexachlorocyclopentadiene	(1)	670
Hexachloroethane	(1)	670
Hexachlorophene	(1)	17000
Hexachloropropene	(1)	670
Indeno(1,2,3-cd) pyrene	(1)	670
Isobutyl alcohol	(1)	34
Isodrin	(1)	670
Isosafrole	(1)	670
Kepone	(1)	1300
m-Dichlorobenzene	(1)	670
Methacrylonitrile	(1)	34
Methapyrilene	(1)	670
Methyl bromide	(1)	34
Methyl chloride	(1)	34
Methyl ethyl ketone	(1)	34
Methyl iodide	(1)	34
Methyl methacrylate	(1)	34
Methyl methanesulfonate	(1)	670
Methyl parathion	(1)	670
Methylene chloride	(1)	34
N-Nitrosodi-n-butylamine	(1)	670
N-Nitrosodiethylamine	(1)	670
N-Nitrosomethylethylamine	(1)	670
N-Nitrosomorpholine	(1)	670
N-Nitrosopiperidine	(1)	670
N-Nitrosopyrrolidine	(1)	670
Naphthalene	2800	
Nitrobenzene	(1)	670
o-Dichlorobenzene	(1)	670
o-Toluidine	(1)	670
O,O-Diethyl O-pyrazinyl phospho- thioate	(1)	670
O,O,O-Triethyl phosphorothionate	(1)	670
p-(Dimethylamino) azobenzene	(1)	670
p-Chloro-m-cresol	(1)	670
p-Chloroaniline	(1)	670
p-Dichlorobenzene	(1)	670
p-Nitroaniline	(1)	670
p-Nitrophenol	(1)	670
p-Phenylenediamine	(1)	670
Parathion	(1)	670
Pentachlorobenzene	(1)	670
Pentachloroethane	(1)	34

TABLE 1.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE GASOLINE SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limit (mg/kg)
Pentachloronitrobenzene	(1)	670
Pentachlorophenol	(1)	670
Phenacetin	(1)	670
Phenol	(1)	670
Phorate	(1)	670
Pronamide	(1)	670
Pyridine	(1)	670
Safrole	(1)	670
Tetrachloroethylene	(1)	34
Tetraethyldithiopyrophosphate	(1)	670
Toluene	35000	
Trichloroethylene	(1)	34
Trichlorofluoromethane	(1)	34
Vinyl Chloride	(1)	34

[1] Non-detect.

TABLE 2.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 2 FUEL OIL SPECIFICATION

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
Total Nitrogen as N	110	
Total Halogens as Cl	25	
Antimony	(1)	6.0
Arsenic	(1)	0.12
Barium	(1)	12
Beryllium	(1)	0.60
Cadmium	(1)	0.60
Chromium	(1)	1.2
Cobalt	(1)	2.4
Lead	6.6	
Manganese	(1)	0.60
Mercury	(1)	0.11
Nickel	(1)	2.4
Selenium	0.070	
Silver	(1)	1.2
Thallium	(1)	12
α-Naphthylamine	(1)	1200
α,α-Dimethylphenethylamine	(1)	1200
β-Naphthylamine	(1)	1200
1,1-Dichloroethylene	(1)	34
1,1,2-Trichloroethane	(1)	34
1,1,2,2-Tetrachloroethane	(1)	34
1,2-Dibromo-3-chloropropane	(1)	34
1,2-Dichloroethylene (cis- or trans-)	(1)	34
1,2,3-Trichloropropane	(1)	34
1,2,4-Trichlorobenzene	(1)	1200
1,2,4,5-Tetrachlorobenzene	(1)	1200
1,3,5-Trinitrobenzene	(1)	1200
1,4-Dichloro-2-butene (cis- or trans-)	(1)	34
1,4-Naphthoquinone	(1)	1200
2-Acetylaminofluorene	(1)	1200
2-Chloroethyl vinyl ether	(1)	34
2-Chloronaphthalene	(1)	1200
2-Chlorophenol	(1)	1200
2-Piccoline	(1)	1200
2,3,4,6-Tetrachlorophenol	(1)	1200
2,4-Dichlorophenol	(1)	1200
2,4-Dimethylphenol	(1)	1200
2,4-Dinitrophenol	(1)	1200
2,4-Dinitrotoluene	(1)	1200
2,4,5-Trichlorophenol	(1)	1200
2,4,6-Trichlorophenol	(1)	1200
2,6-Dichlorophenol	(1)	1200
2,6-Dinitrotoluene	(1)	1200
3-3′-Dimethylbenzidine	(1)	1200
3-Methylcholanthrene	(1)	1200
3,3′-Dichlorobenzidine	(1)	1200

TABLE 2.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 2 FUEL OIL SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
4-Aminobiphenyl	(1)	1200
4-Bromophenyl phenyl ether	(1)	1200
4,6-Dinitro-o-cresol	(1)	1200
5-Nitro-o-toluidine	(1)	1200
7,12-Dimethylbenz[a]anthracene	(1)	1200
Acetonitrile	(1)	34
Acetophenone	(1)	1200
Acrolein	(1)	34
Acrylonitrile	(1)	34
Allyl chloride	(1)	34
Aniline	(1)	1200
Aramite	(1)	1200
Benzene	21	
Benzidine	(1)	1200
Benzo[a]anthracene	610	
Benzo[a]pyrene	610	
Benzo[b]fluoranthene	(1)	1200
Benzo[k]fluoranthene	(1)	1200
Bromoform	(1)	34
Butyl benzyl phthalate	(1)	1200
Carbon disulfide	(1)	34
Carbon tetrachloride	(1)	34
Chlorobenzene	(1)	34
Chlorobenzilate	(1)	1200
Chloroform	(1)	34
Chloroprene	(1)	34
Chrysene	610	
cis-1,3-Dichloropropene	(1)	34
Cresol (o-, n-, or p-)	(1)	1200
Di-n-butyl phthalate	(1)	1200
Di-n-octyl phthalate	610	
Diallate	(1)	1200
Dibenzo[a,h]anthracene	610	
Dibenz[a,j]acridine	(1)	1200
Dichlorodifluoromethane	(1)	34
Diethyl phthalate	(1)	1200
Dimethoate	(1)	1200
Dimethyl phthalate	(1)	1200
Dinoseb	(1)	1200
Diphenylamine	(1)	1200
Disulfoton	(1)	1200
Ethyl methacrylate	(1)	34
Ethyl methanesulfonate	(1)	1200
Famphur	(1)	1200
Fluoranthene	(1)	1200
Fluorene	(1)	1200
Hexachlorobenzene	(1)	1200
Hexachlorobutadiene	(1)	1200
Hexachlorocyclopentadiene	(1)	1200
Hexachloroethane	(1)	1200
Hexachlorophene	(1)	29000
Hexachloropropene	(1)	1200
Indeno(1,2,3-cd)pyrene	(1)	1200
Isobutyl alcohol	(1)	34
Isodrin	(1)	1200
Isosafrole	(1)	1200
Kepone	(1)	2300
m-Dichlorobenzene	(1)	1200
Methacrylonitrile	(1)	34
Methapyrilene	(1)	1200
Methyl bromide	(1)	34
Methyl chloride	(1)	34
Methyl ethyl ketone	(1)	34
Methyl iodide	(1)	34
Methyl methacrylate	(1)	34
Methyl methanesulfonate	(1)	1200
Methyl parathion	(1)	1200
Methylene chloride	(1)	34
N-Nitrosodi-n-butylamine	(1)	1200
N-Nitrosomorpholine	(1)	1200

TABLE 2.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 2 FUEL OIL SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
N-Nitrosopiperidine	(1)	1200
N-Nitrosopyrrolidine	(1)	1200
N-Nitrosodiethylamine	(1)	1200
N-Nitrosomethylethylamine	(1)	1200
Naphthalene	1200	
Nitrobenzene	(1)	1200
o-Dichlorobenzene	(1)	1200
o-Toluidine	(1)	1200
O,O Diethyl O-pyrazinyl phospho-thioate	(1)	1200
O,O,O-Triethyl phosphorothionate	(1)	1200
p-(Dimethylamino) azobenzene	(1)	1200
p-Chloro-m-cresol	(1)	1200
p-Chloroaniline	(1)	1200
p-Dichlorobenzene	(1)	1200
p-Nitroaniline	(1)	1200
p-Nitrophenol	(1)	1200
p-Phenylenediamine	(1)	1200
Parathion	(1)	1200
Pentachlorobenzene	(1)	1200
Pentachloroethane	(1)	34
Pentachloronitrobenzene	(1)	1200
Pentachlorophenol	(1)	1200
Phenacetin	(1)	1200
Phenol	(1)	1200
Phorate	(1)	1200
Pronamide	(1)	1200
Pyridine	(1)	1200
Safrole	(1)	1200
Tetrachloroethylene	(1)	34
Tetraethyldithiopyrophosphate	(1)	1200
Toluene	150	
Trichloroethylene	(1)	34
Trichlorofluoromethane	(1)	34
Vinyl Chloride	(1)	34

[1] Non-detect.

TABLE 3.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 4 FUEL OIL SPECIFICATION

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
Total Nitrogen as N	1500	
Total Halogens as Cl	10	
Antimony	(1)	11
Arsenic	(1)	0.23
Barium	(1)	23
Beryllium	(1)	1.1
Cadmium	(1)	1.1
Chromium	(1)	2.3
Cobalt	(1)	4.6
Lead	9.9	
Manganese	(1)	1.1
Mercury	(1)	0.18
Nickel	16	
Selenium	0.13	
Silver	(1)	2.3
Thallium	(1)	23
α-Naphthylamine	(1)	200
α,α-Dimethylphenethylamine	(1)	200
β-Naphthylamine	(1)	200
1,1-Dichloroethylene	(1)	17
1,1,2-Trichloroethane	(1)	17
1,1,2,2-Tetrachloroethane	(1)	17
1,2-Dibromo-3-chloropropane	(1)	17
1,2-Dichloroethylene (cis- or trans-)	(1)	17
1,2,3-Trichloropropane	(1)	17
1,2,4-Trichlorobenzene	(1)	200
1,2,4,5-Tetrachlorobenzene	(1)	200

TABLE 3.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 4 FUEL OIL SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
1,3,5-Trinitrobenzene	(1)	200
1,4-Dichloro-2-butene (cis- or trans-)	(1)	17
1,4-Naphthoquinone	(1)	200
2-Acetylaminofluorene	(1)	200
2-Chloroethyl vinyl ether	(1)	17
2-Chloronaphthalene	(1)	200
2-Chlorophenol	(1)	200
2-Piccoline	(1)	200
2,3,4,6-Tetrachlorophenol	(1)	200
2,4-Dichlorophenol	(1)	200
2,4-Dimethylphenol	(1)	200
2,4-Dinitrophenol	(1)	200
2,4-Dinitrotoluene	(1)	200
2,4,5-Trichlorophenol	(1)	200
2,4,6-Trichlorophenol	(1)	200
2,6-Dichlorophenol	(1)	200
2,6-Dinitrotoluene	(1)	200
3-3′-Dimethylbenzidine	(1)	200
3-Methylcholanthrene	(1)	200
3,3′-Dichlorobenzidine	(1)	200
4-Aminobiphenyl	(1)	200
4-Bromophenyl phenyl ether	(1)	200
4,6-Dinitro-o-cresol	(1)	200
5-Nitro-o-toluidine	(1)	200
7,12-Dimethylbenz[a]anthracene	(1)	200
Acetonitrile	(1)	17
Acetophenone	(1)	200
Acrolein	(1)	17
Acrylonitrile	(1)	17
Allyl chloride	(1)	17
Aniline	(1)	200
Aramite	(1)	200
Benzene	22	
Benzidine	(1)	200
Benzo[a]anthracene	100	
Benzo[a]pyrene	100	
Benzo[b]fluoranthene	(1)	200
Benzo[k]fluoranthene	(1)	200
Bromoform	(1)	17
Butyl benzyl phthalate	(1)	200
Carbon disulfide	(1)	17
Carbon tetrachloride	(1)	17
Chlorobenzene	(1)	17
Chlorobenzilate	(1)	200
Chloroform	(1)	17
Chloroprene	(1)	17
Chrysene	100	
cis-1,3-Dichloropropene	(1)	17
Cresol (o-, m-, or p-)	(1)	200
Di-n-butyl phthalate	(1)	200
Di-n-octyl phthalate	100	
Diallate	(1)	200
Dibenzo[a,h]anthracene	100	
Dibenz[a,j]acridine	(1)	200
Dichlorodifluoromethane	(1)	17
Diethyl phthalate	(1)	200
Dimethoate	(1)	200
Dimethyl phthalate	(1)	200
Dinoseb	(1)	200
Diphenylamine	(1)	200
Disulfoton	(1)	200
Ethyl methacrylate	(1)	17
Ethyl methanesulfonate	(1)	200
Famphur	(1)	200
Fluoranthene	(1)	200
Fluorene	110	
Hexachlorobenzene	(1)	200
Hexachlorobutadiene	(1)	200
Hexachlorocyclopentadiene	(1)	200
Hexachloroethane	(1)	200

TABLE 3.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 4 FUEL OIL SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
Hexachlorophene	(1)	5000
Hexachloropropene	(1)	200
Indeno(1,2,3-cd)pyrene	(1)	200
Isobutyl alcohol	(1)	17
Isodrin	(1)	200
Isosafrole	(1)	200
Kepone	(1)	400
m-Dichlorobenzene	(1)	200
Methacrylonitrile	(1)	17
Methapyrilene	(1)	200
Methyl bromide	(1)	17
Methyl chloride	(1)	17
Methyl ethyl ketone	(1)	17
Methyl iodide	(1)	17
Methyl methacrylate	(1)	17
Methyl methanesulfonate	(1)	200
Methyl parathion	(1)	200
Methylene chloride	(1)	17
N-Nitrosodi-n-butylamine	(1)	200
N-Nitrosomethylethylamine	(1)	200
N-Nitrosomorpholine	(1)	200
N-Nitrosopiperidine	(1)	200
N-Nitrosopyrrolidine	(1)	200
N-Nitrosodiethylamine	(1)	200
Naphthalene	340	
Nitrobenzene	(1)	200
o-Dichlorobenzene	(1)	200
o-Toluidine	(1)	200
O,O Diethyl O-pyrazinyl phosphoro- thioate	(1)	200
O,O,O-Triethyl phosphorothionate	(1)	200
p-(Dimethylamino)azobenzene	(1)	200
p-Chloro-m-cresol	(1)	200
p-Chloroaniline	(1)	200
p-Dichlorobenzene	(1)	200
p-Nitroaniline	(1)	200
p-Nitrophenol	(1)	200
p-Phenylenediamine	(1)	200
Parathion	(1)	200
Pentachlorobenzene	(1)	200
Pentachloroethane	(1)	17
Pentachloronitrobenzene	(1)	200
Pentachlorophenol	(1)	200
Phenacetin	(1)	200
Phenol	(1)	200
Phorate	(1)	200
Pronamide	(1)	200
Pyridine	(1)	200
Safrole	(1)	200
Tetrachloroethylene	(1)	17
Tetraethyldithiopyrophosphate	(1)	200
Toluene	110	
Trichloroethylene	(1)	17
Trichlorofluoromethane	(1)	17
Vinyl Chloride	(1)	17

[1] Non-detect.

TABLE 4.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 6 FUEL OIL SPECIFICATION

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection level (mg/kg)
Total Nitrogen as N	3500	
Total Halogens as Cl	10	
Antimony	6.5	
Arsenic	(1)	0.20
Barium	(1)	20
Beryllium	(1)	1.0
Cadmium	(1)	1.0

TABLE 4.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 6 FUEL OIL SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection level (mg/kg)
Chromium	(1)	2.0
Cobalt	(1)	4.1
Lead	30	
Manganese	(1)	1.0
Mercury	(1)	0.22
Nickel	36	
Selenium	0.12	
Silver	(1)	2.0
Thallium	(1)	20
α-Naphthylamine	(1)	640
α,α-Dimethylphenethylamine	(1)	640
β-Naphthylamine	(1)	640
1,1-Dichloroethylene	(1)	20
1,1,2-Trichloroethane	(1)	20
1,1,2,2-Tetrachloroethane	(1)	20
1,2-Dibromo-3-chloropropane	(1)	20
1,2-Dichloroethylene (cis- or trans-)	(1)	20
1,2,3-Trichloropropane	(1)	20
1,2,4-Trichlorobenzene	(1)	640
1,2,4,5-Tetrachlorobenzene	(1)	640
1,3,5-Trinitrobenzene	(1)	640
1,4-Dichloro-2-butene (cis- or trans-)	(1)	20
1,4-Naphthoquinone	(1)	640
2-Acetylaminofluorene	(1)	640
2-Chloroethyl vinyl ether	(1)	20
2-Chloronaphthalene	(1)	640
2-Chlorophenol	(1)	640
2-Piccoline	(1)	640
2,3,4,6-Tetrachlorophenol	(1)	640
2,4-Dichlorophenol	(1)	640
2,4-Dimethylphenol	(1)	640
2,4-Dinitrophenol	(1)	640
2,4-Dinitrotoluene	(1)	640
2,4,5-Trichlorophenol	(1)	640
2,4,6-Trichlorophenol	(1)	640
2,6-Dichlorophenol	(1)	640
2,6-Dinitrotoluene	(1)	640
3-3′-Dimethylbenzidine	(1)	640
3-Methylcholanthrene	(1)	640
3,3′-Dichlorobenzidine	(1)	640
4-Aminobiphenyl	(1)	640
4-Bromophenyl phenyl ether	(1)	640
4,6-Dinitro-o-cresol	(1)	640
5-Nitro-o-toluidine	(1)	640
7,12-Dimethylbenz[a]anthracene	(1)	640
Acetonitrile	(1)	20
Acetophenone	(1)	640
Acrolein	(1)	20
Acrylonitrile	(1)	20
Allyl chloride	(1)	20
Aniline	(1)	640
Aramite	(1)	640
Benzene	11	
Benzidine	(1)	640
Benzo[a]anthracene	930	
Benzo[a]pyrene	530	
Benzo[b]fluoranthene	420	
Benzo[k]fluoranthene	(1)	640
Bromoform	(1)	20
Butyl benzyl phthalate	(1)	640
Carbon disulfide	(1)	20
Carbon tetrachloride	(1)	20
Chlorobenzene	(1)	20
Chlorobenzilate	(1)	640
Chloroform	(1)	20
Chloroprene	(1)	20
Chrysene	1300	
cis-1,3-Dichloropropene	(1)	20
Cresol (o-, m-, p-)	(1)	640
Di-n-butylphthalate	(1)	640

TABLE 4.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE NUMBER 6 FUEL OIL SPECIFICATION—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection level (mg/kg)
Di-n-octyl phthalate	350	
Diallate	(1)	640
Dibenzo[a,h]anthracene	350	
Dibenz[a,j]acridine	(1)	640
Dichlorodifluoromethane	(1)	20
Diethyl phthalate	(1)	640
Dimethoate	(1)	640
Dimethyl phthalate	(1)	640
Dinoseb	(1)	640
Diphenylamine	(1)	640
Disulfoton	(1)	640
Ethyl methacrylate	(1)	20
Ethyl methanesulfonate	(1)	640
Famphur	(1)	640
Fluoranthene	(1)	640
Fluorene	350	
Hexachlorobenzene	(1)	640
Hexachlorobutadiene	(1)	640
Hexachlorocyclopentadiene	(1)	640
Hexachloroethane	(1)	640
Hexachlorophene	(1)	16000
Hexachloropropene	(1)	640
Indeno(1,2,3-cd)pyrene	350	
Isobutyl alcohol	(1)	20
Isodrin	(1)	640
Isosafrole	(1)	640
Kepone	(1)	1300
m-Dichlorobenzene	(1)	640
Methacrylonitrile	(1)	20
Methapyrilene	(1)	640
Methyl bromide	(1)	20
Methyl chloride	(1)	20
Methyl ethyl ketone	(1)	20
Methyl iodide	(1)	20
Methyl methacrylate	(1)	20
Methyl methanesulfonate	(1)	640
Methyl parathion	(1)	640
Methylene chloride	(1)	20
N-Nitrosodi-n-butylamine	(1)	640
N-Nitrosomethylethylamine	(1)	640
N-Nitrosomorpholine	(1)	640
N-Nitrosopiperidine	(1)	640
N-Nitrosopyrrolidine	(1)	640
N-Nitrosodiethylamine	(1)	640
Naphthalene	570	
Nitrobenzene	(1)	640
o-Dichlorobenzene	(1)	640
o-Toluidine	(1)	1300
O,O Diethyl O-pyrazinyl phosphothioate	(1)	640
O,O,O-Triethyl phosphorothionate	(1)	640
p-(Dimethylamino)azobenzene	(1)	640
p-Chloro-m-cresol	(1)	640
p-Chloroaniline	(1)	640
p-Dichlorobenzene	(1)	640
p-Nitroaniline	(1)	640
p-Nitrophenol	(1)	640
p-Phenylenediamine	(1)	640
Parathion	(1)	640
Pentachlorobenzene	(1)	640
Pentachloroethane	(1)	20
Pentachloronitrobenzene	(1)	640
Pentachlorophenol	(1)	640
Phenacetin	(1)	640
Phenol	(1)	640
Phorate	(1)	640
Pronamide	(1)	640
Pyridine	(1)	640
Safrole	(1)	640
Tetrachloroethylene	(1)	20
Tetraethyldithiopyrophosphate	(1)	640

Table 4.—Detection and Detection Limit Values for a Possible Number 6 Fuel Oil Specification—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection level (mg/kg)
Toluene	41	
Trichloroethylene	(1)	20
Trichlorofluoromethane	(1)	20
Vinyl Chloride	(1)	20

(1) Non-detect.

Table 5.—Detection and Detection Limit Values for a Possible Composite Fuel Specification—50th Percentile Analysis

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
Total Nitrogen as N	170	
Total Halogens as Cl	10	
Antimony	4.7	
Arsenic	(1)	0.14
Barium	(1)	18
Beryllium	(1)	0.90
Cadmium	(1)	0.90
Chromium	(1)	1.8
Cobalt	(1)	3.6
Lead	7.0	
Manganese	(1)	0.90
Mercury	(1)	0.11
Nickel	2.4	
Selenium	0.090	
Silver	(1)	1.8
Thallium	(1)	18
α-Naphthylamine	(1)	220
α,α-Dimethylphenethylamine	(1)	220
β-Naphthylamine	(1)	220
1,1-Dichloroethylene	(1)	17
1,1,2-Trichloroethane	(1)	17
1,1,2,2-Tetrachloroethane	(1)	17
1,2-Dibromo-3-chloropropane	(1)	17
1,2-Dichloroethylene (cis- or trans-)	(1)	17
1,2,3-Trichloropropane	(1)	17
1,2,4-Trichlorobenzene	(1)	220
1,2,4,5-Tetrachlorobenzene	(1)	220
1,3,5-Trinitrobenzene	(1)	220
1,4-Dichloro-2-butene (cis- or trans-)	(1)	17
1,4-Naphthoquinone	(1)	220
2-Acetylaminofluorene	(1)	220
2-Chloroethyl vinyl ether	(1)	17
2-Chloronaphthalene	(1)	220
2-Chlorophenol	(1)	220
2-Piccoline	(1)	220
2,3,4,6-Tetrachlorophenol	(1)	220
2,4-Dichlorophenol	(1)	220
2,4-Dimethylphenol	(1)	220
2,4-Dinitrophenol	(1)	220
2,4-Dinitrotoluene	(1)	220
2,4,5-Trichlorophenol	(1)	220
2,4,6-Trichlorophenol	(1)	220
2,6-Dichlorophenol	(1)	220
2,6-Dinitrotoluene	(1)	220
3-3′-Dimethylbenzidine	(1)	220
3-Methylcholanthrene	(1)	220
3,3′-Dichlorobenzidine	(1)	220
4-Aminobiphenyl	(1)	220
4-Bromophenyl phenyl ether	(1)	220
4,6-Dinitro-o-cresol	(1)	220
5-Nitro-o-toluidine	(1)	220
7,12-Dimethylbenz[a]anthracene	(1)	220
Acetonitrile	(1)	17
Acetophenone	(1)	220
Acrolein	(1)	17
Acrylonitrile	(1)	17

TABLE 5.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE COMPOSITE FUEL SPECIFICATION—50TH PERCENTILE ANALYSIS—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
Allyl chloride	(1)	17
Aniline	(1)	220
Aramite	(1)	220
Benzene	21	
Benzidine	(1)	220
Benzo[a]anthracene	140	
Benzo[a]pyrene	140	
Benzo[b]fluoranthene	140	
Benzo[k]fluoranthene	(1)	220
Bromoform	(1)	17
Butyl benzyl phthalate	(1)	220
Carbon disulfide	(1)	17
Carbon tetrachloride	(1)	17
Chlorobenzene	(1)	17
Chlorobenzilate	(1)	220
Chloroform	(1)	17
Chloroprene	(1)	17
Chrysene	140	
cis-1,3-Dichloropropene	(1)	17
Cresol (o-, n-, or p-)	(1)	220
Di-n-butyl phthalate	(1)	220
Di-n-octyl phthalate	120	
Diallate	(1)	220
Dibenzo[a,h]anthracene	140	
Dibenz[a,j]acridine	(1)	220
Dichlorodifluoromethane	(1)	17
Diethyl phthalate	(1)	220
Dimethoate	(1)	220
Dimethyl phthalate	(1)	220
Dinoseb	(1)	220
Diphenylamine	(1)	220
Disulfoton	(1)	220
Ethyl methacrylate	(1)	17
Ethyl methanesulfonate	(1)	220
Famphur	(1)	220
Fluoranthene	(1)	220
Fluorene	120	
Hexachlorobenzene	(1)	220
Hexachlorobutadiene	(1)	220
Hexachlorocyclopentadiene	(1)	220
Hexachloroethane	(1)	220
Hexachlorophene	(1)	5500
Hexachloropropene	(1)	220
Indeno(1,2,3-cd)pyrene	140	
Isobutyl alcohol	(1)	17
Isodrin	(1)	220
Isosafrole	(1)	220
Kepone	(1)	440
m-Dichlorobenzene	(1)	220
Methacrylonitrile	(1)	17
Methapyrilene	(1)	220
Methyl bromide	(1)	17
Methyl chloride	(1)	17
Methyl ethyl ketone	(1)	17
Methyl iodide	(1)	17
Methyl methacrylate	(1)	17
Methyl methanesulfonate	(1)	220
Methyl parathion	(1)	220
Methylene chloride	(1)	17
N-Nitrosodi-n-butylamine	(1)	220
N-Nitrosomethylethylamine	(1)	220
N-Nitrosomorpholine	(1)	220
N-Nitrosopiperidine	(1)	220
N-Nitrosopyrrolidine	(1)	220
N-Nitrosodiethylamine	(1)	220
Naphthalene	360	
Nitrobenzene	(1)	220
o-Dichlorobenzene	(1)	220
o-Toluidine	(1)	270

TABLE 5.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE COMPOSITE FUEL SPECIFICATION—50TH PERCENTILE ANALYSIS—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limits (mg/kg)
O,O-Diethyl O-pyrazinyl phosphothioate	(1)	220
O,O,O-Triethyl phosphorothinoate	(1)	220
p-(Dimethylamino) azobenzene	(1)	220
p-Chloro-m-cresol	(1)	220
p-Chloroaniline	(1)	220
p-Dichlorobenzene	(1)	220
p-Nitroaniline	(1)	220
p-Nitrophenol	(1)	220
p-Phenylenediamine	(1)	220
Parathion	(1)	220
Pentachlorobenzene	(1)	220
Pentachloroethane	(1)	17
Pentachloronitrobenzene	(1)	220
Pentachlorophenol	(1)	220
Phenacetin	(1)	220
Phenol	(1)	220
Phorate	(1)	220
Pronamide	(1)	220
Pyridine	(1)	220
Safrole	(1)	220
Tetrachloroethylene	(1)	17
Tetraethyldithiopyrophosphate	(1)	220
Toluene	110	
Trichloroethylene	(1)	17
Trichlorofluoromethane	(1)	17
Vinyl Chloride	(1)	17

[1] Non-detect.

TABLE 6.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE COMPOSITE FUEL SPECIFICATION—90TH PERCENTILE ANALYSIS

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limit (mg/kg)
Total Nitrogen as N	1800	
Total Halogens as Cl	25	
Antimony	5.8	
Arsenic	(1)	0.22
Barium	(1)	22
Beryllium	(1)	1.1
Cadmium	(1)	1.1
Chromium	(1)	2.2
Cobalt	(1)	4.4
Lead	22	
Manganese	(1)	1.1
Mercury	(1)	0.18
Nickel	18	
Selenium	0.12	
Silver	(1)	2.2
Thallium	(1)	22
α-Naphthylamine	(1)	700
α,α-Dimethylphenethylamine	(1)	700
β-Naphthylamine	(1)	700
1,1-Dichloroethylene	(1)	34
1,1,2-Trichloroethane	(1)	34
1,1,2,2-Tetrachloroethane	(1)	34
1,2-Dibromo-3-chloropropane	(1)	34
1,2-Dichloroethylene (cis- or trans-)	(1)	34
1,2,3-Trichloropropane	(1)	34
1,2,4-Trichlorobenzene	(1)	700
1,2,4,5-Tetrachlorobenzene	(1)	700
1,3,5-Trinitrobenzene	(1)	900
1,4-Dichloro-2-butene (cis- or trans-)	(1)	34
1,4-Naphthoquinone	(1)	700
2-Acetylaminofluorene	(1)	700
2-Chloroethyl vinyl ether	(1)	34
2-Chloronaphthalene	(1)	700

TABLE 6.—DETECTION AND DETECTION LIMIT VALUES FOR A POSSIBLE COMPOSITE FUEL SPECIFICATION—90TH PERCENTILE ANALYSIS—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limit (mg/kg)
2-Chlorophenol	(1)	700
2-Piccoline	(1)	700
2,3,4,6-Tetrachlorophenol	(1)	700
2,4-Dichlorophenol	(1)	700
2,4-Dimethylphenol	(1)	700
2,4-Dinitrophenol	(1)	700
2,4-Dinitrotoluene	(1)	700
2,4,5-Trichlorophenol	(1)	700
2,4,6-Trichlorophenol	(1)	700
2,6-Dichlorophenol	(1)	700
2,6-Dinitrotoluene	(1)	700
3-3′-Dimethylbenzidine	(1)	700
3-Methylcholanthrene	(1)	700
3,3′-Dichlorobenzidine	(1)	700
4-Aminobiphenyl	(1)	700
4-Bromophenyl phenyl ether	(1)	700
4,6-Dinitro-o-cresol	(1)	700
5-Nitro-o-toluidine	(1)	700
7,12-Dimethylbenz[a]anthracene	(1)	700
Acetonitrile	(1)	34
Acetophenone	(1)	700
Acrolein	(1)	34
Acrylonitrile	(1)	34
Allyl chloride	(1)	34
Aniline	(1)	700
Aramite	(1)	700
Benzene	3300	
Benzidine	(1)	700
Benzo[a]anthracene	610	
Benzo[a]pyrene	530	
Benzo[b]fluoranthene	390	
Benzo[k]fluoranthene	(1)	700
Bromoform	(1)	34
Butyl benzyl phthalate	(1)	700
Carbon disulfide	(1)	34
Carbon tetrachloride	(1)	34
Chlorobenzene	(1)	34
Chlorobenzilate	(1)	700
Chloroform	(1)	34
Chloroprene	(1)	34
Chrysene	610	
cis-1,3-Dichloropropene	(1)	34
Cresol (o-, n-, or p-)	(1)	700
Di-n-butyl phthalate	(1)	700
Di-n-octyl phthalate	360	
Diallate	(1)	700
Dibenzo[a,h]anthracene	360	
Dibenz[a,j]acridine	(1)	700
Dichlorodifluoromethane	(1)	34
Diethyl phthalate	(1)	700
Dimethoate	(1)	700
Dimethyl phthalate	(1)	700
Dinoseb	(1)	700
Diphenylamine	(1)	700
Disulfoton	(1)	700
Ethyl methacrylate	(1)	34
Ethyl methanesulfonate	(1)	700
Famphur	(1)	700
Fluoranthene	(1)	700
Fluorene	360	
Hexachlorobenzene	(1)	700
Hexachlorobutadiene	(1)	700
Hexachlorocyclopentadiene	(1)	700
Hexachloroethane	(1)	700
Hexachlorophene	(1)	18000
Hexachloropropene	(1)	700
Indeno(1,2,3-cd)pyrene	360	
Isobutyl alcohol	(1)	34
Isodrin	(1)	700

Table 6.—Detection and Detection Limit Values for a Possible Composite Fuel Specification—90th Percentile Analysis—Continued

Chemical name	Concentration limit (mg/kg at 10,000 BTU/lb)	Maximum detection limit (mg/kg)
Isosafrole	(1)	700
Kepone	(1)	1400
m-Dichlorobenzene	(1)	700
Methacrylonitrile	(1)	34
Methapyrilene	(1)	700
Methyl bromide	(1)	34
Methyl chloride	(1)	34
Methyl ethyl ketone	(1)	34
Methyl iodide	(1)	34
Methyl methacrylate	(1)	34
Methyl methanesulfonate	(1)	700
Methyl parathion	(1)	700
Methylene chloride	(1)	34
N-Nitrosodi-n-butylamine	(1)	700
N-Nitrosomethylethylamine	(1)	700
N-Nitrosomorpholine	(1)	700
N-Nitrosopiperidine	(1)	700
N-Nitrosopyrrolidine	(1)	700
N-Nitrosodiethylamine	(1)	700
Naphthalene	1300	
Nitrobenzene	(1)	700
o-Dichlorobenzene	(1)	700
o-Toluidine	(1)	1000
O,O-Diethyl O-pyrazinyl phophorothioate	(1)	700
O,O,O-Triethyl phosphorothionate	(1)	700
p-(Dimethylamino)azobenzene	(1)	700
p-Chloro-m-cresol	(1)	700
p-Chloroaniline	(1)	700
p-Dichlorobenzene	(1)	700
p-Nitroaniline	(1)	700
p-Nitrophenol	(1)	700
p-Phenylenediamine	(1)	700
Parathion	(1)	700
Pentachlorobenzene	(1)	700
Pentachloroethane	(1)	34
Pentachloronitrobenzene	(1)	700
Pentachlorophenol	(1)	700
Phenacetin	(1)	700
Phenol	(1)	700
Phorate	(1)	700
Pronamide	(1)	700
Pyridine	(1)	700
Safrole	(1)	700
Tetrachloroethylene	(1)	34
Tetraethyldithiopyrophosphate	(1)	700
Toluene	25,000	
Trichloroethylene	(1)	34
Trichlorofluoromethane	(1)	34
Vinyl Chloride	(1)	34

[1] Non-detect.

Table 7.—Possible Physical Specifications—From EPA's Data

Fuel type (physical param)	Gasoline	No. 2	No. 4	No. 6	Comp. 50th	Comp 90th
Flash Point (°C)	< 0	44	66	69	63	< 0
Kinematic viscosity (cSt @ 40°C)		3.7	6.4	660	6.4	

Note: Kinematic viscosity for gasoline is less than measureable levels.

Table 8.—Possible Physical Specifications—From ASTM and Other Published Literature

Fuel type [220] (parameter)	Gasoline	No. 2	No. 4	No. 6
Flashpoint (°C)	[221] –42	38	55	60
Kinematic viscosity (cSt@40 °C)	[222] 0.6	3.4	24	50 (at 100 °C)

[220] Fuel oil specifications from ASTM Designation D 396–92, *Standard Specifications for Fuel Oils.*

[221] Felder, M.F., and R.W. Rousseau, *Elementary Principles of Chemical Processes*, John Wiley and Sons, New York, 1978, 420.

[222] Perry, Robert H., Don W. Green, and James O. Moloney, *Perry's Chemical Engineers' Handbook: Sixth Edition,* McGraw-Hill Book Co., New York, 1984, 9–13.

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Sulfur oxides
Sulfuric acid plants
Tires
Urethane
Vinyl
Volatile organic compounds
Waste treatment and disposal
Zinc

40 CFR Part 63

Air pollution control
Hazardous substances
Reporting and recordkeeping requirements

40 CFR Part 260

Administrative practice and procedure
Confidential business information
Environmental Protection Agency
Hazardous waste

40 CFR Part 261

Environmental Protection Agency
Hazardous waste
Recycling
Reporting and recordkeeping requirements

40 CFR Part 264

Air pollution control
Environmental Protection Agency
Hazardous waste
Insurance
Packaging and containers
Reporting and recordkeeping requirements
Security measures
Surety bonds

40 CFR Part 265

Air pollution control
Environmental Protection Agency
Hazardous waste
Insurance
Packaging and containers
Reporting and recordkeeping requirements
Security measures
Surety bonds
Water supply

40 CFR Part 266

Energy
Environmental Protection Agency
Hazardous waste
Recycling
Reporting and recordkeeping requirements

40 CFR Part 270

Administrative practice and procedure
Confidential business information
Environmental Protection Agency
Hazardous materials transportation
Hazardous waste
Reporting and recordkeeping requirements
Water pollution control
Water supply

40 CFR Part 271

Administrative practice and procedure
Confidential business information
Environmental Protection Agency
Hazardous materials transportation
Hazardous waste
Indians-lands
Intergovernmental relations
Penalties
Reporting and recordkeeping requirements
Water pollution control
Water supply

Dated: March 20, 1996.

Carol M. Browner,
Administrator.

For the reasons set out in the preamble, it is proposed to amend Title 40 of the Code of Federal Regulations as follows:

PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

I. In part 60:

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

Authority: 42 USC 7401, 7411, 7414, 7416, 7429, and 7601.

2. Appendix B in Part 60 is amended by adding four entries to the table of contents, and by adding new performance specifications 4B, 8A, 10, 11, and 12:

Appendix B—Performance Specifications

* * * * *

Performance Specification 4B—Specifications and test procedures for carbon monoxide and oxygen continuous monitoring systems in stationary sources.

* * * * *

Performance Specification 8A—Specifications and test procedures for total hydrocarbon continuous monitoring systems in hazardous waste-burning stationary sources.

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Performance Specification 10—Specifications and test procedures for multi-metals continuous monitoring sytems in stationary sources.

Performance Specification 11—Specifications and test procedures for particulate matter continuous monitoring systems in stationary sources.

Performance Specification 12—Specifications and test procedures for total mercury monitoring systems in stationary sources.

* * * * *

Performance Specification 4B—Specifications and test procedures for carbon monoxide and oxygen continuous monitoring systems in stationary sources.

1. Applicability and Principle

1.1 Applicability. This specification is to be used for evaluating the acceptability of carbon monoxide (CO) and oxygen (O_2) continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in the regulations. The CEMS may include, for certain stationary sources, (a) flow monitoring equipment to allow measurement of the dry volume of stack effluent sampled, and (b) an automatic sampling system.

This specification is not designed to evaluate the installed CEMS' performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS' performance. The source owner or operator, however, is responsible to properly calibrate, maintain, and operate the CEMS. To evaluate the CEMS' performance, the Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test.

The definitions, installation and measurement location specifications, test procedures, data reduction procedures, reporting requirements, and bibliography are the same as in PS 3 (for O_2) and PS 4A (for CO) except as otherwise noted below.

1.2 Principle. Installation and measurement location specifications, performance specifications, test procedures, and data reduction procedures are included in this specification. Reference method tests, calibration error tests, and calibration drift tests, and interferant tests are conducted to determine conformance of the CEMS with the specification.

2. Definitions

2.1 Continuous Emission Monitoring System (CEMS). This definition is the same as PS 2 Section 2.1 with the following addition. A continuous monitor is one in which the sample to be analyzed passes the measurement section of the analyzer without interruption.

2.2 Response Time. The time interval between the start of a step change in the system input and the time when the pollutant analyzer output reaches 95 percent of the final value.

2.3 Calibration Error (CE). The difference between the concentration indicated by the CEMS and the known concentration generated by a calibration source when the entire CEMS, including the sampling interface) is challenged. A CE test procedure is performed to document the accuracy and linearity of the CEMS over the entire measurement range.

3. Installation and Measurement Location Specifications

3.1 The CEMS Installation and Measurement Location. This specification is the same as PS 2 Section 3.1 with the following additions. Both the CO and O_2 monitors should be installed at the same general location. If this is not possible, they may be installed at different locations if the effluent gases at both sample locations are not stratified and there is no in-leakage of air between sampling locations.

3.1.1 Measurement Location. Same as PS 2 Section 3.1.1.

3.1.2 Point CEMS. The measurement point should be within or centrally located over the centroidal area of the stack or duct cross section.

3.1.3 Path CEMS. The effective measurement path should be (1) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area, or (2) be centrally located over any part of the centroidal area.

3.2 Reference Method (RM) Measurement Location and Traverse Points. This specification is the same as PS 2 Section 3.2 with the following additions. When pollutant concentrations changes are due solely to diluent leakage and CO and O_2 are simultaneously measured at the same location, one half diameter may be used in place of two equivalent diameters.

3.3 Stratification Test Procedure. Stratification is defined as the difference in excess of 10 percent between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall. To determine whether effluent stratification exists, a dual probe system should be used to determine the average effluent concentration while measurements at each traverse point are being made. One probe, located at the stack or duct centroid, is used as a stationary reference point to indicate change in the effluent concentration over time. The second probe is used for sampling at the traverse points specified in method 1, appendix A, 40 CFR part 60. The monitoring system samples sequentially at the reference and traverse points throughout the testing period for five minutes at each point.

4. Performance and Equipment Specifications

4.1 Data Recorder Scale. For O_2, same as specified in PS 3, except that the span shall be 25 percent. The span of the O_2 may be higher if the O_2 concentration at the sampling point can be greater than 25 percent. For CO, same as specified in PS 4A, except that the low-range span shall be 200 ppm and the high range span shall be 3000 ppm. In addition, the scale for both CEMS must record all readings within a measurement range with a resolution of 0.5 percent.

4.2 Calibration Drift. For O_2, same as specified in PS 3. For CO, the same as specified in PS 4A except that the CEMS calibration must not drift from the reference value of the calibration standard by more than 3 percent of the span value on either the high or low range.

4.3 Relative Accuracy (RA). For O_2, same as specified in PS 3. For CO, the same as specified in PS 4A.

4.4 Calibration Error (CE). The mean difference between the CEMS and reference values at all three test points (see Table I) must be no greater than 5 percent of span value for CO monitors and 0.5 percent for O_2 monitors.

4.5 Response Time. The response time for the CO or O_2 monitor shall not exceed 2 minutes.

5. Performance Specification Test Procedure

5.1 Calibration Error Test and Response Time Test Periods. Conduct the CE and response time tests during the CD test period.

6.0 The CEMS Calibration Drift and Response Time Test Procedures

The response time test procedure is given in PS 4A, and must be carried out for both the CO and O_2 monitors.

7. Relative Accuracy and Calibration Error Test Procedures

7.1 Calibration Error Test Procedure. Challenge each monitor (both low and high range CO and O_2) with zero gas and EPA Protocol 1 cylinder gases at three measurement points within the ranges specified in Table I.

TABLE I.—CALIBRATION ERROR CONCENTRATION RANGES

Measurement point	CO low range (ppm)	CO high range (ppm)	O_2 (percent)
1	0–40	0–600	0–2
2	60–80	900–1200	8–10
3	140–160	2100–2400	14–16

Operate each monitor in its normal sampling mode as nearly as possible. The calibration gas shall be injected into the sample system as close to the sampling probe outlet as practical and should pass through all CEMS components used during normal sampling. Challenge the CEMS three non-consecutive times at each measurement point and record the responses. The duration of each gas injection should be sufficient to ensure that the CEMS surfaces are conditioned.

7.1.1 Calculations. Summarize the results on a data sheet. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate the CE results according to:

$$CE = |d/FS| \times 100 \qquad (1)$$

Where d is the mean difference between the CEMS response and the known reference concentration and FS is the span value.

7.2 Relative Accuracy Test Procedure. Follow the RA test procedures in PS 3 (for O_2) section 3 and PS 4A (for CO) section 4.

7.3 Alternative RA Procedure. Under some operating conditions, it may not be possible to obtain meaningful results using the RA test procedure. This includes conditions where consistent, very low CO emission or low CO emissions interrupted periodically by short duration, high level spikes are observed. It may be appropriate in these circumstances to waive the RA test and substitute the following procedure.

Conduct a complete CEMS status check following the manufacturer's written instructions. The check should include operation of the light source, signal receiver, timing mechanism functions, data acquisition and data reduction functions, data recorders, mechanically operated functions, sample filters, sample line heaters, moisture traps, and other related functions of the CEMS, as applicable. All parts of the CEMS must be functioning properly before the RA requirement can be waived. The instrument must also successfully passed the CE and CD specifications. Substitution of the alternate procedure requires approval of the Regional Administrator.

8. Bibliography

1. 40 CFR Part 266, Appendix IX, Section 2, "Performance Specifications for Continuous Emission Monitoring Systems."

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Performance Specification 8A—Specifications and test procedures for total hydrocarbon continuous monitoring systems in hazardous waste-burning stationary sources.

1. Applicability and Principle

1.1 Applicability. These performance specifications apply to hydrocarbon (HC) continuous emission monitoring systems (CEMS) installed on hazardous waste-burning stationary sources. The specifications include procedures which are intended to be used to evaluate the acceptability of the CEMS at the time of its installation or whenever specified in regulations or permits. The procedures are not designed to evaluate CEMS performance over an extended period of time. The source owner or operator is responsible for the proper calibration, maintenance, and operation of the CEMS at all times.

1.2 Principle. A gas sample is extracted from the source through a heated sample line and heated filter to a flame ionization detector (FID). Results are reported as volume concentration equivalents of propane. Installation and measurement location specifications, performance and equipment specifications, test and data reduction procedures, and brief quality assurance guidelines are included in the specifications. Calibration drift, calibration error, and response time tests are conducted to determine conformance of the CEMS with the specifications.

2. Definitions

2.1 Continuous Emission Monitoring System (CEMS). The total equipment used to acquire data, which includes sample extraction and transport hardware, analyzer, data recording and processing hardware, and software. The system consists of the following major subsystems:

2.1.1 Sample Interface. That portion of the system that is used for one or more of the following: Sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.

2.1.2 Organic Analyzer. That portion of the system that senses organic concentration and generates an output proportional to the gas concentration.

2.1.3 Data Recorder. That portion of the system that records a permanent record of the measurement values. The data recorder may include automatic data reduction capabilities.

2.2 Instrument Measurement Range. The difference between the minimum and maximum concentration that can be measured by a specific instrument. The minimum is often stated or assumed to be zero and the range expressed only as the maximum.

2.3 Span or Span Value. Full scale instrument measurement range. The span value shall be documented by the CEMS manufacturer with laboratory data.

2.4 Calibration Gas. A known concentration of a gas in an appropriate diluent gas.

2.5 Calibration Drift (CD). The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment takes place. A CD test is performed to demonstrate the stability of the CEMS calibration over time.

2.6 Response Time. The time interval between the start of a step change in the system input (e.g., change of calibration gas) and the time when the data recorder displays 95 percent of the final value.

2.7 Accuracy. A measurement of agreement between a measured value and an accepted or true value, expressed as the percentage difference between the true and measured values relative to the true value. For these performance specifications, accuracy is checked by conducting a calibration error (CE) test.

2.8 Calibration Error (CE). The difference between the concentration indicated by the CEMS and the known concentration of the cylinder gas. A CE test procedure is performed to document the accuracy and linearity of the monitoring equipment over the entire measurement range.

2.9 Performance Specification Test (PST) Period. The period during which CD, CE, and response time tests are conducted.

2.10 Centroidal Area. A concentric area that is geometrically similar to the stack or duct cross section and is no greater than 1 percent of the stack or duct cross-sectional area.

3. Installation and Measurement Location Specifications

3.1 CEMS Installation and Measurement Locations. The CEMS shall be installed in a location in which measurements representative of the source's emissions can be obtained. The optimum location of the sample interface for the CEMS is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, the degree to which it represents total emissions, and the degree to which it represents the combustion situation in the firebox. The location should be as free from in-leakage influences as possible and reasonably free from severe flow disturbances. The sample location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs and at least 0.5 diameter upstream from the exhaust or control device. The equivalent duct diameter is calculated as per 40 CFR part 60, appendix A, method 1, section 2.1. If these criteria are not achievable or if the location is otherwise less than optimum, the possibility of stratification should be investigated as described in section 3.2. The measurement point shall be within the centroidal area of the stack or duct cross section.

3.2 Stratification Test Procedure. Stratification is defined as a difference in excess of 10 percent between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall. To determine whether effluent stratification exists, a dual probe system should be used to determine the average effluent concentration while measurements at each traverse point are being made. One probe, located at the stack or duct centroid, is used as a stationary reference point to indicate the change in effluent concentration over time. The second probe is used for sampling at the traverse points specified in 40 CFR part 60 appendix A, method 1. The monitoring system samples sequentially at the reference and traverse points throughout the testing period for five minutes at each point.

4. CEMS Performance and Equipment Specifications

If this method is applied in highly explosive areas, caution and care shall be exercised in choice of equipment and installation.

4.1 Flame Ionization Detector (FID) Analyzer. A heated FID analyzer capable of meeting or exceeding the requirements of these specifications. Heated systems shall maintain the temperature of the sample gas between 150 °C (300 °F) and 175 °C (350 °F) throughout the system. This requires all system components such as the probe, calibration valve, filter, sample lines, pump, and the FID to be kept heated at all times such that no moisture is condensed out of the system. The essential components of the measurement system are described below:

4.1.1 Sample Probe. Stainless steel, or equivalent, to collect a gas sample from the centroidal area of the stack cross-section.

4.1.2 Sample Line. Stainless steel or Teflon tubing to transport the sample to the analyzer.

Note: Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

4.1.3 Calibration Valve Assembly. A heated three-way valve assembly to direct the zero and calibration gases to the analyzer is recommended. Other methods, such as quick-connect lines, to route calibration gas to the analyzers are applicable.

4.1.4 Particulate Filter. An in-stack or out-of-stack sintered stainless steel filter is recommended if exhaust gas particulate loading is significant. An out-of-stack filter must be heated.

4.1.5 Fuel. The fuel specified by the manufacturer (e.g., 40 percent hydrogen/60 percent helium, 40 percent hydrogen/60 percent nitrogen gas mixtures, or pure hydrogen) should be used.

4.1.6 Zero Gas. High purity air with less than 0.1 parts per million by volume (ppm) HC as methane or carbon equivalent or less than 0.1 percent of the span value, whichever is greater.

4.1.7 Calibration Gases. Appropriate concentrations of propane gas (in air or nitrogen). Preparation of the calibration gases should be done according to the procedures in EPA Protocol 1. In addition, the manufacturer of the cylinder gas should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change by more than ±2 percent from the certified value.

4.2 CEMS Span Value. 100 ppm propane. The span value shall be documented by the CEMS manufacturer with laboratory data.

4.3 Daily Calibration Gas Values. The owner or operator must choose calibration gas concentrations that include zero and high-level calibration values.

4.3.1 The zero level may be between zero and 0.1 ppm (zero and 0.1 percent of the span value).

4.3.2 The high-level concentration shall be between 50 and 90 ppm (50 and 90 percent of the span value).

4.4 Data Recorder Scale. The strip chart recorder, computer, or digital recorder must be capable of recording all readings within the CEMS' measurement range and shall have a resolution of 0.5 ppm (0.5 percent of span value).

4.5 Response Time. The response time for the CEMS must not exceed 2 minutes to achieve 95 percent of the final stable value.

4.6 Calibration Drift. The CEMS must allow the determination of CD at the zero and high-level values. The CEMS calibration response must not differ by more than ±3 ppm (±3 percent of the span value) after each 24-hour period of the 7-day test at both zero and high levels.

4.7 Calibration Error. The mean difference between the CEMS and reference values at all three test points listed below shall be no greater than 5 ppm (±5 percent of the span value).

4.7.1 Zero Level. Zero to 0.1 ppm (0 to 0.1 percent of span value).

4.7.2 Mid-Level. 30 to 40 ppm (30 to 40 percent of span value).

4.7.3 High-Level. 70 to 80 ppm (70 to 80 percent of span value).

4.8 Measurement and Recording Frequency. The sample to be analyzed shall pass through the measurement section of the analyzer without interruption. The detector shall measure the sample concentration at least once every 15 seconds. An average emission rate shall be computed and recorded at least once every 60 seconds.

4.9 Hourly Rolling Average Calculation. The CEMS shall calculate every minute an hourly rolling average, which is the arithmetic mean of the 60 most recent 1-minute average values.

4.10 Retest. If the CEMS produces results within the specified criteria, the test is successful. If the CEMS does not meet one or more of the criteria, necessary corrections must be made and the performance tests repeated.

5. *Performance Specification Test (PST) Periods*

5.1 Pretest Preparation Period. Install the CEMS, prepare the PTM test site according to the specifications in section 3, and prepare the CEMS for operation and calibration according to the manufacturer's written instructions. A pretest conditioning period similar to that of the 7-day CD test is recommended to verify the operational status of the CEMS.

5.2 Calibration Drift Test Period. While the facility is operating under normal conditions, determine the magnitude of the CD at 24-hour intervals for seven consecutive days according to the procedure given in section 6.1. All CD determinations must be made following a 24-hour period during which no unscheduled maintenance, repair, or adjustment takes place. If the combustion unit is taken out of service during the test period, record the onset and duration of the downtime and continue the CD test when the unit resumes operation.

5.3 Calibration Error Test and Response Time Test Periods. Conduct the CE and response time tests during the CD test period.

6. Performance Specification Test Procedures

6.1 Relative Accuracy Test Audit (RATA) and Absolute Calibration Audits (ACA). The test procedures described in this section are in lieu of a RATA and ACA.

6.2 Calibration Drift Test.

6.2.1 Sampling Strategy. Conduct the CD test at 24-hour intervals for seven consecutive days using calibration gases at the two daily concentration levels specified in section 4.3. Introduce the two calibration gases into the sampling system as close to the sampling probe outlet as practical. The gas shall pass through all CEM components used during normal sampling. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Record the CEMS response and subtract this value from the reference (calibration gas) value. To meet the specification, none of the differences shall exceed 3 percent of the span of the CEM.

6.2.2 Calculations. Summarize the results on a data sheet. An example is shown in Figure 1. Calculate the differences between the CEMS responses and the reference values.

6.3 Response Time. The entire system including sample extraction and transport, sample conditioning, gas analyses, and the data recording is checked with this procedure.

6.3.1 Introduce the calibration gases at the probe as near to the sample location as possible. Introduce the zero gas into the system. When the system output has stabilized (no change greater than 1 percent of full scale for 30 sec), switch to monitor stack effluent and wait for a stable value. Record the time (upscale response time) required to reach 95 percent of the final stable value.

6.3.2 Next, introduce a high-level calibration gas and repeat the above procedure. Repeat the entire procedure three times and determine the mean upscale and downscale response times. The longer of the two means is the system response time.

6.4 Calibration Error Test Procedure.

6.4.1 Sampling Strategy. Challenge the CEMS with zero gas and EPA Protocol 1 cylinder gases at measurement points within the ranges specified in section 4.7.

6.4.1.1 The daily calibration gases, if Protocol 1, may be used for this test.

Source: ________________
Monitor: ________________
Serial Number: ________________
Date: ________________
Location: ________________
Span: ________________

Day	Date	Time	Calibration value	Monitor response	Difference	Percent of span (1)
Zero/low level:						
1						
2						
3						
4						
5						
6						
7						
High level:						
1						
2						
3						
4						
5						
6						
7						

[1]=Acceptance Criteria: ≤ 3% of span each day for seven days.

Figure 1: Calibration Drift Determination

6.4.1.2 Operate the CEMS as nearly as possible in its normal sampling mode. The calibration gas should be injected into the sampling system as close to the sampling probe outlet as practical and shall pass through all filters, scrubbers, conditioners, and other monitor components used during normal sampling. Challenge the CEMS three non-consecutive times at each measurement point and record the responses. The duration of each gas injection should be for a sufficient period of time to ensure that the CEMS surfaces are conditioned.

6.4.2 Calculations. Summarize the results on a data sheet. An example data sheet is shown in Figure 2. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate three CE results according to Equation 1. No confidence coefficient is used in CE calculations.

7. Equations

7.1 Calibration Error. Calculate CE using Equation 1.

$$CE = \left| d / FS \right| \times 100 \qquad (Eq.1)$$

Where:

d = Mean difference between CEMS response and the known reference concentration, determined using Equation 2.

$$d = \frac{1}{n} \sum_{i=1}^{n} d_i \qquad (Eq.2)$$

d_i = Individual difference between CEMS response and the known reference concentration.

8. Reporting

At a minimum, summarize in tabular form the results of the CD, response time, and CE test, as appropriate. Include all data sheets, calculations, CEMS data records, and cylinder gas or reference material certifications.

Source: ______________________

Monitor: ______________________

Serial Number: ______________________

Date: ______________________

Location: ______________________

Span: ______________________

Run No.	Calibration value	Monitor response	Difference		
			Zero/Low	Mid	High
1–Zero					
2–Mid					
3–High					
4–Mid					
5–Zero					
6–High					
7–Zero					
8–Mid					
9–High					
	Mean Difference =				
	Calibration Error =		%	%	%

Figure 2: Calibration Error Determination

9. References

1. Measurement of Volatile Organic Compounds-Guideline Series. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711, EPA–450/2–78–041, June 1978.

2. Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol No. 1). U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, June 1978.

3. Gasoline Vapor Emission Laboratory Evaluation-Part 2. U.S. Environmental Protection Agency, OAQPS, Research Triangle Park, North Carolina, 27711, EMB Report No. 76–GAS–6, August 1975.

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Performance Specification 10—Specifications and test procedures for multi-metals continuous monitoring systems in stationary sources.

1. Applicability and Principle

1.1 Applicability. This specification is to be used for evaluating the acceptability of multi-metals continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in the regulations. The CEMS may include, for certain stationary sources, (a) a diluent (O_2) monitor (which must meet its own performance specifications: 40 CFR part 60, Appendix B, Performance Specification 3), (b) flow monitoring equipment to allow measurement of the dry volume of stack effluent sampled, and (c) an automatic sampling system.

A multi-metals CEMS must be capable of measuring the total concentrations (regardless of speciation) of two or more of the following metals in both their vapor and solid forms: Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Lead (Pb), Mercury (Hg), Silver (Ag), Thallium (Tl), Manganese (Mn), Cobalt (Co), Nickel (Ni), and Selenium (Se). Additional metals may be added to this list at a later date by addition of appendices to this performance specification. If a CEMS does not measure a particular metal or fails to meet the performance specifications for a particular metal, then the CEMS may not be used to determine emission compliance with the applicable regulation for that metal.

This specification is not designed to evaluate the installed CEMS' performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS' performance. The source owner or operator, however, is responsible to properly calibrate, maintain, and operate the CEMS. To evaluate the CEMS' performance, the Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test. See Sec. 60.13 (c) and "Quality Assurance Requirements For Multi-Metals Continuous Emission Monitoring Systems Used For Compliance Determination."

1.2 Principle. Installation and measurement location specifications, performance specifications, test procedures, and data reduction procedures are included in this specification. Reference method tests and calibration drift tests are conducted to determine conformance of the CEMS with the specification.

2. Definitions

2.1 Continuous Emission Monitoring System (CEMS). The total equipment required for the determination of a metal concentration. The system consists of the following major subsystems:

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

2.1.2 Pollutant Analyzer. That portion of the CEMS that senses the metals concentrations and generates a proportional output.

2.1.3 Diluent Analyzer (if applicable). That portion of the CEMS that senses the diluent gas (O_2) and generates an output proportional to the gas concentration.

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

2.2 Point CEMS. A CEMS that measures the metals concentrations either at a single point or along a path equal to or less than 10 percent of the equivalent diameter of the stack or duct cross section.

2.3 Path CEMS. A CEMS that measures the metals concentrations along a path greater than 10 percent of the equivalent diameter of the stack or duct cross section.

2.4 Span Value. The upper limit of a metals concentration measurement range defined as twenty times the applicable emission limit for each metal. The span value shall be documented by the CEMS manufacturer with laboratory data.

2.5 Relative Accuracy (RA). The absolute mean difference between the metals concentrations determined by the CEMS and the value determined by the reference method (RM) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests or the applicable emission limit.

2.6 Calibration Drift (CD). The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.7 Zero Drift (ZD). The difference in the CEMS output readings for zero input after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.8 Representative Results. Defined by the RA test procedure defined in this specification.

2.9 Response Time. The time interval between the start of a step change in the system input and the time when the pollutant analyzer output reaches 95 percent of the final value.

2.10 Centroidal Area. A concentric area that is geometrically similar to the stack or duct cross section and is no greater than 1 percent of the stack or duct cross sectional area.

2.11 Batch Sampling. Batch sampling refers to the technique of sampling the stack effluent continuously and concentrating the pollutant in some capture medium. Analysis is performed periodically after sufficient time has elapsed to concentrate the pollutant to levels detectable by the analyzer.

2.12 Calibration Standard. Calibration standards consist of a known amount of metal(s) that are presented to the pollutant analyzer portion of the CEMS in order to calibrate the drift or response of the analyzer. The calibration standard may be, for example, a solution containing a known metal concentration, or a filter with a known mass loading or composition.

3. Installation and Measurement Location Specifications

3.1 The CEMS Installation and measurement location. Install the CEMS at an accessible location downstream of all pollution control equipment where the metals concentrations measurements are directly representative or can be corrected so as to be representative of the total emissions from the affected facility. Then select representative measurement points or paths for monitoring in locations that the CEMS will pass the RA test (see Section 7). If the cause of failure to meet the RA test is determined to be the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated.

Measurement locations and points or paths that are most likely to provide data that will meet the RA requirements are listed below.

3.1.1 Measurement Location. The measurement location should be (1) at least eight equivalent diameters downstream of the nearest control device, point of pollutant generation, bend, or other point at which a change of pollutant concentration or flow disturbance may occur, and (2) at least two equivalent diameters upstream from the effluent exhaust. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, Method 1, Section 2.1.

3.1.2 Point CEMS. The measurement point should be (1) no less than 1.0 meter from the stack or duct wall or (2) within or centrally located over the centroidal area of the stack or duct cross section. Selection of traverse points to determine the representativeness of the measurement location should be made according to 40 CFR part 60, Appendix A, Method 1, Sections 2.2 and 2.3.

3.1.3 Path CEMS. The effective measurement path should be (1) totally within the inner area bounded by a line 1.0 meter from the stack or duct wall, or (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area, or (3) be centrally located over any part of the centroidal area.

3.2 Reference Method (RM) Measurement Location and Traverse Points. The RM measurement location should be (1) at least eight equivalent diameters downstream of the nearest control device, point of pollutant generation, bend, or other point at which a change of pollutant concentration or flow disturbance may occur, and (2) at least two equivalent diameters upstream from the effluent exhaust. The RM and CEMS locations need not be the same, however the difference may contribute to failure of the CEMS to pass the RA test, thus they should be as close as possible without causing interference with one another. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, Method 1, Section 2.1. Selection of traverse measurement point locations should be made according to 40 CFR part 60, Appendix A, Method 1, Sections 2.2 and 2.3. If the RM traverse line interferes with or is interfered by the CEMS measurements, the line may be displaced up to 30 cm (or 5 percent of the equivalent diameter of the cross section, whichever is less) from the centroidal area.

4. Performance and Equipment Specifications

4.1 Data Recorder Scale. The CEMS data recorder response range must include zero and a high level value. The high level value must be equal to the span value. If a lower high level value is used, the CEMS must have the capability of providing multiple outputs with different high level values (one of which is equal to the span value) or be capable of automatically changing the high level value as required (up to the span value) such that the measured value does not exceed 95 percent of the high level value.

4.2 Relative Accuracy (RA). The RA of the CEMS must be no greater than 20 percent of the mean value of the RM test data in terms of units of the emission standard for each metal, or 10 percent of the applicable standard, whichever is greater.

4.3 Calibration Drift. The CEMS design must allow the determination of calibration drift at concentration levels commensurate with the applicable emission standard for each metal monitored. The CEMS calibration may not drift or deviate from the reference value (RV) of the calibration standard used for each metal by more than 5 percent of the emission standard for each metal. The calibration shall be performed at a point equal to 80 to 120 percent of the applicable emission standard for each metal.

4.4 Zero Drift. The CEMS design must allow the determination of calibration drift at the zero level (zero drift) for each metal. If this is not possible or practicable, the design must allow the zero drift determination to be made at a low level value (zero to 20 percent of the emission limit value). The CEMS zero point for each metal shall not drift by more than 5 percent of the emission standard for that metal.

4.5 Sampling and Response Time. The CEMS shall sample the stack effluent continuously. Averaging time, the number of measurements in an average, and the averaging procedure for reporting and determining compliance shall conform with that specified in the applicable emission regulation.

4.5.1 Response Time for Instantaneous, Continuous CEMS. The response time for the CEMS must not exceed 2 minutes to achieve 95 percent of the final stable value.

4.5.2 Waiver from Response Time Requirement. A source owner or operator may receive a waiver from the response time requirement for instantaneous, continuous CEMS in section 4.5.1 from the Agency if no CEM is available which can meet this specification at the time of purchase of the CEMS.

4.5.3 Response Time for Batch CEMS. The response time requirement of Sections 4.5.1 and 4.5.2 do not apply to batch CEMS. Instead it is required that the sampling time be no longer than one third of the averaging period for the applicable standard. In addition, the delay between the end of the sampling period and reporting of the sample analysis shall be no greater than one hour. Sampling is also required to be continuous except in that the pause in sampling when the sample collection media are changed should be no greater than five percent of the averaging period or five minutes, whichever is less.

5. Performance Specification Test Procedure

5.1 Pretest Preparation. Install the CEMS and prepare the RM test site according to the specifications in Section 3, and prepare the

CEMS for operation according to the manufacturer's written instructions.

5.2 Calibration and Zero Drift Test Period. While the affected facility is operating at more than 50 percent of normal load, or as specified in an applicable subpart, determine the magnitude of the calibration drift (CD) and zero drift (ZD) once each day (at 24-hour intervals) for 7 consecutive days according to the procedure given in Section 6. To meet the requirements of Sections 4.3 and 4.4 none of the CD's or ZD's may exceed the specification. All CD determinations must be made following a 24-hour period during which no unscheduled maintenance, repair, or manual adjustment of the CEMS took place.

5.3 RA Test Period. Conduct a RA test following the CD test period. Conduct the RA test according to the procedure given in Section 7 while the affected facility is operating at more than 50 percent of normal load, or as specified in the applicable subpart.

6.0 The CEMS Calibration and Zero Drift Test Procedure

This performance specification is designed to allow calibration of the CEMS by use of standard solutions, filters, etc. that challenge the pollutant analyzer part of the CEMS (and as much of the whole system as possible), but which do not challenge the entire CEMS, including the sampling interface. Satisfactory response of the entire system is covered by the RA requirements.

The CD measurement is to verify the ability of the CEMS to conform to the established CEMS calibration used for determining the emission concentration. Therefore, if periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before the adjustments, or conduct it in such a way that the CD and ZD can be determined.

Conduct the CD and ZD tests at the points specified in Sections 4.3 and 4.4. Record the CEMS response and calculate the CD according to:

$$CD = \frac{\left(R_{CEM} - R_V\right)}{R_V} \times 100, \qquad (1)$$

Where CD denotes the calibration drift of the CEMS in percent, R_{CEM} is the CEMS response, and R_V is the reference value of the high level calibration standard. Calculate the ZD according to:

$$ZD = \frac{\left(R_{CEM} - R_V\right)}{R_{EM}} \times 100, \qquad (2)$$

Where ZD denotes the zero drift of the CEMS in percent, R_{CEM} is the CEMS response, R_V is the reference value of the low level calibration standard, and REM is the emission limit value.

7. Relative Accuracy Test Procedure

7.1 Sampling Strategy for RA Tests. The RA tests are to verify the initial performance of the entire CEMS system, including the sampling interface, by comparison to RM measurements. Conduct the RM measurements in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30 to 60-minute period, which includes the pollutant measurements, may be used to calculate dry pollutant concentration.

A measure of relative accuracy at a single level is required for each metal measured for compliance purposes by the CEMS. Thus the concentration of each metal must be detectable by both the CEMS and the RM. In addition, the RA must be determined at three levels (0 to 20, 40 to 60, and 80 to 120 percent of the emission limit) for one of the metals which will be monitored, or for iron. If iron is chosen, the three levels should be chosen to correspond to those for one of the metals that will be monitored using known sensitivities (documented by the manufacturer) of the CEMS to both metals.

In order to correlate the CEMS and RM data properly, note the beginning and end of each RM test period of each run (including the exact time of day) in the CEMS data log. Use the following strategy for the RM measurements:

7.2 Correlation of RM and CEMS Data. Correlate the CEMS and RM test data as to the time and duration by first determining from the CEMS final output (the one used for reporting) the integrated average pollutant concentration for each RM test period. Consider system response time, if important, and confirm that the pair of results are on a consistent moisture, temperature, and diluent concentration basis. Then compare each integrated CEMS value against the corresponding average RM value.

7.3 Number of tests. Obtain a minimum of three pairs of CEMS and RM measurements for each metal required and at each level required (see Section 7.1). If more than nine pairs of measurements are obtained, then up to three pairs of measurements may be rejected so long as the total number of measurement pairs used to determine the RA is greater than or equal to nine. However, all data, including the rejected data, must be reported.

7.4 Reference Methods. Unless otherwise specified in an applicable subpart of the regulations, Method 3B, or its approved alternative, is the reference method for diluent (O_2) concentration. Unless otherwise specified in an applicable subpart of the regulations, the manual method for multi-metals in 40 CFR part 266, Appendix IX, Section 3.1 (until superseded by SW–846), or its approved alternative, is the reference method for multi-metals.

As of March 22, 1995 there is no approved alternative RM to Method 29 (for example, a second metals CEMS, calibrated absolutely according to the alternate procedure to be specified in an appendix to this performance specification to be added when an absolute system calibration procedure becomes available and is approved).

7.5 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2–2 of 40 CFR part 60, Appendix B, Performance Specification 2. Calculate the mean of the RM values. Calculate the arithmetic differences between the RM and CEMS output sets, and then calculate the mean of the differences. Calculate the standard deviation of each data set and CEMS RA using the equations in Section 8.

7.6 Undetectable Emission Levels. In the event of metals emissions concentrations from the source being so low as to be undetectable by the CEMS operating in its normal mode (i.e., measurement times and frequencies within the bounds of the performance specifications), then spiking of the appropriate metals in the feed or other operation of the facility in such a way as to raise the metal concentration to a level detectable by both the CEMS and the RM is required in order to perform the RA test.

8. Equations

8.1 Arithmetic Mean. Calculate the arithmetic mean of a data set as follows:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i, \qquad (3)$$

Where n is equal to the number of data points.

8.1.1 Calculate the arithmetic mean of the difference, d, of a data set, using Equation 3 and substituting d for x. Then

$$d_i = x_i - y_i, \qquad (4)$$

Where x and y are paired data points from the CEMS and RM, respectively.

8.2 Standard Deviation. Calculate the standard deviation (SD) of a data set as follows:

$$SD = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2}{n-1}}, \qquad (5)$$

8.3 Relative Accuracy (RA). Calculate the RA as follows:

$$RA = \frac{\bar{d} + \frac{t_{0.975}}{\sqrt{n}}(SD)}{\bar{R}_{RM}}, \qquad (6)$$

Where $\bar{d}$ is equal to the arithmetic mean of the difference, d, of the paired CEMS and RM data set, calculated according to Equations 3 and 4, SD is the standard deviation calculated according to Equation 5, $\bar{R}_{RM}$ is equal to either the average of the RM data set, calculated according to Equation 3, or the value of the emission standard, as applicable (see Section 4.2), and $t_{0.975}$ is the t-value at 2.5 percent error confidence, see Table 1.

TABLE 1

[t-Values]

n[a]	$t_{0.975}$	n[a]	$t_{0.975}$	n[a]	$t_{0.975}$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

[a] The values in this table are already corrected for n-1 degrees of freedom. Use n equal to the number of individual values.

9. Reporting

At a minimum (check with the appropriate regional office, or State, or local agency for additional requirements, if any) summarize in tabular form the results of the CD tests and the RA tests or alternate RA procedure as appropriate. Include all data sheets, calculations, and records of CEMS response necessary to substantiate that the performance of the CEMS met the performance specifications.

The CEMS measurements shall be reported to the agency in units of μg/m³ on a dry basis, corrected to 20°C and 7 percent O_2.

10. Alternative Procedures

A procedure for a total system calibration, when developed, will be acceptable as a procedure for determining RA. Such a procedure will involve challenging the entire CEMS, including the sampling interface, with a known metals concentration. This procedure will be added as an appendix to this performance specification when it has been developed and approved. The RA requirement of Section 4.2 will remain unchanged.

11. Bibliography

1. 40 CFR part 60, Appendix B, ‘‘Performance Specification 2—Specifications and Test Procedures for SO_2 and NO_x Continuous Emission Monitoring Systems in Stationary Sources.’’

2. 40 CFR part 60, Appendix B, ‘‘Performance Specification 1—Specification and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources.’’

3. 40 CFR part 60, Appendix A, ‘‘Method 1—Sample and Velocity Traverses for Stationary Sources.’’

4. 40 CFR part 266, Appendix IX, Section 2, ‘‘Performance Specifications for Continuous Emission Monitoring Systems.’’

5. Draft Method 29, ‘‘Determination of Metals Emissions from Stationary Sources,’’ Docket A–90–45, Item II–B–12, and EMTIC CTM–012.WPF.

6. ‘‘Continuous Emission Monitoring Technology Survey for Incinerators, Boilers, and Industrial Furnaces: Final Report for Metals CEM's,’’ prepared for the Office of Solid Waste, U.S. EPA, Contract No. 68–D2–0164 (4/25/94).

Performance Specification 11—Specifications and test procedures for particulate matter continuous monitoring systems in stationary sources.

1. Applicability and Principle

1.1 Applicability. This specification is to be used for evaluating the acceptability of particulate matter continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in the regulations. The CEMS may include, for certain stationary sources, a) a diluent (O_2) monitor (which must meet its own performance specifications: 40 CFR part 60, Appendix B, Performance Specification 3), b) flow monitoring equipment to allow measurement of the dry volume of stack effluent sampled, and c) an automatic sampling system.

This performance specification requires site specific calibration of the PM CEMS' response against manual gravimetric method measurements. The range of validity of the response calibration is restricted to the range of particulate mass loadings used to develop the calibration relation. Further, if conditions at the facility change (i.e., changes in emission control system or fuel type), then a new response calibration is required. Since the validity of the response calibration may be affected by changes in the properties of the particulate, such as density, index of refraction, and size distribution, the limitations of the CEMS used should be evaluated with respect to these possible changes on a site specific basis.

This specification is not designed to evaluate the installed CEMS' performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS' performance. The source owner or operator, however, is responsible to properly calibrate, maintain, and operate the CEMS. To evaluate the CEMS' performance, the Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test. See Sec. 60.13 (c) and ‘‘Quality Assurance Requirements For Particulate Matter Continuous Emission Monitoring Systems Used For Compliance Determination.’’

1.2 Principle. Installation and measurement location specifications, performance specifications, test procedures, and data reduction procedures are included in this specification. Reference method tests and calibration drift tests are conducted to determine conformance of the CEMS with the specification.

2. Definitions

2.1 Continuous Emission Monitoring System (CEMS). The total equipment required for the determination of particulate matter mass concentration. The system consists of the following major subsystems:

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

2.1.2 Pollutant Analyzer. That portion of the CEMS that senses the particulate matter concentration and generates a proportional output.

2.1.3 Diluent Analyzer (if applicable). That portion of the CEMS that senses the diluent gas (O_2) and generates an output proportional to the gas concentration.

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

2.2 Point CEMS. A CEMS that measures particulate matter mass concentrations either at a single point or along a path equal to or less than 10 percent of the equivalent diameter of the stack or duct cross section.

2.3 Path CEMS. A CEMS that measures particulate matter mass concentrations along a path greater than 10 percent of the equivalent diameter of the stack or duct cross section.

2.4 Span Value. The upper limit of the CEMS measurement range. The span value shall be documented by the CEMS manufacturer with laboratory data.

2.5 Confidence Interval. The interval with upper and lower limits within which the CEMS response calibration relation lies with a given level of confidence.

2.6 Tolerance Interval. The interval with upper and lower limits within which are contained a specified percentage of the population with a given level of confidence.

2.7 Calibration Drift (CD). The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.8 Zero Drift (ZD). The difference in the CEMS output readings for zero input after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.9 Representative Results. Defined by the reference method test procedure defined in this specification.

2.10 Response Time. The time interval between the start of a step change in the system input and the time when the pollutant analyzer output reaches 95 percent of the final value.

2.11 Centroidal Area. A concentric area that is geometrically similar to the stack or duct cross section and is no greater than 1 percent of the stack or duct cross sectional area.

2.12 Batch Sampling. Batch sampling refers to the technique of sampling the stack effluent continuously and concentrating the pollutant in some capture medium. Analysis is performed periodically after sufficient time has elapsed to concentrate the pollutant to levels detectable by the analyzer.

2.13 Calibration Standard. Calibration standards produce a known and unchanging response when presented to the pollutant analyzer portion of the CEMS, and are used to calibrate the drift or response of the analyzer.

3. Installation and Measurement Location Specifications

3.1 The CEMS Installation and measurement location. Install the CEMS at an accessible location downstream of all pollution control equipment where the particulate matter mass concentrations measurements are directly representative or can be corrected so as to be representative of the total emissions from the affected facility. Then select representative measurement points or paths for monitoring in locations that the CEMS will meet the calibration requirements (see Section 7). If the cause of failure to meet the calibration requirements is determined to be the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated.

Measurement locations and points or paths that are most likely to provide data that will meet the calibration requirements are listed below.

3.1.1 Measurement Location. The measurement location should be (1) at least eight equivalent diameters downstream of the nearest control device, point of pollutant generation, bend, or other point at which a change of pollutant concentration or flow disturbance may occur and (2) at least two equivalent diameters upstream from the effluent exhaust. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, Method 1, Section 2.1.

3.1.2 Point CEMS. The measurement point should be (1) no less than 1.0 meter from the stack or duct wall or (2) within or centrally located over the centroidal area of the stack or duct cross section. Selection of traverse points to determine the representativeness of the measurement location should be made according to 40 CFR part 60, Appendix A, Method 1, Section 2.2 and 2.3.

3.1.3 Path CEMS. The effective measurement path should be (1) totally within the inner area bounded by a line 1.0 meter from the stack or duct wall, or (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area, or (3) be centrally located over any part of the centroidal area.

3.1.4 Sampling Requirement for Saturated Flue Gas. If the CEMS is to be installed downstream of a wet air pollution control system such that the flue gases are saturated with water, then the CEMS must isokinetically extract and heat a sample of the flue gas for measurement so that the pollutant analyzer portion of the CEMS measures only dry particulate. Heating shall be to a temperature above the water condensation temperature of the extracted gas and shall be maintained at all points in the sample line, from where the flue gas is extracted to and including the pollutant analyzer. Performance of a CEMS design configured in this manner must be documented by the CEMS manufacturer.

3.2 Reference Method (RM) Measurement Location and Traverse Points. The RM measurement location should be (1) at least eight equivalent diameters downstream of the nearest control device, point of pollutant generation, bend, or other point at which a change of pollutant concentration or flow disturbance may occur and (2) at least two equivalent diameters upstream from the effluent exhaust. The RM and CEMS locations need not be the same, however the difference may contribute to failure of the CEMS to pass the RA test, thus they should be as close as possible without causing interference with one another. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, Method 1, Section 2.1. Selection of traverse measurement point locations should be made according to 40 CFR part 60, Appendix A, Method 1, Sections 2.2 and 2.3. If the RM traverse line interferes with or is interfered by the CEMS measurements, the line may be displaced up to 30 cm (or 5 percent of the equivalent diameter of the cross section, whichever is less) from the centroidal area.

4. Performance and Equipment Specifications

4.1 Span and Data Recorder Scale.

4.1.1 Span. The span of the instrument shall be three times the applicable emission limit. The span value shall be documented by the CEMS manufacturer with laboratory data.

4.1.2 Data Recorder Scale. The CEMS data recorder response range must include zero and a high level value. The high level value must be equal to the span value. If a lower high level value is used, the CEMS must have the capability of providing multiple outputs with different high level values (one of which is equal to the span value) or be capable of automatically changing the high level value as required (up to the span value) such that the measured value does not exceed 95 percent of the high level value.

4.2 CEMS Response Calibration Specifications. The CEMS response calibration relation must meet the following specifications.

4.2.1 Correlation Coefficient. The correlation coefficient shall be ≥ 0.90.

4.2.2 Confidence Interval. The confidence interval (95 percent) at the emission limit shall be within ±20 percent of the emission limit value.

4.2.3 Tolerance Interval. The tolerance interval at the emission limit shall have 95 percent confidence that 75 percent of all possible values are within ±35 percent of the emission limit value.

4.3 Calibration Drift. The CEMS design must allow the determination of calibration drift at concentration levels commensurate with the applicable emission standard. The CEMS calibration may not drift or deviate from the reference value (RV) of the calibration standard by more than 2 percent of the reference value. The calibration shall be performed at a point equal to 80 to 120 percent of the applicable emission standard.

4.4 Zero Drift. The CEMS design must allow the determination of calibration drift at the zero level (zero drift). If this is not possible or practicable, the design must allow the zero drift determination to be made at a low level value (zero to 20 percent of the emission limit value). The CEMS zero point shall not drift by more than 2 percent of the emission standard.

4.5 Sampling and Response Time. The CEMS shall sample the stack effluent continuously. Averaging time, the number of measurements in an average, and the averaging procedure for reporting and determining compliance shall conform with that specified in the applicable emission regulation.

4.5.1 Response Time. The response time of the CEMS should not exceed 2 minutes to achieve 95 percent of the final stable value. The response time shall be documented by the CEMS manufacturer.

4.5.2 Response Time for Batch CEMS. The response time requirement of Section 4.5.1 does not apply to batch CEMS. Instead it is required that the sampling time be no longer than one third of the averaging period for the applicable standard. In addition, the delay between the end of the sampling time and reporting of the sample analysis shall be no greater than one hour. Sampling is also required to be continuous except in that the pause in sampling when the sample collection media are changed should be no greater than five percent of the averaging period or five minutes, whichever is less.

5. Performance Specification Test Procedure

5.1 Pretest Preparation. Install the CEMS and prepare the RM test site according to the specifications in Section 3, and prepare the CEMS for operation according to the manufacturer's written instructions.

5.2 Calibration and Zero Drift Test Period. While the affected facility is operating at more than 50 percent of normal load, or as specified in an applicable subpart, determine the magnitude of the calibration drift (CD) and zero drift (ZD) once each day (at 24-hour intervals) for 7 consecutive days according to the procedure given in Section 6. To meet the requirements of Sections 4.3 and 4.4 none of the CD's or ZD's may exceed the specification. All CD determinations must be made following a 24-hour period during which no unscheduled maintenance, repair, or manual adjustment of the CEMS took place.

5.3 CEMS Response Calibration Period. Calibrate the CEMS response following the CD test period. Conduct the calibration according to the procedure given in Section 7 while the affected facility is operating at more than 50 percent of normal load, or as specified in the applicable subpart.

6.0 The CEMS Calibration and Zero Drift Test Procedure

This performance specification is designed to allow calibration of the CEMS by use of calibration standard that challenges the pollutant analyzer part of the CEMS (and as much of the whole system as possible), but which does not challenge the entire CEMS, including the sampling interface. Satisfactory response of the entire system is covered by the CEMS response calibration requirements.

The CD measurement is to verify the ability of the CEMS to conform to the established CEMS response calibration used for determining the emission concentration. Therefore, if periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before the adjustments, or conduct it in such a way that the CD and ZD can be determined.

Conduct the CD and ZD tests at the points specified in Sections 4.3 and 4.4. Record the CEMS response and calculate the CD according to:

$$CD = \frac{\left(R_{CEM} - R_V\right)}{R_V} \times 100, \qquad (1)$$

Where CD denotes the calibration drift of the CEMS in percent, R_{CEM} is the CEMS response, and R_V is the reference value of the high level calibration standard. Calculate the ZD according to:

$$ZD = \frac{\left(R_{CEM} - R_V\right)}{R_{EM}} \times 100, \qquad (2)$$

Where ZD denotes the zero drift of the CEMS in percent, R_{CEM} is the CEMS response, R_V is the reference value of the low level calibration standard, and R_{EM} is the emission limit value.

7. CEMS Response Calibration Procedure

7.1 Sampling Strategy for Response Calibration. The CEMS response calibration is carried out in order to verify and calibrate the performance of the entire CEMS system, including the sampling interface, by comparison to RM measurements. Conduct the RM measurements in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the diluent (if applicable), moisture (if needed), and pollutant measurements simultaneously, the diluent and moisture measurements that are taken within a 30 to 60-minute period, which includes the pollutant measurements, may be used to calculate dry pollutant concentration.

7.2 Correlation of RM and CEMS Data. In order to correlate the CEMS and RM data properly, note the beginning and end of each RM test period of each run (including the exact time of day) in the CEMS data log. Correlate the CEMS and RM test data as to the time and duration by first determining from the CEMS final output (the one used for reporting) the integrated average pollutant concentration for each RM test period. Consider system response time, if important, and confirm that the pair of results are on a consistent moisture, temperature, and diluent concentration basis. Then compare each integrated CEMS value against the corresponding average RM value.

7.3 Number of tests. The CEMS response calibration shall be carried out by making simultaneous CEMS and RM measurements at three (or more) different levels of particulate mass concentrations. Three (or more) sets of measurements shall be obtained at each level. A total of at least 15 measurements shall be obtained. The different levels of particulate mass concentration should be obtained by varying the process conditions as much as the process allows within the range of normal operation. Alternatively, emission levels may be varied by adjusting the particulate control system. It is recommended that the CEMS be calibrated over PM levels ranging from a minimum normal level to a level roughly twice the emission limit, as this will provide the smallest confidence interval bounds on the calibration relation at the emission limit level.

7.4 Reference Methods. Unless otherwise specified in an applicable subpart of the regulations, Method 3B, or its approved alternative, is the reference method for diluent (O_2) concentration. Unless otherwise specified in an applicable subpart of the regulations, Method 5 (40 CFR Part 60, Appendix A), or its approved alternative, is the reference method for particulate matter mass concentration.

7.5 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2–2 of 40 CFR part 60, Appendix B, Performance Specification 2. Calculate the calibration relation, correlation coefficient, and confidence and tolerance intervals using the equations in Section 8.

8. Equations

8.1 Linear Calibration Relation. A linear calibration relation may be calculated from the calibration data by performing a linear least squares regression. The CEMS data are taken as the x values, and the reference method data as the y values. The calibration relation, which gives the predicted mass emission, $\hat{y}$, based on the CEMS response x, is given by

$$\hat{y} = a \cdot x + b \qquad (3)$$

where:

$$a = \frac{S_{xy}}{S_{xx}} \qquad (4)$$

and

$$b = \overline{y} - a \cdot \overline{x} \qquad (5)$$

The mean values of the data sets are given by

$$\overline{x} = \frac{1}{n}\sum_{i=1}^{n} x_i, \overline{y} = \frac{1}{n}\sum_{i=1}^{n} y_i \qquad (6)$$

Where x_i and y_i are the absolute values of the individual measurements and n is the number of data points. The values S_{xx}, S_{yy}, and S_{xy} are given by

$$S_{xx} = \sum_{i=1}^{n}\left(x_i - \overline{x}\right)^2, S_{yy} = \sum_{i=1}^{n}\left(y_i - \overline{y}\right)^2, S_{xy} = \sum_{i=1}^{n}\left(x_i - \overline{x}\right)\cdot\left(y_i - \overline{y}\right) \qquad (7)$$

From which the scatter of y values about the regression line (calibration relation) s_L can be determined:

$$s_L = \sqrt{\frac{S_{yy}}{n-2}\left(1 - \frac{S_{xy}^2}{S_{xx} \cdot S_{yy}}\right)} \qquad (8)$$

The two-sided confidence interval y_c for the predicted concentration $\hat{y}$ at point x is given by

$$y_c = \hat{y} \pm t_f \cdot s_L \sqrt{\frac{1}{n} + \frac{\left(x - \overline{x}\right)^2}{S_{xx}}}, \text{with } f = n - 2 \qquad (9)$$

The two-sided tolerance interval y_t for the regression line is given by

$$y_T = \hat{y} \pm k_T \cdot s_L \qquad (10)$$

At the point x with $k_T = un' \, v_f$ and $f = n -$, where

$$n' = \frac{n}{1 + \frac{n \cdot \left(x - \overline{x}\right)^2}{S_{xx}}}, n' \geq 2. \qquad (11)$$

The tolerance factor un′ for 75 percent of the population is given in Table I as a function of n′. The factor v_f as a function of f is also given in Table I as well as the t-factor at the 95 percent confidence level.

The correlation coefficient r may be calculated from

$$r = a\sqrt{\frac{S_{xx}}{S_{yy}}} \qquad (12)$$

TABLE I.—FACTORS FOR CALCULATION OF CONFIDENCE AND TOLERANCE INTERVALS

f	t_f	v_f	n′	un′ (75)
7	2.365	1.7972	7	1.233
8	2.306	1.7110	8	1.223
9	2.262	1.6452	9	1.214
10	2.228	1.5931	10	1.208
11	2.201	1.5506	11	1.203
12	2.179	1.5153	12	1.199
13	2.160	1.4854	13	1.195
14	2.145	1.4597	14	1.192
15	2.131	1.4373	15	1.189
16	2.120	1.4176	16	1.187
17	2.110	1.4001	17	1.185
18	2.101	1.3845	18	1.183
19	2.093	1.3704	19	1.181
20	2.086	1.3576	20	1.179
21	2.080	1.3460	21	1.178
22	2.074	1.3353	22	1.177
23	2.069	1.3255	23	1.175
24	2.064	1.3165	24	1.174
25	2.060	1.3081	25	1.173

8.2 Quadratic Calibration Relation. In some cases a quadratic regression will provide a better fit to the calibration data than a linear regression. If a quadratic regression is used to determine a calibration relation, a test to determine if the quadratic regression gives a better fit to the data than a linear regression must be performed, and the relation with the best fit must be used.

8.2.1 Quadratic Regression. A least-squares quadratic regression gives the best fit coefficients b_0, b_1, and b_2 for the calibration relation:

$$\hat{y} = b_0 + b_1 x + b_2 x^2 \qquad (13)$$

The coefficients b_0, b_1, and b_2 are determined from the solution to the matrix equation Ab=B where:

$$A = \begin{bmatrix} n & S_1 & S_2 \\ S_1 & S_2 & S_3 \\ S_2 & S_3 & S_4 \end{bmatrix}, \qquad b = \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix}, \qquad B = \begin{bmatrix} S_5 \\ S_6 \\ S_7 \end{bmatrix}.$$

and

$$S_1 = \sum_{i=1}^{n}(x_i), S_2 = \sum_{i=1}^{n}(x_i^2), S_3 = \sum_{i=1}^{n}(x_i^3), S_4 = \sum_{i=1}^{n}(x_i^4), \qquad (14)$$

$$S_5 = \sum_{i=1}^{n} y_i, S_6 = \sum_{i=1}^{n}(x_i y_i), S_7 = \sum_{i=1}^{n}(x_i^2 y_i).$$

The solutions to b_0, b_1, and b_2 are:

$$b_0 = (S_5 \cdot S_2 \cdot S_4 + S_1 \cdot S_3 \cdot S_7 + S_2 \cdot S_6 \cdot S_3 - S_7 \cdot S_2 \cdot S_2 - S_3 \cdot S_3 \cdot S_5 - S_4 \cdot S_6 \cdot S_1) / \det A \qquad (15)$$

$$b_1 = (n \cdot S_6 \cdot S_4 + S_5 \cdot S_3 \cdot S_2 + S_2 \cdot S_1 \cdot S_7 - S_2 \cdot S_6 \cdot S_2 - S_7 \cdot S_3 \cdot n - S_4 \cdot S_1 \cdot S_5) / \det A \qquad (16)$$

$$b_2 = (n \cdot S_2 \cdot S_7 + S_1 \cdot S_6 \cdot S_2 + S_5 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_5 - S_3 \cdot S_6 \cdot n - S_7 \cdot S_1 \cdot S_1) / \det A \qquad (17)$$

Where:

$$\det A = n \cdot S_2 \cdot S_4 + S_1 \cdot S_3 \cdot S_2 + S_2 \cdot S_1 \cdot S_3 - S_2 \cdot S_2 \cdot S_2 - S_3 \cdot S_3 \cdot S_2 - S_4 \cdot S_1 \cdot S_1 \qquad (18)$$

8.2.2 Confidence Interval. For any positive value of x, the confidence interval is given by:

$$y_{CI} = \hat{y} \pm t_f \cdot s_Q \sqrt{\Delta} \qquad (19)$$

Where:

$f = n - 3$,

t_f is given in Table I,

$$s_Q = \sqrt{\frac{1}{n-3} \sum_{i=1}^{n} (\hat{y}_i - y_i)^2}, \text{ and} \qquad (20)$$

$$\Delta = C_0 + 2C_1 x + (2C_2 + C_3)x^2 + 2C_4 x^3 + C_5 x^4. \qquad (21)$$

The C coefficients are given below:

$$C_0 = \frac{S_2 \cdot S_4 - S_3^2}{D}, C_1 = \frac{S_3 \cdot S_2 - S_1 \cdot S_4}{D}, C_2 = \frac{S_1 \cdot S_3 - S_2^2}{D},$$

$$C_3 = \frac{nS_4 - S_2^2}{D}, C_4 = \frac{S_1 \cdot S_2 - nS_3}{D}, C_5 = \frac{nS_2 - S_1^2}{D} \qquad (22)$$

Where:

$$D = n\left(S_2 \cdot S_4 - S_3^2\right) + S_1\left(S_3 \cdot S_2 - S_1 \cdot S_4\right) + S_2\left(S_1 \cdot S_3 - S_2^2\right). \quad (23)$$

8.2.3 Tolerance Interval. For any positive value of x, the tolerance interval is given by:

$$y_{TI} = \hat{y} \pm k_T \cdot s_Q, \quad (24)$$

Where:

$$k_T = u_{n'} \cdot v_f \text{ with } f = n - 3, \text{ and} \quad (25)$$

$$n' = 1/\Delta \text{ with } n' \geq 2. \quad (26)$$

The v_f and $u_{n'}$ factors can also be found in Table I.

8.3 Test to Determine Best Regression Fit. The test to determine if the fit using a quadratic regression is better than the fit using a linear regression is based on the values of s calculated in the two formulations. If s_L denotes the value of s from the linear regression and s_Q the value of s from the quadratic regression, then the quadratic regression gives a better fit at the 95 percent confidence level if the following relationship is fulfilled:

$$\frac{(n-2) \cdot s_L^2 - (n-3) \cdot s_Q^2}{s_Q^2} > F_f \quad (27)$$

With f = n-3 and the value of F_f at the 95 percent confidence level as a function of f taken from Table II below.

TABLE II.—VALUES FOR F_f

f	F_f	f	$F\phi$
1	161.4	16	4.49
2	18.51	17	4.45
3	10.13	18	4.41
4	7.71	19	4.38
5	6.61	20	4.35
6	5.99	22	4.30
7	5.59	24	4.26
8	5.32	26	4.23
9	5.12	28	4.20
10	4.96	30	4.17
11	4.84	40	4.08
12	4.75	50	4.03
13	4.67	60	4.00
14	4.60	80	3.96
15	4.54	100	3.94

9. Reporting

At a minimum (check with the appropriate regional office, or State, or local agency for additional requirements, if any) summarize in tabular form the results of the CD tests and the CEMS response calibration. Include all data sheets, calculations, and records of CEMS response necessary to substantiate that the performance of the CEMS met the performance specifications.

The CEMS measurements shall be reported to the agency in units of mg/m³ on a dry basis, corrected to 20°C and 7 percent O_2.

10. Bibliography

1. 40 CFR part 60, Appendix B, "Performance Specification 2—Specifications and Test Procedures for SO_2 and NO_X Continuous Emission Monitoring Systems in Stationary Sources."

2. 40 CFR part 60, Appendix B, "Performance Specification 1—Specification and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources."

3. 40 CFR part 60, Appendix A, "Method 1—Sample and Velocity Traverses for Stationary Sources."

4. 40 CFR part 266, Appendix IX, Section 2, "Performance Specifications for Continuous Emission Monitoring Systems."

5. ISO 10155, "Stationary Source Emissions—Automated Monitoring of Mass Concentrations of Particles: Performance Characteristics, Test Procedures, and Specifications," available from ANSI.

6. G. Box, W. Hunter, J. Hunter, Statistics for Experimenters (Wiley, New York, 1978).

7. M. Spiegel, Mathematical Handbook of Formulas and Tables (McGraw-Hill, New York, 1968).

Performance Specification 12—Specifications and test procedures for total mercury continuous monitoring systems in stationary sources.

1. Applicability and Principle

1.1 Applicability. This specification is to be used for evaluating the acceptability of total mercury continuous emission monitoring systems (CEMS) at the time of or soon after installation and whenever specified in the regulations. The CEMS must be capable of measuring the total concentration (regardless of speciation) of both vapor and solid phase mercury. The CEMS may include, for certain stationary sources, (a) a diluent (O_2) monitor (which must meet its own performance specifications: 40 CFR part 60, Appendix B, Performance Specification 3), (b) flow monitoring equipment to allow measurement of the dry volume of stack effluent sampled, and (c) an automatic sampling system.

This specification is not designed to evaluate the installed CEMS' performance over an extended period of time nor does it identify specific calibration techniques and auxiliary procedures to assess the CEMS' performance. The source owner or operator, however, is responsible to properly calibrate, maintain, and operate the CEMS. To evaluate the CEMS' performance, the Administrator may require, under Section 114 of the Act, the operator to conduct CEMS performance evaluations at other times besides the initial test.

1.2 Principle. Installation and measurement location specifications, performance specifications, test procedures, and data reduction procedures are included in this specification. Reference method tests, calibration error tests, and calibration drift tests, and interferant tests are conducted to determine conformance of the CEMS with the specification. Calibration error is assessed with standards for elemental mercury (Hg(0)) and mercuric chloride ($HgCl_2$). The ability of the CEMS to provide a measure of total mercury (regardless of speciation and phase) at the facility at which it is installed is demonstrated by comparison to manual reference method measurements.

2. Definitions

2.1 Continuous Emission Monitoring System (CEMS). The total equipment required for the determination of a pollutant concentration. The system consists of the following major subsystems:

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

2.1.2 Pollutant Analyzer. That portion of the CEMS that senses the pollutant concentration(s) and generates a proportional output.

2.1.3 Diluent Analyzer (if applicable). That portion of the CEMS that senses the diluent gas (O_2) and generates an output proportional to the gas concentration.

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

2.2 Point CEMS. A CEMS that measures the pollutant concentrations either at a single point or along a path equal to or less than 10 percent of the equivalent diameter of the stack or duct cross section.

2.3 Path CEMS. A CEMS that measures the pollutant concentrations along a path greater than 10 percent of the equivalent diameter of the stack or duct cross section.

2.4 Span Value. The upper limit of a pollutant concentration measurement range defined as twenty times the applicable emission limit. The span value shall be documented by the CEMS manufacturer with laboratory data.

2.5 Relative Accuracy (RA). The absolute mean difference between the pollutant concentration(s) determined by the CEMS and the value determined by the reference method (RM) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the RM tests or the applicable emission limit.

2.6 Calibration Drift (CD). The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.7 Zero Drift (ZD). The difference in the CEMS output readings for zero input after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.8 Representative Results. Defined by the RA test procedure defined in this specification.

2.9 Response Time. The time interval between the start of a step change in the system input and the time when the pollutant analyzer output reaches 95 percent of the final value.

2.10 Centroidal Area. A concentric area that is geometrically similar to the stack or duct cross section and is no greater than 1 percent of the stack or duct cross sectional area.

2.11 Batch Sampling. Batch sampling refers to the technique of sampling the stack effluent continuously and concentrating the pollutant in some capture medium. Analysis is performed periodically after sufficient time has elapsed to concentrate the pollutant to levels detectable by the analyzer.

2.12 Calibration Standard. Calibration standards consist of a known amount of pollutant that is presented to the pollutant analyzer portion of the CEMS in order to calibrate the drift or response of the analyzer. The calibration standard may be, for example, a solution containing a known concentration, or a filter with a known mass loading or composition.

2.13 Calibration Error (CE). The difference between the concentration indicated by the CEMS and the known concentration generated by a calibration source when the entire CEMS, including the sampling interface) is challenged. A CE test procedure is performed to document the accuracy and linearity of the CEMS over the entire measurement range.

3. Installation and Measurement Location Specifications

3.1 The CEMS Installation and measurement location. Install the CEMS at an accessible location downstream of all pollution control equipment where the mercury concentration measurements are directly representative or can be corrected so as to be representative of the total emissions from the affected facility. Then select representative measurement points or paths for monitoring in locations that the CEMS will pass the RA test (see Section 7). If the cause of failure to meet the RA test is determined to be the measurement location and a satisfactory correction technique cannot be established, the Administrator may require the CEMS to be relocated.

Measurement locations and points or paths that are most likely to provide data that will meet the RA requirements are listed below.

3.1.1 Measurement Location. The measurement location should be (1) at least eight equivalent diameters downstream of the nearest control device, point of pollutant generation, bend, or other point at which a change of pollutant concentration or flow disturbance may occur and (2) at least two equivalent diameters upstream from the effluent exhaust. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, Method 1, Section 2.1.

3.1.2 Point CEMS. The measurement point should be (1) no less than 1.0 meter from the stack or duct wall or (2) within or centrally located over the centroidal area of the stack or duct cross section. Selection of traverse points to determine the representativeness of the measurement location should be made according to 40 CFR part 60, Appendix A, Method 1, Section 2.2 and 2.3.

3.1.3 Path CEMS. The effective measurement path should be (1) totally within the inner area bounded by a line 1.0 meter from the stack or duct wall, or (2) have at least 70 percent of the path within the inner 50 percent of the stack or duct cross sectional area, or (3) be centrally located over any part of the centroidal area.

3.2 Reference Method (RM) Measurement Location and Traverse Points. The RM measurement location should be (1) at least eight equivalent diameters downstream of the nearest control device, point of pollutant generation, bend, or other point at which a change of pollutant concentration or flow disturbance may occur and (2) at least two equivalent diameters upstream from the effluent exhaust. The RM and CEMS locations need not be the same, however the difference may contribute to failure of the CEMS to pass the RA test, thus they should be as close as possible without causing interference with one another. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, Method 1, Section 2.1. Selection of traverse measurement point locations should be made according to 40 CFR part 60, Appendix A, Method 1, Sections 2.2 and 2.3. If the RM traverse line interferes with or is interfered by the CEMS measurements, the line may be displaced up to 30 cm (or 5 percent of the equivalent diameter of the cross section, whichever is less) from the centroidal area.

4. Performance and Equipment Specifications

4.1 Data Recorder Scale. The CEMS data recorder response range must include zero and a high level value. The high level value must be equal to the span value. If a lower high level value is used, the CEMS must have the capability of providing multiple outputs with different high level values (one of which is equal to the span value) or be capable of automatically changing the high level value as required (up to the span value) such that the measured value does not exceed 95 percent of the high level value.

4.2 Relative Accuracy (RA). The RA of the CEMS must be no greater than 20 percent of the mean value of the RM test data in terms of units of the emission standard, or 10 percent of the applicable standard, whichever is greater.

4.3 Calibration Error. Calibration error is assessed using standards for Hg(0) and $HgCl_2$. The mean difference between the indicated CEMS concentration and the reference concentration value for each standard at all three test levels listed below shall be no greater than ±15 percent of the reference concentration at each level.

4.3.1 Zero Level. Zero to twenty (0–20) percent of the emission limit.

4.3.2 Mid-Level. Forty to sixty (40–60) percent of the emission limit.

4.3.3 High-Level. Eighty to one-hundred and twenty (80–120) percent of the emission limit.

4.4 Calibration Drift. The CEMS design must allow the determination of calibration drift of the pollutant analyzer at concentration levels commensurate with the applicable emission standard. The CEMS calibration may not drift or deviate from the reference value (RV) of the calibration standard by more than 10 percent of the emission limit. The calibration shall be performed at a level equal to 80 to 120 percent of the applicable emission standard. Calibration drift shall be evaluated for elemental mercury only.

4.5 Zero Drift. The CEMS design must allow the determination of calibration drift at the zero level (zero drift). The CEMS zero point shall not drift by more than 5 percent of the emission standard.

4.6 Sampling and Response Time. The CEMS shall sample the stack effluent continuously. Averaging time, the number of measurements in an average, and the averaging procedure for reporting and determining compliance shall conform with that specified in the applicable emission regulation.

4.6.1 Response Time. The response time of the CEMS should not exceed 2 minutes to achieve 95 percent of the final stable value. The response time shall be documented by the CEMS manufacturer.

4.6.2 Waiver from Response Time Requirement. A source owner or operator may receive a waiver from the response time requirement for instantaneous, continuous CEMS in section 4.5.1 from the Agency if no CEM is available which can meet this specification at the time of purchase of the CEMS.

4.6.3 Response Time for Batch CEMS. The response time requirement of Section 4.5.1 does not apply to batch CEMS. Instead it is required that the sampling time be no longer than one third of the averaging period for the applicable standard. In addition, the delay between the end of the sampling time and reporting of the sample analysis shall be no greater than one hour. Sampling is also required to be continuous except in that the pause in sampling when the sample collection media are changed should be no greater than five percent of the averaging period or five minutes, whichever is less.

4.7 CEMS Interference Response. While the CEMS is measuring the concentration of mercury in the high-level calibration sources used to conduct the CE test the gaseous components (in nitrogen) listed in Table I shall be introduced into the measurement system either separately or in combination. The interference test gases must be introduced in such a way as to cause no change in the mercury or mercuric chloride calibration concentration being delivered to the CEMS. The concentrations listed in the table are the target levels at the sampling interface of the CEMS based on the known cylinder gas concentrations and the extent of dilution (see Section 9). Interference is defined as the difference between the CEMS response with these components present and absent. The sum of the interferences must be less than 10 percent of the emission limit value. If this level of interference is exceeded, then corrective action to eliminate the interference(s) must be taken.